

Social Media, Ethics, and Automation

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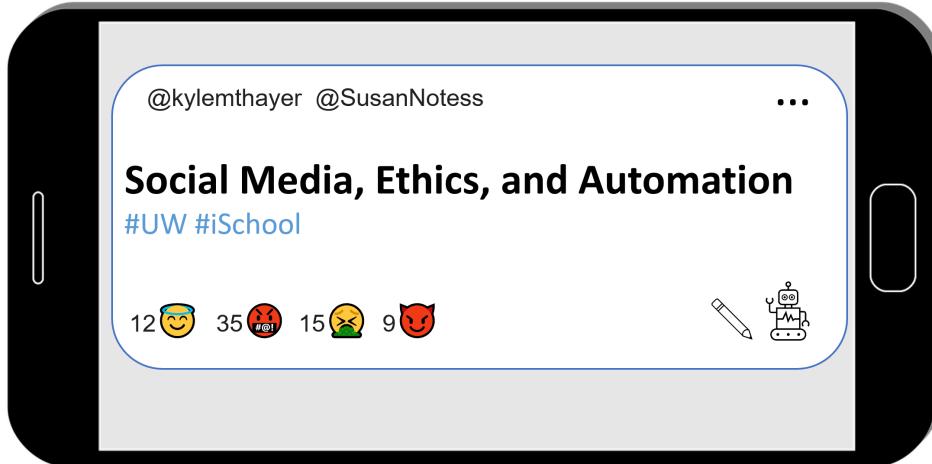
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Automation drives our experience of social media platforms, from timeline feeds to disinformation bots. This book examines social media phenomena, like viral memes, parasocial relationships, and harassment campaigns. This book then explores the ethics of automation on social media platforms by experimenting with computer programs that automate social media actions. We assume no prior programming experience.

⚠️ Warning

This book is still being created and therefore has incomplete sections, missing citations, etc.

What this book is about:

- Social Media
 - What it does, how it works, how people use it, different uses and abuses
- Ethics
 - Individual Behaviors
 - Group Behaviors
 - Design and management decisions
- Automation
 - Learn basic programming skills in Python
 - Create Reddit bots
 - Find and process information from Reddit

What we hope you gain from this book:

As a social media user, we hope you learn how social media sites influence you, from how your data gets used or abused, to how harassment and spam bots operate, to how platforms manipulate your emotions and mental state. We hope you could then be a more knowledgeable consumer and participant on social media sites.

As a member of a society that is influenced by social media, we hope you learn about the societal impact of automated social media systems, and how those systems are designed under different economic, social, and governmental pressures. We hope you could then be more knowledgeable in what you might advocate for or vote for in how social media sites operate.

As a potential tech worker that might work for a social media site, we hope you learn how to analyze the ethical tradeoffs made in designing automated systems. We hope you could then bring those concerns into how you design and implement automated systems for social media sites.

Authors and Acknowledgements

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Contributors

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Image and Materials Attributions (placeholder)

Logo phone image is from [pixabay](#).

Land Acknowledgement

We want to respectfully acknowledge that the land on which we did the majority of this work is the traditional home of the [Coast Salish people](#), the traditional home of all tribes and bands within the [Duwamish](#), [Suquamish](#), [Tulalip](#) and [Muckleshoot](#) nations. This land was taken from these tribes mainly by means of conquest and the rule of force rather than through legal process or transfer of ownership based on free will of all involved. We cannot undo the past; however, we feel obliged to acknowledge wrongdoing and work to ensure the sovereignty of tribes today.

Perspectives and Biases

As white Americans (though one of us now lives in the UK), we have a tendency to pull from examples from America, the UK, and other English speaking social media. We also have more experience with social media networks of Twitter, Facebook, and YouTube, and tend to use those in our examples.

1. Introduction

- How does social media influence our world and us, in good and bad ways?
- How do the decisions made by the creators of social media platforms affect how it is used and what people do?
- How do social media bots change the dynamics on the platform?
- What can we learn about people from social media data?
- What are the ethical trade-offs made in all of these situations?

In this book, we will try to start answering questions like this. To get us started let's look at a particular situation that happened on Social Media: the case of Justine Sacco's racist joke tweet, and then read actor Kumail Nanjiani's reflections on ethics in tech.

1.1. The case of Justine Sacco's racist joke tweet

In 2013, Justine Sacco, a PR director at IAC, was boarding a flight to South Africa, and posted the following racist and insensitive joke tweet, which went viral while she was in-flight and unable to check Twitter:

Justine Sacco
@JustineSacco

Going to Africa. Hope I don't get AIDS. Just kidding. I'm white!

4 RETWEETS 2 FAVORITES

10:19 AM - 20 Dec 13 from Hillingdon, London

1.1.1. Timeline of events:

1. Justine Sacco, a PR director at IAC with only 170 followers posted a racist joke tweet right before getting on an 11-hour flight to South Africa
2. Someone emailed the tweet to [valleywag.gawker.com](#). Valleywag wrote a post on it and tweeted the post.
3. Word spread, and Justine's tweet went viral. Twitter users found other recent offensive tweets by Justine about countries she was traveling in.
4. IAC (Justine's employer) called the tweet "outrageous, offensive" but "Unfortunately, the employee in question is unreachable on an international flight."

5. Twitter users, now knowing that Justine is on a flight, started the hashtag #hasjustinelanedyet, which started trending on Twitter (including some celebrities tweeting about it).
6. Twitter users were able to deduce which flight Justine was on.
7. One Twitter user got a photo of Justine turning on her phone after getting off the plane. That user also talked to her father at the airport and tweeted about the photo and their responses.



8. Justine lost her job at IAC, apologized, and was later rehired by IAC.

Sources: [Buzzfeed](#), [IBTimes](#), later [Vox](#), later [New York Times profile](#)

1.1.2. What our focus will be

Rather than talk about whether any or all of the responses to Justine's racist joke tweet were deserved, let's instead talk about why it played out as it did:

- Why did so many people see it?
- How did it spread?
- What enabled someone to be able to get a photo of her checking the phone at the airport?

1.1.3. Reflection questions

- What motivated Twitter users to put time and energy into this?
- What things about the design of Twitter enabled these events to happen?

Justine Sacco
@JustineSacco

Reply Retweet Favorite More

4 RETWEETS 2 FAVORITES

10:19 AM - 20 Dec 13 from Hillingdon, London

- For example, you might notice that the interface shows where Sacco was located when tweeting, Hillingdon, London, which is where Heathrow Airport is located, helping people deduce which flight she was on.
- What financial motivations does Twitter have? How does that influence Twitter's design?
- What changes to Twitter could have changed how this story went?

1.2. Kumail Nanjiani's Reflections on Ethics in Tech



[Image source](#)

Kumail Nanjiani was a star of the [Silicon Valley](#) TV Show, which was about the tech industry. He posted these reflections on ethics in tech on Twitter (@kumailn) on November 1, 2017:

As a cast member on a show about tech, our job entails visiting tech companies/conferences etc. We meet ppl eager to show off new tech.

Often we'll see tech that is scary. I don't mean weapons etc. I mean altering video, tech that violates privacy, stuff w obv ethical issues.

And we'll bring up our concerns to them. We are realizing that ZERO consideration seems to be given to the ethical implications of tech.

They don't even have a pat rehearsed answer. They are shocked at being asked. Which means nobody is asking those questions.

"We're not making it for that reason but the way ppl choose to use it isn't our fault. Safeguard will develop." But tech is moving so fast.

That there is no way humanity or laws can keep up. We don't even know how to deal with open death threats online.

Only "Can we do this?" Never "should we do this? We've seen that same blasé attitude in how Twitter or Facebook deal w abuse/fake news.

You can't put this stuff back in the box. Once it's out there, it's out there. And there are no guardians. It's terrifying. The end.

- Kumail Nanjiani

1.2.1. Reflection questions:

- What do you think is the responsibility of tech workers to think through the ethical implications of what they are making?
- Why do you think the people who Kumail talked with didn't have answers to his questions?

2. Definitions

Before we continue to specific topics, we want to define and give some background on our three main subjects: Social Media, Ethics, and Automation

2.1. Social Media

This book will be centered in the world of Social Media, and all the things that happen there. So what is Social Media?

2.1.1. What is Social Media?

There is no clear single definition for what counts as social media. John Hartley points out that you could consider almost all of culture as "social media."

"All media are social. All society is mediated."

- John Hartley, [The Sage Handbook of Social Media](#)

This means that media, which includes painting, movies, books, speech, songs, dance, etc., all communicates in some way, and thus are social. And every social thing humans do is done through various mediums. So, for example, a war is enacted through the mediums of speech (e.g., threats, treaties, battle plans), coordinated movements, clothing (uniforms), and, of course, the mediums of weapons and violence.

But when we use the phrase "social media," we mean something much more specific, something involving computers (or smartphones), the internet, communication, and networks of connected people.

We will think of social media in terms of **internet-based social media platforms**, along the lines of these definitions:

"By social media technologies, we mean those digital platforms, services, and apps built around the convergence of content sharing, public communication, and interpersonal connection."

- Jean Burgess, Alice Marwick, and Thomas Poell, [The Sage Handbook of Social Media](#)

"Social media are interactive technologies that allow the creation or sharing/exchange of information, ideas, career interests, and other forms of expression via virtual communities and networks."

- [Wikipedia](#)

But, even though our focus is on internet-based social media platforms, since all media are social and all society is mediated, we will find that much of what we observe is also common throughout the rest of human culture.

2.1.2. Social Media Platform Examples

There are a wide variety of social media platforms with different aims and ways of engaging with them.

We can't give every example, but here is a range of different things social media platforms do (though this is all an oversimplification).

Some platforms are used for sharing text and pictures (e.g., Facebook, Twitter, LinkedIn, WeChat, Weibo, QQ), some for sharing video (e.g., YouTube, TikTok), some for sharing audio (e.g., Clubhouse), some for sharing fanfiction (e.g., Fanfiction.net, AO3), some for gathering and sharing knowledge (e.g., Wikipedia, Quora, StackOverflow), some for sharing erotic content (e.g., OnlyFans).

Some platforms are primarily intended for forming connections and building networks, like Facebook for friends and family, and LinkedIn for business connections.

There are also platforms built around activities like gaming (Discord), and dating and hookups (e.g. Bumble, Tinder, OKCupid, etc.).

Platforms can be minimalist, like [Yo](#), which only lets you say "yo" to people and nothing else.

Platforms can also be tailored for specific groups of people, like a [social media platforms for low-income blind people in India](#).

Additionally, some sites are primarily built for other purposes but have a social media component as well, such as the Amazon online store that has user reviews and customer questions & answers, or news sites that have comment sections.

There are many other varieties of social media sites, though hopefully we have at least covered a decent range of them.

2.1.3. Social Media and "Real Life"

When we (the authors) were young, as internet-based social media was starting to become commonly used, a popular sentiment we often heard was:

"The internet isn't real life."

This was used as a way to devalue time spent on social media sites, and to dismiss harms that occurred on them.

Versions of this phrase are still around, such as in this tweet from statistician Nate Silver:



Nate Silver

@NateSilver538

...

Twitter is not real life part 69420

((Harry Enten)) @ForecasterEnten · Feb 14, 2019

Most of the polling indicated NYC'ers wanted Amazon in NYC. When tax breaks were mentioned, support did fall. But even with it mentioned, support was very strong in Queens.

8:55 AM · Feb 14, 2019 · Twitter for Android

148 Retweets 6 Quote Tweets 894 Likes

In that tweet, Nate Silver seems to be saying that conversations and views represented on Twitter are not representative of most people, thus devaluing the conversations and views expressed on Twitter.

We also see this phrase used to say that things seen on social media are not authentic, but are manipulated, such as people only posting their good news and not bad news, or people using photo manipulation software to change how they look.

We're curious to see how this phrase is continued to be used, and how these sentiments are continuing, being rejected, or evolving.

Reflection questions

- How often do you hear phrases like "social media isn't real life"?
- How do you think about the relationship between social media and "real life"?

2.2. Ethics

As we look at social media, we will be looking at ethical concerns around decisions by social media users, designers, moderators, etc.

So what is ethics^[1]?

2.2.1. What is Ethics?

Have you ever paused to decide what to do in a situation, and found yourself wondering what would be the 'right' thing to do? Or perhaps you might think, as a good person, how should I handle this situation?

These questions are examples of ethical thinking. Ethics is a way of investigating these habits of thought about what is morally right and good, about what we should do, and about how the world should be. Most people have ethical beliefs; for example, many believe that stealing is wrong. When we stop and ponder why stealing is wrong, or what makes it wrong, or when it is wrong, we are doing ethics.

Because humans have pretty much always been interested in these kinds of questions, we already have several different 'systems' of ethical thought available to us as tools for thinking through how to guide ourselves in a course of action. These ethical systems vary in many ways, such as whether they focus on individuals or communities, or focus on rights or relationships.

Now, you might be thinking... isn't ethics something that people NEVER agree on? We don't exactly have firm answers, right? And more than a few wars have been fought over ethical disagreements that couldn't be resolved. So how is ethics supposed to help us decide about how things should go in the world of social media? How does ethics help us to know what to do?

It might help to think about ethical frameworks as tools for seeing inside of a situation. In medicine, when doctors need to see what's going on inside someone's body, they have many different tools for looking in, depending on what they need to know. An x-ray, an ultra-sound, and an MRI all show different information about what's happening inside the body. A doctor chooses what tool to use based on what she needs to know. An x-ray is great for seeing what's happening with bones, but isn't particularly helpful for seeing how a fetus's development is progressing.

When we are trying to see inside the many complicated factors of a situation and decide what to do, there are various different kinds of information we might want to gather. When facing a moral decision, we might want to know about:

- how a certain course of action would impact other people. Will more people be hurt if I take this or that course of action?
- what course of action would leave us feeling okay with ourselves and our desires to be good people. Maybe I could cheat in a situation and many people would be helped or spared pain, but could I live with myself knowing I had cheated?
- what course of action should we take, if it will be carried out by many different people across an organization? When I need to depend on others to act in certain ways to achieve a good outcome, what course of action can be accomplished even when some of those different people disagree about what should be done?

One question many people have about using ethical reasoning as a tool for analysis is: what about cultural disagreements? What about the idea that there is no absolute truth, that a moral claim is only true for me or you, or for my culture or your culture? In an increasingly globalized world, there is an opportunity to learn to respect and accommodate the differences between cultures and values, and this is a good thing! It means that we have even more tools at our disposal for thinking through the ethical considerations packed into a situation, as we learn from those who see things differently.

In this class, you will be building up a 'toolbox' for thinking about ethics. We won't get into the more abstract philosophical side of questions about ultimate moral truths or where they come from (that discussion is called metaethics, and it is fun, but quite a brain-twister). When using ethical tools to analyze a situation concerning social media and automation, you will be encouraged to always choose at least two different ethical frameworks and compare them. This is not about finding one theory you like and sticking with it. Rather, it's about learning how to use multiple tools to see multiple different factors in a situation (using an MRI and an x-ray), getting a more complete picture of what is going on and what is at stake.

So, with that said, let's get to know some of the tools that will be in your toolbox!

2.2.2. The "Golden Rule"

One widespread ethical principle is what English speakers sometimes call the "[Golden Rule](#)":

- "Tsze-kung asked, saying, 'Is there one word which may serve as a rule of practice for all one's life?' The Master said, 'Is not reciprocity such a word? **What you do not want done to yourself, do not do to others.**'"
 - Confucius, [Analects 15.23](#) (~500 BCE China)
- "There is nothing dearer to man than himself; therefore, as it is the same thing that is dear to you and to others, **hurt not others with what pains yourself.**"
 - Gautama Buddha, [Udānavarga 5:18](#) (~500 BCE Nepal/India)
- "**That which is hateful to you do not do to another;** that is the entire Torah, and the rest is its interpretation."
 - Hillel the Elder, [Talmud Shabbat, folio 33a](#) (~0 CE Palestine)
- "So in everything, **do to others what you would have them do to you,** for this sums up the Law and the Prophets."
 - Jesus of Nazareth, [Matthew 7:12](#) (~30 CE Palestine)
- And [many more...](#)

2.2.3. Ethics Frameworks

Below are some summaries of a selection ethics frameworks. There are many more ethics frameworks which we haven't included here, and these explanations are all way oversimplified. We hope that this gives you a start to understanding each framework, and a range of options for how to think through ethics in social media and programming.

Ancient Ethics

Here are few ancient ethics systems. These examples are mostly about qualities of a good person.

Confucianism (another [link](#))

- Being and becoming an exemplary person (e.g., benevolent; sincere; honoring and sacrificing to ancestors; respectful to parents, elders and authorities, taking care of children and the young; generous to family and others). These traits are often performed and achieved through ceremonies and rituals (including sacrificing to ancestors, music, and tea drinking), resulting in a harmonious society.
- Key figures:
 -  [Confucius](#) ~500, China
 -  [Mencius](#) ~350, China
 -  [Xunzi](#) ~300 BCE, China

Taoism

- Act with unforced actions in harmony with the natural cycles of the universe. Trying to force something to happen will likely backfire.
- Rejects Confucian focus on ceremonies/rituals. Prefers spontaneity and play.
 - Like how water (soft and yielding), can, over time, cut through rock.
- Key figures:
 -  [Lao Tzu](#) ~500 BCE China
 -  [Zhuangzi](#) ~300 BCE China

Virtue Ethics

- Acting in ways consistent with the virtues (e.g., courage, truthfulness, wittiness, friendliness, etc.) leads to flourishing of an individual.
- In acting virtuously, you are training yourself to become more virtuous, and you will subsequently be able to act even more virtuously.
- Different groups have different sets of virtues:
 - Quaker [SPICES](#) (Simplicity, Peace, Integrity, Community, Equality, Stewardship)
 - US Army [LDRSHIP](#): Loyalty, Duty, Respect, Selfless Service, Honor, Integrity, Personal Courage
- Key figures:
 -  [Aristotle](#), 300s BCE Greece
 -  [Martha Nussbaum](#), present USA

Aztec Virtue Ethics (another [link](#))

- Live a rooted, balanced life of moderation.
- Virtue is a group effort. Individuals can't be virtuous on their own because "the earth is slippery, slick" (meaning it is easy for an individual to fall into bad actions, they need support and moderation)
-  [Aztecs](#), 1300s - 1500s CE in what is now Mexico

1600s - 1700s European Ethics

A few ethics systems that originated in the 1600s and 1700s in Europe. Note that in this selection of ethics frameworks motive and inner qualities don't matter, only outward actions or outcomes.

Natural Rights

- Locke: Everyone has a right to life, liberty, and property
- Jefferson in the [Declaration of Independence](#): "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness."
- Discussions of "human rights" fit in the Natural Rights ethics framework
- Key figures:
 -  [John Locke](#), 1600s England
 -  [Thomas Jefferson](#) 1700s American Colonies / USA

Consequentialism:

- Actions are judged on the sum total of their consequences (utility calculus)
- The ends justify the means.
- Utilitarianism: "It is the greatest happiness of the greatest number that is the measure of right and wrong."
 - That is, What is moral is to do what makes the most people the most happy.
- Key figures:
 -  [Jeremy Bentham](#) 1700's England
 -  [John Stuart Mill](#), 1800's England

Deontology

- There are absolute moral rules and duties to follow (regardless of the consequences). They can be deduced by reasoning about the objective reality.
- Kantianism: "Act only according to that maxim whereby you can, at the same time, will that it should become a universal law."
 - Meaning: only follow rules that you are ok with everyone else following.
 - For example, you might conclude that it is wrong to lie no matter what the consequences are. Kant certainly thought so, but many have disagreed with him.
- Deontological thinking comes out of the same era as Natural Rights thinking, and they are rooted in similar assumptions about the world. Deontology is often associated with Kant, because at that time, he gave us one of the first systematic, or comprehensive, interpretations of those ideas in a fully-fledged ethical framework. But deontological ethics does not need to be based on Kant's ethics, and many ethicists working in the deontological tradition have suggested that reasoning about the objective reality should lead us to derive different sets of principles.
- Key figures:
 -  [Immanuel Kant](#), 1700's Germany
 -  [Christine Korsgaard](#) present USA

Relational Ethics

These are a few ethics systems which center on maintaining proper relationships.

Ethics of Care (another [link](#))

- Focuses on responsibilities and relational issues in the relationships you are invested in.
- Balancing your needs and the needs of those you care for, and sometimes strangers too.
- Rejects frameworks that focus on scenarios of competing for resources (justice, fairness).
 - Started out as a critique of the idea, popular in some circles following World War 2, that men are naturally more fully developed, and more morally mature, than women. As the first care theorists pointed out, the only way this could be true is if we try to learn about ethics only by considering the lives and views of men. In

American society at the time, male and female socialization were starkly different from each other. Of course socializing males and females to act in different ways will lead to them having different moral responses to situations. It is absurd, then, to come back and say that one way is more morally advanced than the other!

- Care Ethics began by contrasting the American socially male way of considering ethics, especially valued behaviors in business and government contexts, vs. the American socially female way of considering ethics in relationships, especially in the female-coded spaces of the family and the home.

- Key figures:

-  [Carol Gilligan](#), present USA
-  [Nel Noddings](#), present USA
-  [Joan Tronto](#), present USA

Ubuntu

- "A person is a person through other people."
 - The concept of Ubuntu is [traditional in Sub-Saharan Africa](#), but this summary of Ubuntu is more modern and was popularized globally by Nelson Mandela and Desmond Tutu. There are also other different definitions of Ubuntu.
- "Actions are right roughly insofar as they are a matter of living harmoniously with others or honouring communal relationships." ([source](#)) ([alternate interpretation](#))
- Key figures:
 -  [Nelson Mandela](#) 1990s South Africa
 -  [Desmond Tutu](#) 1990s South Africa
 -  [Joseph Balatedi Radinkudikae Gaie](#), present, Botswana
 -  [Augustine Shutte](#), 1900s-2000s, South Africa
 -  [Sabelo Mhlambi](#), present, USA
- ([More on African Ethics here](#))

American Indigenous Ethics

- Like Ubuntu, American Indigenous ethics is actually a wide family of differing views. But there are some particularly common ideas that show up again and again in American Indigenous thought, and which philosophers from those traditions have identified as being reasonably central to the ethical theories espoused by the nations of this continent.
 - Distrust of abstract propositional claims, focus on experiential / lived knowledge.
 - Including distrust of abstract includes grand abstract claims about ethics as opposed to the lived knowledge of practicing ethics. This would include community experiences of ethics shared through stories. Still, we can list some common commitments in the form of principles, below.
 - Anti-hierarchy. No one should be fully dependent or independent.
 - Learn to perceive the needs of others in order to help the group and maintain equality.
 - Equality for people, but also air, water, plants, etc. (everything is part of one process).
 - (Based on book [American Indian Thought](#). You can also [search google scholar](#))
- Key figures:
 -  [VF Cordova](#), 1900s USA
 -  [Anne Waters](#), present USA
 -  [Brian Burkhart](#), present USA
 -  [Kyle Powys Whyte](#), present USA

Divine Command Theory.

- Something is right or wrong because God(s) said so.
- Euthyphro Dilemma: "Is the pious [action] loved by the gods because it is pious, or is it pious because it is loved by the gods?" (Socrates, 400s BCE Greece)
 - If the gods love an action because it is morally good, then it is good because it follows some other ethics framework. If we can figure out which ethics framework the gods are using, then we can just apply that one ourselves without the gods.
 - If, on the other hand, an action is morally good because it is loved by the gods, then it doesn't matter whether it makes sense under any ethics framework, and it is pointless to use ethics frameworks.^[1]

Egoism

- "Rational Selfishness": It is rational to seek your own self-interest above all else. Great feats of engineering happen when brilliant people ruthlessly follow their ambition.
 - That is, Do whatever benefits yourself. Altruism is bad.
- Key figure:
 -  [Ayn Rand](#), 1900s America
 - Ayn Rand is sometimes popular with tech people and CEOs. Understandably, some CEOs view themselves as brilliant and like being told that ruthlessly pursuing their ambition is morally good. (Though the end-goal can't be great feats of engineering, that self-interest must come first and great feats of engineering can only be a side-effect).

Nihilism

- There is no right or wrong. Nothing matters.
- There are many different types of moral nihilism. But they all boil down, one way or another, to the idea that moral reasoning or trying to think about ethics is not real, or is based on a mistake.
- Even if one is inclined towards nihilism, there is still truth in the anthropological observation that people do deliberate about how to act and how to live, and that these deliberations consistently take the shape of one or more of the ethical frameworks above, considering principles, character, virtues, consequences, responsibilities, and so on. So it is still interesting to look at ethics, even if you like the idea of nihilism.

Existentialism

- Like nihilism, existentialism starts with a claim that there is no fundamental meaning or morality. But in existentialism, people must create their own meaning and morality.
 - In philosophical terms: "existence precedes essence." That is, things exist first without meaning or value. They only have value because we choose to create meaning or value for them.
- Existential ethics: your actions have consequences, but the consequences are unknowable. Even though you desire to do what's right, there is no objective morality to follow (part of existential angst). You are forced to invent some sort of meaning-giving basis for life that can tell you what to care about. This might include constructing a kind of "morality" to follow.
- Key figures:
 -  [Søren Kierkegaard](#), 1800s Denmark
 -  [Jean-Paul Sartre](#), 1900s France

More on Ethics

There are many more ethics frameworks that we haven't mentioned here. You can look up some more [here](#).

Also, many of these ethics frameworks overlap and different ones can be considered versions of another. So the Confucianist definition of an exemplary person could be considered as virtues in virtue ethics. Existentialism can be considered a form of Nihilism. Moral Relativism (saying that what is good or bad is just totally subjective, and depends on who you ask.) can also be considered a form of Nihilism, etc.

You can also follow any of the other links in this page or read books like [this](#), or watch the TV show The Good Place (currently streaming on [nbc.com](#) and [Netflix](#))



Ethics Frameworks Don't Guarantee Moral Goodness

One final note we'd like to make here is that, as we said before, we can use ethics frameworks as tools to help us see into situations. But just because we use an ethics framework to look at a situation doesn't mean that we will come out with a morally good conclusion. This is perhaps most obvious with something like nihilism, which rejects the very existence of a morally good conclusion. But we can also see this with other frameworks, such as egoism, which we (the authors) believe often gives morally wrong results, or with consequentialist/utilitarianist reasoning, which has been challenged at many points in history (e.g., [A Modest Proposal](#) from 1729, the [character Ivan arguing with his brother](#) in [Brothers Karamazov](#) from 1880, and the two articles [Effective Altruism Is Pushing a Dangerous Brand of 'AI Safety'](#) [[archived here](#)] and [Effective altruism's most controversial idea](#) from 2022). Still, we hope that in using different frameworks (even ones you often disagree with) you are able to understand situations better and with more nuance.

-
- [1] As an example of how religion and divine command theory can work with other frameworks, let's consider a few different versions of Christian thinking. In the white Evangelical Christian community the authors grew up in, we often tried to figure out deontology-type rules based on Bible verses (e.g., based on [Exodus 20:16](#), we might conclude that lying is always wrong regardless of the consequences). But this is quite different from the Archbishop [Desmond Tutu](#) who helped popularize Ubuntu philosophy globally and chaired the [Truth and Reconciliation Commission](#), or [George E. Tinker](#) of the [Osage Nation](#), who wrote [American Indian Liberation: A Theology of Sovereignty](#).

2.2.4. Practice Using Frameworks

To practice using ethical frameworks as tools, here is an exercise.

Scenario: A Parent With Alzheimer's

Suppose you are in the position of needing to decide what to do to care for a parent. Although they are used to an active and independent life, it is clear that they have been showing signs of worsening, early stages [Alzheimer's](#). You believe they are no longer able to safely live on their own, but they get upset at the suggestion that they might need help.

You have two options. Either you can intervene, by ignoring your parent's wishes and securing a professional carer or care home to support them, or you can choose not to intervene, hoping that they will finally realize they need care. You have consulted with your siblings, and they left the final decision to you. The cost of professional care will come out of your parent's financial reserves (they can afford it), but you will need to spend their money for them against their will.

You don't know what to do, so you sit down and work through your options with a list of ethical frameworks.

Trying Out Different Frameworks

Your job in this exercise is to articulate a reason for intervening (forcing your parent to get care) AND a reason against intervening (hoping your parent comes to their own realization they need care), for each framework listed.

The goal of this exercise is to practice using the ethical frameworks as tools for looking at the insides of a complex ethical dilemma, and to see how each tool gives you slightly different information about what is at stake.

This scenario will be hypothetical for some of you, but for others, like for one of the authors, this will be a decision you have been very close to in real life.

If you are able to, work with others in filling out this chart or compare with others to compare what you came up with. Every real-life instance of this is a little bit different, so make sure to respect whatever decisions your groupmates may have made. One suggestion is to ask if anyone has seen a situation like this unfold in their family, and to invite them to share first about the reasons that were most salient to the decision that was made. Once anyone who wishes to offer experience has volunteered, then you can begin working through the theories in the list.

Framework	Intervene	Do Not Intervene
Confucianism: become an exemplary person, i.e. generous and respectful, through rituals, i.e. sacrifice to ancestors	Be generous and respectful to your parent and siblings by taking the hard decision and absorbing whatever upset follows. It might be a substantial sacrifice to let your parent be angry with you, but an exemplary person would respectfully accept the difficulty in order to secure proper care for their parent.	Be respectful of your parent's authority and don't intervene and try to take the decision away from them. Instead be generous in helping provide for your parent while your parent makes their own decision.
Taoism: Act in harmony with universe; trying to force things will backfire	Act in harmony with the natural process of what's going on with your parent's health and what needs to be done for their care; trying to ignore the natural process of Alzheimer's and not intervening now will cause more problems later	Act in harmony with the natural process of your parent's journey coming to terms with their illness; trying to force them to accept care before they are ready will backfire.
Virtue Ethics (Aristotle): Act in a way consistent with the virtues to promote your flourishing. Practicing virtuous actions makes us more virtuous in the future.		
Virtue Ethics (Aztec): Virtue is a group effort; we all need support to help us live lives of balance and moderation.		
Natural Rights		
Care Ethics		
Consequentialism		
Deontology		
Ubuntu		
American Indigenous		
Divine Command		
Egoism		
Nihilism		
Existentialism		

Once your table is completed, think back over the different rationales given for each decision option. What 'reasons' felt most compelling to you? Some will seem unpersuasive, and some will seem to really get to the heart of the issue. Which framework best supports your decision to intervene? Which framework best supports your decision not to intervene?

[1] English language note: As you may notice here, 'ethics' is, by convention, a singular word. An 'ethics' is a way of describing how people think about something. There is also a word, 'ethic', but that has different usage. So for example, someone's 'work ethic' is different from the 'ethics of work' to which they might subscribe. On a related note, some people will tell you that 'data' and 'media' are both plural. These words come from Latin, and those word forms are indeed plural in

Latin! But we are using English, and conventions vary as to whether these terms should be treated as grammatically plural or singular. You will see variation in how people use these forms in your studies (and perhaps even in this book!), but it should not alarm you. The rule of thumb is to be consistent across a document or project in how you treat such things, so we have tried to be consistent in this book, with the exception of where we are quoting someone else's words. TODO: decide whether we will treat media and data as plural or singular, and ensure compliance

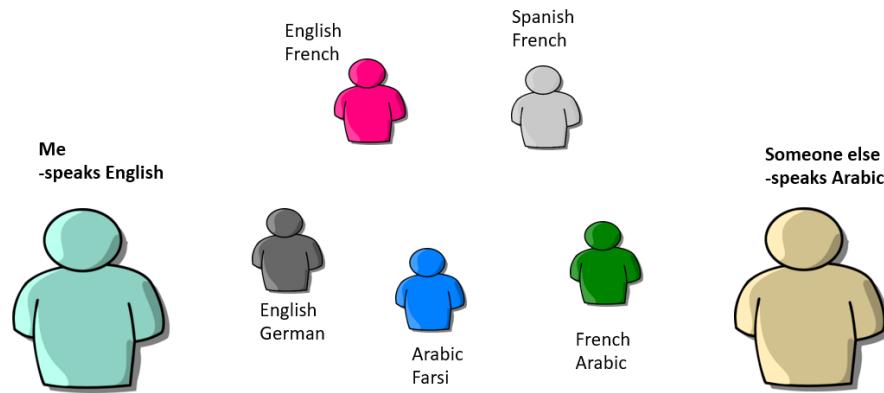
2.3. Automation

As we look at ethical considerations in social media, we will be focused on automation (actions that run on their own) done by computers. We will particularly look at computer programming code that performs actions on social media.

Let's start with an analogy: language translation.

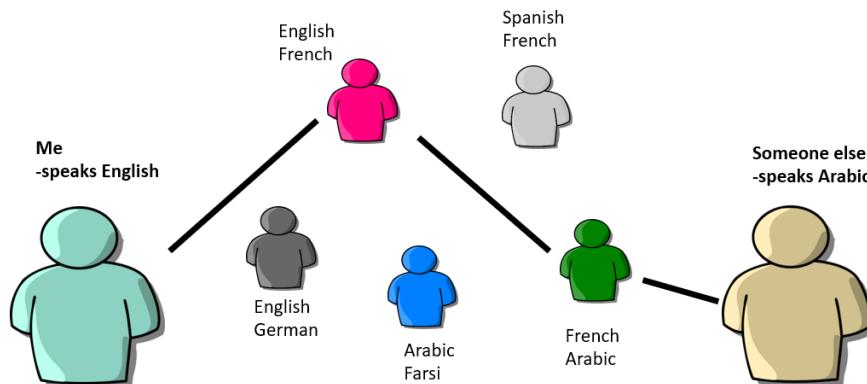
2.3.1. Language Translation (Analogy)

In order to have computers do an automated activity, we will need to communicate with the computer. Let's start by looking at how communication works between different human languages.



Imagine I am an English speaker who wants to communicate with someone else who speaks Arabic. Neither of us speaks the other one's language. If we have access to people who speak multiple languages, it is possible for them to act as translators, taking what someone says and repeating it in another language, until we are able to get our messages back and forth.

So, given the set of bilingual translators in the above diagram, how can we translate between English and Arabic?



In my example, we use two translators: The English-French speaker and the French-Arabic speaker. Then in order for me to communicate with the Arabic speaker, we pass our message to the translators, and they communicate with each other using French as an intermediate language. So messages will be translated from English to French and then to Arabic one way, and from Arabic to French to English the other.

As we look at communicating with computers, we will see a similar translation path, including the use of intermediate languages.

Now let's look at the history of computers and communication with them.

2.3.2. Human Computers



Before electronic computers were generally available, when scientists wanted the results of some calculations, they sometimes hired "[computers](#)," which were people trained to perform the calculations.



When scientists wanted these human computers to do a task for them, they would give these human computers instructions for what they wanted calculated. These instructions were given in a regular human language (like English), and in math notation. Then the human computers would send back the results of whatever calculation they had been asked to perform.

But human computers were eventually replaced by electronic computers, and communication with electronic computers was not straightforward.

Learn More

- [When Computers Were Human](#)
- <https://www.history.com/news/human-computers-women-at-nasa>
- Read the book or watch the movie *Hidden Figures*

2.3.3. Computers Speak Binary

As electronic computers became faster and more available, scientists began to rely on electronic computers to automatically perform their calculations instead of on human computers.

But computers don't speak human languages like the human computers did. Instead, computers speak binary:



I speak English, and so I can come up with an English statement of what I want the computer to do, like:

"Retweet all tweets that mention me."

But a computer only understands instructions that are written in binary, which is composed entirely of 0s and 1s. So somehow I'll need to turn my English instruction into binary instructions, so the computer can understand.

Binary

Early in the history of computers, the designers of computers decided that the easiest way of making them work was to use the binary numbering system, since the 0s and 1s could be represented easily through physical means like a switch being on (which represents 1) or off (which represents 0).

These 0s and 1s, can then be used to represent numbers, like this:

- decimal 0 → binary 0
- decimal 1 → binary 1
- decimal 2 → binary 10
- decimal 3 → binary 11
- decimal 4 → binary 100
- decimal 5 → binary 101
- decimal 6 → binary 110
- decimal 7 → binary 111
- decimal 8 → binary 1000
- decimal 9 → binary 1001
- decimal 10 → binary 1010
- ...

But these binary 0s and 1s can be used for more than just representing numbers. In 1842, [Ada Lovelace](#) realized that a [full computer](#) (which was only a theoretical possibility at the time) could represent and work with all sorts of things:

[Computers] might act upon other things besides *number* [...] Supposing, for instance, that the fundamental relations of pitched sounds in the science of harmony and of musical composition were susceptible of such expression and adaptations, the [computer] might compose elaborate and scientific pieces of music of any degree of complexity or extent.



Augusta Ada King, Countess of Lovelace (1815-1852). Fun fact for those of you who are interested English Poetry: Ada Lovelace was the daughter of the poet Lord Byron.

Everything a modern computer does happens through binary. So all information is stored in binary, such as:

- Text (like in this book). For example: "A" can be stored as "1000001" and "B" can be stored as "1000010"
- Images are represented as a grid of points called pixels, and each pixel has a number representing its color in terms of Red, Green, and Blue. So a pixel with the color of "0000000111111100000000" would be green.
- Social media connections. For example, somewhere in Facebook's computer systems is information stored with your ID number, and it has a list of the ID numbers of the people you are friends with.

Additionally, all the instructions which tell a computer what to do are stored in binary as well.

For example, in the Intel 8080 computer:

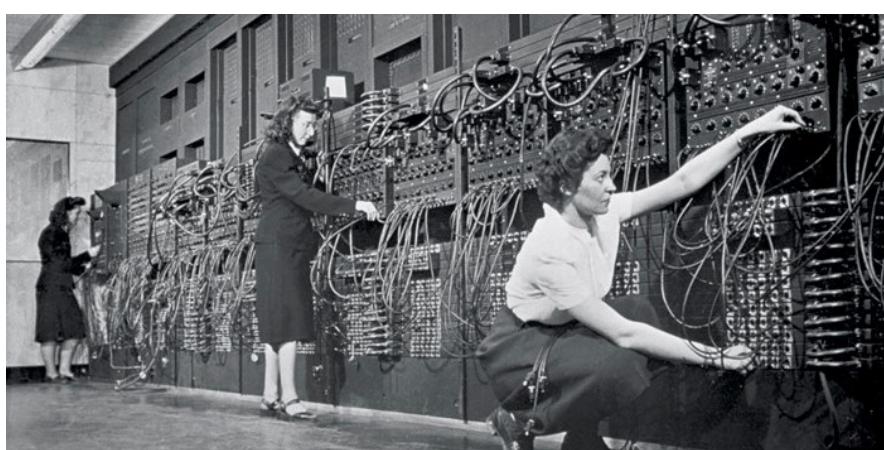
- "00010100" means "add 1 to the number stored in register #2"
- "11010010" means "jump to another set of instructions if condition #2 is true"

These instructions and information are combined together to make any website you use, any computer game you play, and any online textbook you read.

So how do people turn their ideas into binary computer instructions?

2.3.4. First Programmers

The way the first computer programmers told computers what to do was by learning the binary language of computers and then translating their goals directly into binary instructions by themselves.

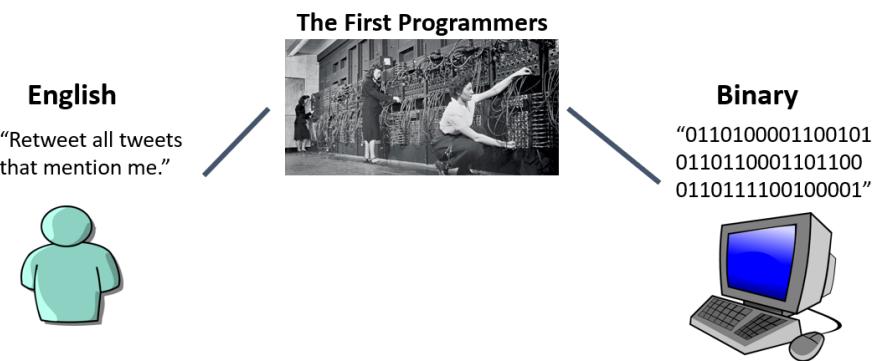


The photo above shows the [ENIAC](#) computer (built with US Army funds in 1945, this was the first electronic general-purpose computer), being programmed by three of the six women who were the original programmers on this computer: [Kay McNulty](#), [Betty Jennings](#), [Betty Snyder](#), [Marlyn Meltzer](#), [Fran Bilas](#), and [Ruth Licherman](#).

The job of these women was to take a request for a task to be done on the ENIAC, and to turn it into computer instructions, and enter those instructions into the computer (though this early computer happened to use decimal numbers and not binary).

Note: Since this book is also about ethics, we should mention that the first thing these women were asked to program on the ENIAC was some calculations to help build [thermonuclear bombs](#). How do you think they might have felt about being asked to do this? The building of those bombs involved many scientists and other professionals along the way, several of whom were not on board with the idea of what their calculations were being used for. This has raised questions about moral responsibility: were the women made complicit in whatever moral wrongs may have come about using calculations they performed using the ENIAC?

So, at this stage of computer history, giving a task to a computer involved a programmer translating the task directly into the computer's language (generally binary):



Now, this task of translating a task into the binary a computer speaks is a very slow, tedious, and difficult process. So why bother to go through all that trouble?

The reason it was worth it to go through the trouble of translating tasks into a computer's language is that computers can do two things very quickly: Arithmetic (e.g., $2 + 2 = 4$), and following logical steps (e.g., *when you press this button, then close the program*). So if you can get your task translated into arithmetic and logical steps, the computer can work faster than a human could.

But this process of translating tasks into computer code was still a big pain, so couldn't there be a better way?

2.3.5. Compilers and Programming Languages

History

In the early 1950s, [Grace Hopper](#) proposed a better way of programming a computer. She suggested creating a "programming language" based on English words with a "compiler" computer program that would turn the computer language code into binary computer instructions.

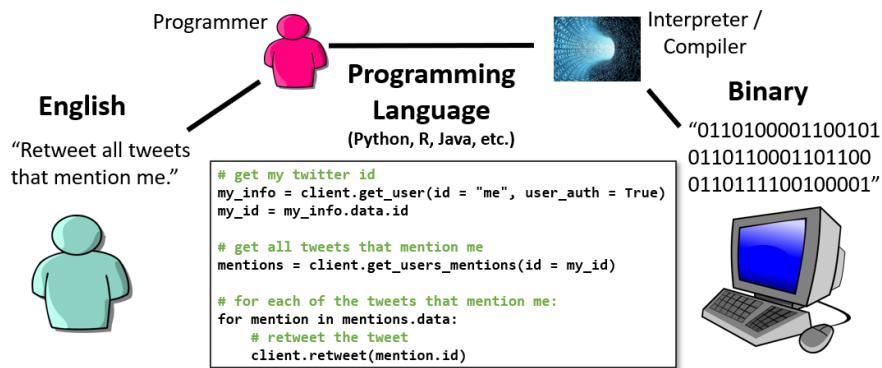


- photo of Grace Hopper c. 1960, at that time a Commander in the US Navy.

When Hopper's ideas were mostly ignored, she proceeded to create her own compiler and later helped design some of the most important and influential early programming languages and compilers.

The new set-up for programming

So, thanks to Grace Hopper, we now have a new set-up for computer programming, which is what programmers still use today:



When someone wants a computer to perform a task (that hasn't already been programmed), a human programmer will act as a translator to translate that task into a programming language. Next, a compiler (or interpreter) program will translate the programming language code into the binary code that the computer runs. In this set-up, the programming language acts as an intermediate language the way that French did in my earlier analogy.

In this set-up, a programmers basic task is to do these three things:

1. Given a problem, break it down into steps for a computer
2. Write those steps down in a programming language
3. Run the compiler or interpreter, so the computer program can run on the computer

Programming languages

Programming languages (e.g., Python, R, Java) are specially designed languages that attempt to split the difference between how a computer thinks and communicates and how people think and communicate. There are many programming languages, with different specializations and trade-offs.

In this book, we will use [Python](#), which is commonly used in data science tasks, and has support for writing programs that work with Reddit.

Compilers / Interpreters

Compilers are special programs that translate code written in a programming language into the binary 0s and 1s that a computer runs.

There are two varieties of compilers:

- standard **compiler**: takes a whole computer program and turn it all into binary so it can be run later
- **interpreter**: turns the computer language code into binary as it is running the program

Python uses an interpreter, so when you run a Python program, the interpreter translates the Python code into binary while it's running it.

Programming in this book

Throughout the rest of this book, we will take ideas for programs written in English and translate them into Python code, and we will look at Python code and translate it back into English descriptions of what the code does. The Python Interpreter will then translate this code into binary instructions, which the computer will then run.

Next, let's look at an example computer program that posts one tweet.

2.3.6. A program that makes one reddit post

Below is a computer program written in the Python programming language. The program will make a reddit post in the subreddit "soc_media_ethics_auto". The post will be titled "A bot post" and say: "This post was made by a computer program!". Since this is a computer program that posts on reddit, we would call this program a reddit bot.

Don't worry if you don't understand any of this Python code yet; we will build an understanding of code like this throughout the book.

```
import praw

username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$.%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"

reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)

reddit.subreddit(
    "soc_media_ethics_auto"
).submit(
    "A bot post",
    selftext = "This post was made by a computer program!"
)
```

Though you may not understand anything in the above code yet, I want to point out a couple things:

- The code above is full of English words like "import", "username", "password", and "secret," which may help you guess the meaning of the code.
- There are also other symbols as well, though being used in a different way than in normal English, symbols like `=`, `_`, `,`, `(`, and `)`
- The final lines of code gives good hints as to what it is doing: `subreddit` chooses which subreddit the post will be made on, and `submit` has the information to submit as a new post.

- There are four pieces of text with random numbers and letters that include things like "username" and "client_secret" inside. These pieces of text are meant to be replaced with your reddit username and password and a pair of special passwords for running a reddit bot. You can get these special passwords if you get developer access to reddit (see the page on [Making a Reddit Bot Account](#)). Once you put your special passwords in those locations then this code will post a tweet on your account.

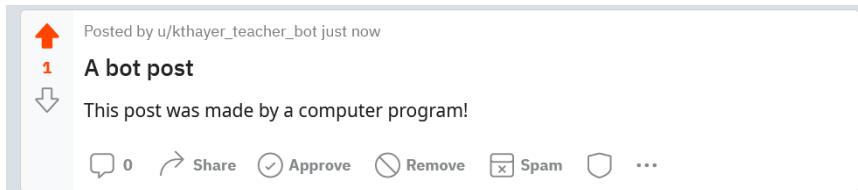


Fig. 2.1 A [reddit post](#) made by running the code above with the account information for "kthayer_teacher_bot".

We will go through that example code in more detail next.

2.3.7. Understanding the Reddit Bot Code

Let's look more at that program that creates one Reddit post.

There are a number of ways of looking at the code, but first, let's look at it as a template with a couple pieces we can change.

The program as a template

Below I've highlighted the text of the sections of the program that you might want to modify.

```
import praw

username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$.%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"

reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)

reddit subreddit(
    "soc_media_ethics_auto"
).submit(
    "A bot post",
    selftext = "This post was made by a computer program!"
)
```

The first four highlighted pieces of code are for the special passwords that let you run a bot. You can get when you get those passwords by following these steps to get [developer access to reddit](#) (I've put fake values in them for now):

- username
- password
- client_id
- client_secret

The final three highlighted pieces of code are the information for what to post on reddit. First, in the parentheses after `subreddit` is which subreddit to post on. In the parentheses after the `submit` is first the title of the post, and next is the text of the post itself. You can change any of these values or change which subreddit you post to, and what title and text to post.

So, by changing those sections of code, you run this program to post whatever reddit you want to post on a subreddit. It is, of course, much easier to just open reddit and post something, but as we get to more complicated programs, we'll start to see more of the power (and pitfalls) of automation on social media.

Note: all the highlighted sections of code are surrounded by double quotes. In the Python programming language, putting something in quotes indicates that you want the computer to think of the things inside the quotes as pieces of text, in this case passwords and reddit post information.

Adding code comments

The goal of programming language code is to be readable by both humans and computers, but sometimes the meaning of code isn't always clear to humans trying to read it. In order to aid humans reading the code, programming languages allow programmers to do things to make the code more readable, such as adding extra blank lines between sections of code. Blank lines can be used to have some lines of code be visually grouped together, and some be separated, so humans can better follow the outline of the code.

Most programming languages also allow "comments," which are pieces of code that the computer will ignore. These comments allow the person writing the code to leave a note to future people reading the code, knowing that the computer won't read it (like an *aside* in a play).

In Python, you can add a comment by using the `#` symbol. Python will ignore everything on a line that comes after the `#`. But human programmers will often look for the meaning of the program in these comments.

So, in order to make the program above easier for future humans to understand, let's add two comments telling these future humans where to add their special passwords and where they can change the text of the tweet:

```
import praw

# TODO: Put your reddit username, password, and special developer access passwords
# below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$.%DSG#.DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"

reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)

# TODO: modify the text in the quotes below to change what and where this bot posts
# to reddit:
reddit.subreddit(
    "soc_media_ethics_auto"
).submit(
    "A bot post",
    selftext = "This post was made by a computer program!"
)
```

With those, hopefully a future human reader will have a better chance of understanding how to modify the program to do what they want.

*Note: I started each comment with "TODO" to tell the future human that there is a task they have **to do** to get the program to work for them. Since this is only intended for human readers, I could have written it in any way I want, but all capital letter TODOs are commonly used like this by programmers.*

Purpose of each section of code

Now that we've looked at the code as a modifiable template, let's break the code into sections and look at what the purpose of each part is. The code is run starting at the top and going down from there, so we will go through the code in that order.

Note: It's normal if you don't understand everything here. Over the course of this book you will learn to understand more of how programs work, but also, even professional programmers often don't understand parts of the programs they are working on, they just understand enough to modify the parts they need to.

The first line of code is:

```
import praw
```

The purpose of this line of code that loads another set of code. The code it loads is called [praw](#) (The Python Reddit API Wrapper), which is code specially written to help make programs that work with Reddit.

The next section of code is four lines long:

```
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_#$DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

This is code to store all of the reddit password information we need to use a bot. You need your reddit username and password, and then a special client_id and client_secret for the bot. Again, you'll have to get your actual developer access passwords and replace the fake ones currently in the code.

The next section of code is five lines long:

```
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

The purpose of this code is to take all the developer access passwords you entered above, and give them to the praw code so that the praw code can log into your reddit account and provide the needed passwords for running a reddit bot.

Note that the last line is setting the `user_agent` which is a description of which program is being used to post from. For example, it might be "Reddit web page" or "Reddit iPhone app" or "Sprout social media manager." For our programs, I've just labeled our posts as being from "a custom python script."

The final lines of code are:

```
reddit subreddit(
    "soc_media_ethics_auto"
).submit(
    "A bot post",
    selftext = "This post was made by a computer program!"
)
```

These are the lines of code where a reddit post is actually made. First, the `subreddit` section selects which subreddit an action will be taken on, and then `submit` creates a new post with the given title and text.

Adding more code comments

Now that we've looked at the purpose of each section of code, we can add additional comments explaining what each section does, so that future humans reading the code are more likely to understand it.

Following the common practice of programmers, we will put the comment before the section of code that the comment is explaining. We can also make multiple comment lines as needed if our comments are long.

```
# Load some code called "praw" that will help us work with reddit
import praw

# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords
# below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_#$DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"

# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)

# Post a reddit post
# TODO: modify the text in the quotes below to change what and where this bot posts
# to reddit:
reddit.subreddit(
    "soc_media_ethics_auto"
).submit(
    "A bot post",
    selftext = "This post was made by a computer program!"
)
```

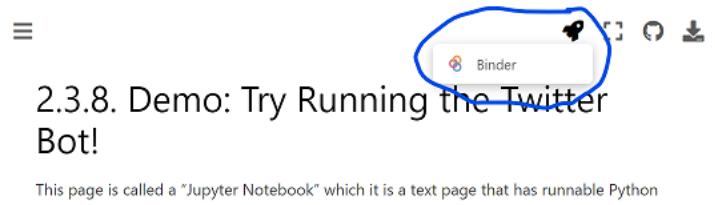
Now that we've looked over the code and commented it, let's go to the next page, where you can try running it!

2.3.8. Demo: Try Running the Reddit Bot!

Running this Jupyter Notebook

This page is called a "Jupyter Notebook" which it is a text page that has runnable Python code in it.

In order to run the code, you can look for the rocket button at the top which will give you an option to "launch binder"



If you launch binder, it will take a while to load, but eventually show you a version of this page Jupyter Notebook in a code editor called Jupyter Lab



In Jupyter Lab you can double click any section to edit it, and you can press the triangle "run" button to run the code (or display the text).



When the code runs, the little number to the left of the code block should change. There might also be some output from your action displayed below the code block.

So now you can go through the rest of this page and select and run each section of code.

Here is the bot code you can run!

Our demo Reddit bot code is below, broken up into different sections.

You can select each section of the code below and run it to see what it does.

By default this code uses a fake version of our reddit connection so it doesn't connect to a real reddit account.

If you want to actually connect to your reddit account, you can put your special developer access passwords in the right code section below, and then when you run the code make sure to skip the code section that makes a fake twitter connection with "fake_praw".

Step 1: Load praw code

```
# Load some code called "praw" that will help us work with reddit
import praw
```

(Optional) Step 1b: Make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it won't actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

Step 2: Load your developer access passwords

To use this on your real Reddot account, copy your [developer access passwords](#) into the code below, replacing our fake passwords.

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

Step 4: Give praw (or fake_praw) your developer access passwords

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Step 5: Submit a post to Reddit

```
# Post a reddit post
# TODO: modify the text in the quotes below to change what and where this bot posts to reddit:
reddit.subreddit(
    "soc_media_ethics_auto"
).submit(
    "A bot post",
    selftext = "This post was made by a computer program!"
)
```

Fake praw is pretending to select the subreddit: soc_media_ethics_auto

```
AttributeError                                     Traceback (most recent call last)
Input In [5], in <cell line: 3>()
  1 # Post a reddit post
  2 # TODO: modify the text in the quotes below to change what and where this
bot posts to reddit:
  3 reddit.subreddit(
  4     "soc_media_ethics_auto"
----> 5 ).submit(
  6     "A bot post",
  7     selftext = "This post was made by a computer program!"
  8 )

AttributeError: 'NoneType' object has no attribute 'submit'
```

Step 6: Modify the code above to create a different reddit post

2.3.9. Reflections on the Reddit Bot

- When one of us ran the program, who made those reddit posts (me? you? the bot?)?
- Notice that there are at least three times of actions for posting reddit post with this bot, one is when the code was originally written, another is when the code was modified, and the other is when the code is run. These could even be done by different people.
 - How do you divide out responsibility for a bot's actions between the person writing the code and the person running the program?

2.3.10. Automation in Social Media

Now that we have looked at what automation is and seen one example of automation on social media (a Reddit bot), let's consider some different ways automation shows up on social media:

External Programs

Some automation on social media is done with programs that are separate from the social media platform.

Bots

Bots are computer programs that act through a social media account. We will talk about them more in the next (Chapter 3).

There are also various applications that are made to help users interact with social media. For example, there are social media manager programs that help people schedule posts and let multiple people use the same account (particularly useful if you are something like a news organization).

Data Gathering

Various groups want to gather data from social media, such as advertisers and scientists. This data is gathered and analyzed with computer programs. We will cover these programs later, particularly in Chapter 8: Data Mining.

The Social Media Platform

Social media platforms themselves also have many places where automation occurs.

Code

Social media platforms have code that automates many of the tasks it takes to keep a social media platform running. These are things like the code that saves and loads the data on the platform (see Chapter 4: Data), the code that displays that data to users (including the visual layout) and gives users ways of interacting with the platform, the code that decides which posts a user sees (see Chapter 12: Recommendation Algorithms).

Policies

Finally, social media platforms have various policies on how they will operate, such as what people are allowed to have for user names, or what behaviors will get you banned from the platform. The policies are often partly supported by code on the social media platform, but also done by actions of humans, such as content moderators (chapter 15). These humans are acting as human computers to enforce the policies.

2.4. Tying It Together

Now that we have defined social media, ethics, and programming, we will spend the rest of this book tying them together in different ways.

To give one example, let's look at the experience of people who use social media but can't view images (they may be blind or low vision, or their device or internet might have restrictions). In order to make the information from the image accessible to these users, social media platforms allow images to be posted with an "alt text", which the user can read (or have the computer read to them). See [Fig. 2.2](#) below for an example.

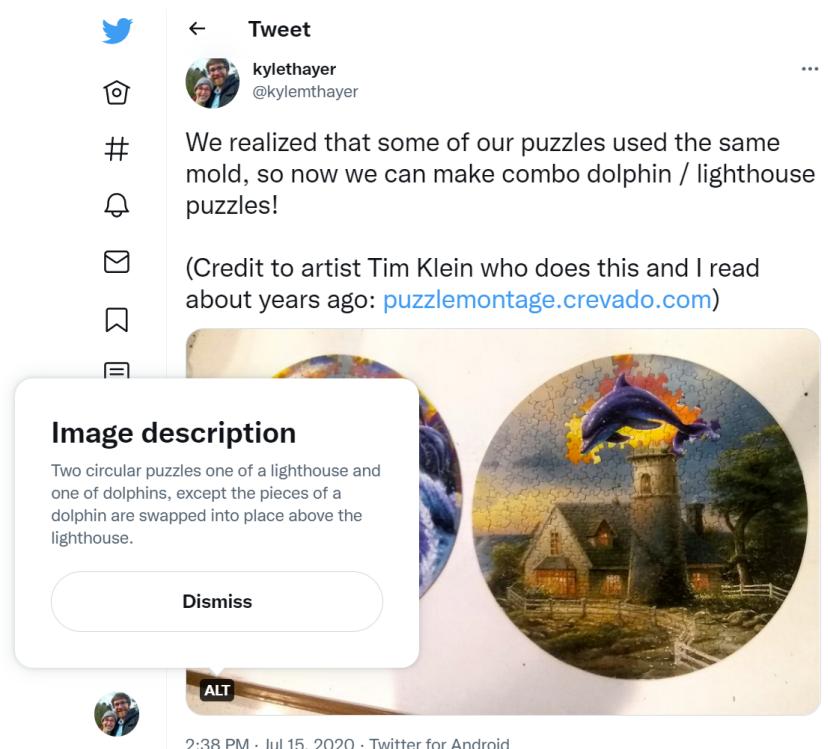


Fig. 2.2 A [tweet](#) with a photo that has an "alt text" (seen in the popup over the image), so those who cannot see the photo still have access to the information in the tweet.

Now, people who design and program social media platforms can do things to encourage or discourage users adding alt-text to their photos. For example, they could require or forbid users from adding alt-text to their photos, or they could do more subtle versions of those by putting reminders to add alt-text, or making the option of adding alt-text hard to find.

Additionally, they could run a machine learning program to try to [automatically generate alt-text for photos](#), though those programs may make mistakes or have biases.

So what are the ethical questions facing the designers and programmers of social media platforms? Are they responsible for designing their platforms around this accessibility issue, or is it the responsibility of users uploading image data to make their content accessible by using alt-text?

- Imagine a debate on this question between someone using the Aztec Virtue Ethics framework, and someone using the Natural Rights framework.

ⓘ Have a think about your answers, and then click to see some sample answers

- Natural Rights (all humans have rights that should not be violated):
 - Every individual has the right to post how they see fit, for whichever audiences they choose. If they do not want to include alt-text (perhaps because they do not consider anyone who can't view images to be part of their community or audience), then that is their prerogative.

OR

- Every individual has a right to the information posted on social media, even if they can't view images. So not including alt-text is a violation of their rights and platforms should force users to include alt-text.

- Aztec Virtue Ethics (virtue is a group effort and we all need support to find balance and moderation):
 - It is everyone's responsibility to support others, so the platform should make everyone support those who can't view images by forcing them to include alt-text.

OR

- Everyone should be supported in finding balance and moderation, and so a platform shouldn't force users to include alt-text even when it doesn't make sense or is unnecessarily burdensome (that wouldn't be moderation).

- Now imagine we propose letting the platforms wait and add the ability to include alt-text when users are really ready for it. How might a Taoist and a Consequentialist respond?

ⓘ Have a think about your answers, and then click to see some sample answers

- Taoist:
 - Trying to force this issue will likely backfire. Just leave things as they are, until the users are themselves asking for this option to be integrated into the platform's design.

OR

- You should make adding alt-text part of the natural flow of posting images.

- Consequentialist:
 - There are actually very few people who can't view images, so having people do extra work for those very few people is a waste of time.

OR

- The difficulty caused to people who can't view images when there is no alt-text is very significant, so a minor burden of having users add alt-text is worth the trade-off.

Now look back through how those frameworks framed the issues. Remember, each framework is a tool to help us see inside the problem. What does each tool show us? What do you learn from comparing the different approaches?

Note

While we show how these frameworks might argue for different approaches to image alt-text, we don't want to give the impression that we are neutral about an issue like alt-text. Please provide alt-texts for images and encourage others to do the same! We will talk more about accessibility in chapter 10.

This is a small example of the kind of reflection that we will be returning to again and again throughout the course. As we get more deeply acquainted with the automation side of things, we will be able to use these ethical tools to look deeper into questions of Social Media, Ethics, and Automation.

2.5. Learn more

- [Ethical Tech Starts With Addressing Ethical Debt](#)
- (just for fun) [Parody video](#)

3. Bots

One kind of automation done on social media is what are called "bots."

3.1. Definition of a bot

There are several ways computer programs are involved with social media. One of them is a "bot," a computer program that acts through a social media account.

There are other ways of programming with social media that we won't consider a bot (and we will cover these at various points as well):

- The social media platform itself is run with computer programs, such as recommendation algorithms (chapter 12).
- Various groups want to gather data from social media, such as advertisers and scientists. This data is gathered and analyzed with computer programs, which we will not consider bots, but will cover later, such as in Chapter 8: Data Mining.

Bots, on the other hand, will do actions through social media accounts and can appear to be like any other user. The bot might be the only thing posting to the account, or human users might sometimes use a bot to post for them.

Note that sometimes people use "bots" to mean inauthentically run accounts, such as those run by actual humans, but are paid to post things like advertisements or political content. We will not consider those to be bots, since they aren't run by a computer. Though we might consider these to be run by "human computers" who are following the instructions given to them, such as in a click farm:



Fig. 3.1 A photo that is [likely from a click-farm](#), where a human computer is paid to do actions through multiple accounts, such as like a post or rate an app. For our purposes here, we consider this a type of automation, but we are not considering this a "bot," since it is not using (electrical) computer programming.

3.2. Examples of Bots (or apps)

There are many types of bots in the social media world. Here are some examples of different bots:

3.2.1. Friendly bots:

Some bots are intended to be helpful, using automation to make tasks easier for others or to provide information, such as:

- Auto caption: <https://twitter.com/headlinerclip>
- Vaccine progress: https://twitter.com/vax_progress
- Blocking groups of people: <https://twitter.com/blockpartyapp>
- Social Media managing programs that help people schedule and coordinate posts
- Delete old tweets: <https://tweetdelete.net/>
- See a new photo of a red panda every hour: <https://twitter.com/RedPandaEveryHr>

Bots might have significant limits on how helpful they are, such as tech support bots you might have had frustrating experiences with on various websites.

3.2.2. Antagonistic bots:

On the other hand, some bots are made with the intention of harming, countering, or deceiving others. For example, people use bots to spam advertisements at people. You can use bots as a way of [buying fake followers](#), or making fake crowds that appear to support a cause (called [Astroturfing](#)).

As one example, in 2016, Rian Johnson, who was in the middle of directing Star Wars: The Last Jedi, got bombarded by tweets that all originated in Russia (likely making at least some use of bots).

"I've gotten a rush of tweets – coordinated tweets. Like, somewhere else on the internet there's like a group on the internet saying, 'Okay, everyone tweet Rian Johnson.' All from Russian accounts, and all begging me not to kill Admiral Hux in this movie."

From: <https://www.imdb.com/video/vi3962091545> (start at 7:49)

After the Star Wars: Last Jedi was released, there was a significant online backlash. When a researcher looked into it:

[Morten] Bay found that 50.9% of people tweeting negatively about "The Last Jedi" were "politically motivated or not even human," with a number of these users appearing to be Russian trolls. The overall backlash against the film wasn't even that great, with only 21.9% of tweets analyzed about the movie being negative in the first place.

<https://www.indiewire.com/2018/10/star-wars-last-jedi-backlash-study-russian-trolls-rian-johnson-1202008645/>

Antagonistic bots can also be used as a form of political pushback that may be ethically justifiable. For example, the "[Gender Pay Gap Bot](#)" bot on Twitter is connected to a database on gender pay gaps for companies in the UK. Then on International Women's Day, the bot automatically finds when any of those companies make an official tweet celebrating International Women's Day and it quotes tweets it with the pay gap at that company:



Fig. 3.2 When Loughborough University tweeted in celebration of International Women's Day, the [Gender Pay Gap Bot automatically quoted](#) pointing out how much less the median salary of women was than men at Loughborough University.

3.2.3. Corrupted bots

As a final example, we wanted to tell you about Microsoft Tay a bot that got corrupted.

In 2016, Microsoft launched a Twitter bot that was intended to learn to speak from other Twitter users and have conversations. Twitter users quickly started tweeting racist comments at Tay, which Tay learned from and started tweeting out within one day.

Read more about what went wrong from Vice [How to Make a Bot That Isn't Racist](#)

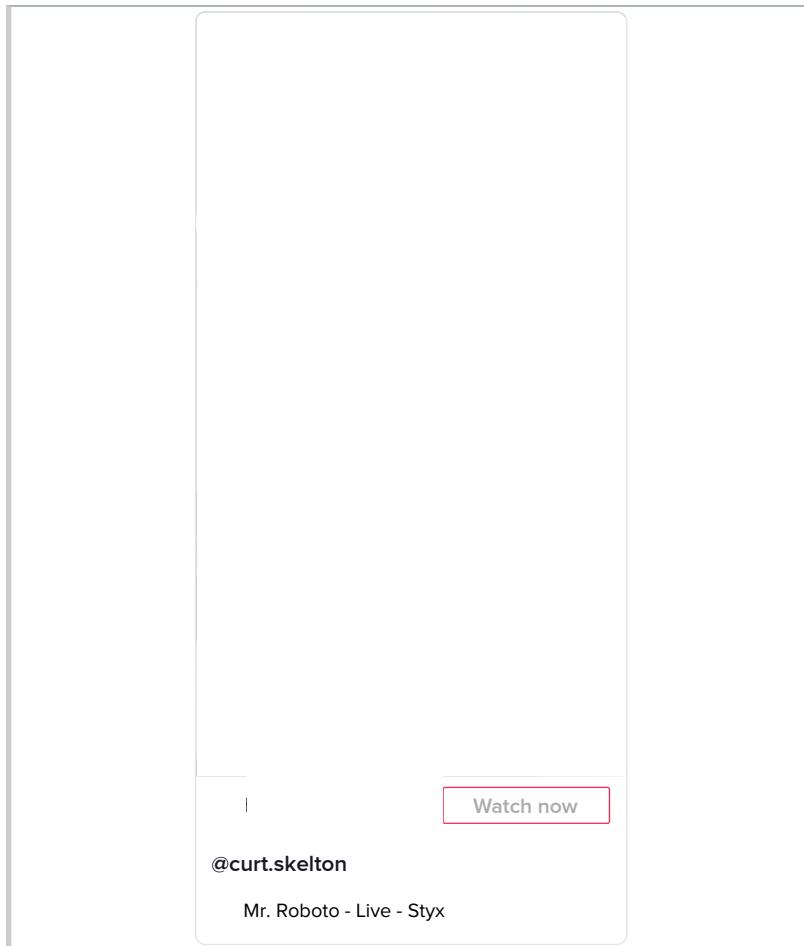
3.2.4. Registered vs. Unregistered bots

Most social media platforms provide an official way to connect a bot to their platform (called an [Application Programming Interface](#), or API). This lets the social media platform track these registered bots and provide certain capabilities and limits to the bots (like a rate limit on how often the bot can post).

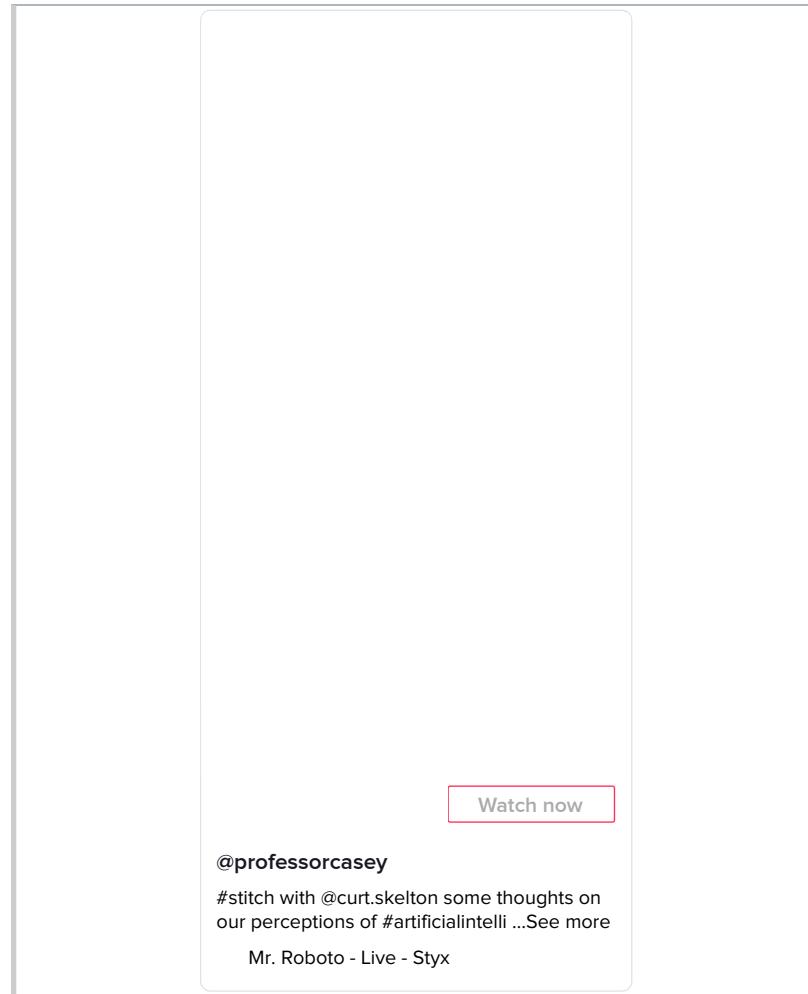
But when some people want to get around these limits, they can make bots that don't use this official API, but instead, open the website or app and then have a program perform clicks and scrolls the way a human might. These are much harder for social media platforms to track, and they normally ban accounts doing this if they are able to figure out that is what is happening.

3.2.5. Fake Bots

We also would like to point out that there are fake bots as well, that is real people pretending their work is the result of a Bot. For example, TikTok user Curt Skelton posted a video claiming that he was actually an AI-generated / deepfake character:



But Kurt Skelton was an actual human (in spite of the well done video claiming he was fake). He was just trolling his audience. [Professor Casey Fiesler](#) talked about it on her TikTok channel:



3.3. Anatomy of a Bot

Since bots are computer programs, let's look at the structure of code written in programming languages.

With all languages (including programming languages), you combine pieces of the language together according to specific rules in order to create meaning. For example: Consider this sentence in English:

I was at UW (University of Washington, Seattle) yesterday.

In our constructing that sentence, we used a number of English language rules, such as:

- Putting the subject **I** before the verb **was**
- Ending the sentence with a period .
- Making a parenthetical remark with a matching opening parenthesis (and closing parenthesis). This parenthetical remark clarified the part of the sentence before it **UW**.

Programming languages also have their own set of rules for combining and organizing pieces of code in order to create meaning. We will look at some of these rules in these sections:

3.3.1. Organizing a Computer Program

In order to understand how a bot is built and can work, we will now look at the different ways computer programs can be organized. We will cover a bunch of examples quickly here, to hopefully give you an idea of many options for how to write a program. Don't worry if you don't follow all of it, as we will go back over these one at a time in more detail throughout the book.

In this section, we will not show actual Python computer programs (that will be in the next section). Instead, here we will focus on what programmers call “[psuedocode](#),” which is a human language outline of a program. Psuedocode is intended to be easier to read and write. Pseudocode is often used by programmers to plan how they want their programs to work, and once the programmer is somewhat confident in their pseudocode, they will then try to write it in actual programming language code.

Note

The programs outlined below in pseudocode are meant to demonstrate what could be done with a computer program, not what should be done or what would necessarily be a good idea.

Statements: Steps that Run In Order

Python is in a group of programming languages called [imperative programming languages](#)^[1].

At their core, programs written in imperative programming languages consist of a list of “statements” to be run in order.

So a program in one of these languages would look like:

- statement 1
- statement 2
- statement 3

And when the program is run, statement 1 runs first, then statement 2, then, finally, statement 3.

You might recognize this as the same style of instructions as a cooking recipe, like making dumplings:

- Make dumpling dough.
- Make veggie filling.
- Flatten small balls of dough.
- Put some filling on each piece of dough.
- Fold dough around the filling.
- Steam the dumplings.

In fact, the format of a cooking recipe is basically an imperative programming language where the cook acts as a “human computer” following the cooking instructions.



A human computer running a cooking program. In other words: “someone following a recipe” (but probably not a dumpling recipe) ([photo source](#))

Twitter bots are generally organized in this same way, so one bot might be organized like this:

- Log into Twitter
- Find any new tweets that mention me that also have curse words
- Look up the users who posted those tweets
- Block those users

Click to see actual code

You are not expected to understand all this code. It is here to give you an examples of what code looks like.

Also, you'll notice that the actual code has a lot more steps then our psuedocode above has.

Note: This code is untested and we may have made programming errors

```
##### Log Into Twitter #####
import tweepy

# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YEhDsdrr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"

# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)

##### Find any new tweets that mention me that also have curse words #####
# get my twitter id
my_info = client.get_user(id = "me", user_auth = True)
my_id = my_info.data.id

# get all tweets that mention me
mentions = client.get_users_mentions(id = my_id)

# import profanity checking library
from profanity_check import predict

# start a List of mentions that have curse words
cursing_mentions = []

# Go through the tweets to see which ones have curse words
for mention in mentions.data:
    # check if the tweet has a curse word
    if(predict(mention.text))[0] == 1:
        # if it did have a curse word, put it in the cursing mentions list
        cursing_mentions.append(mention)

##### Look up the users who posted those tweets #####
# start a List of users to block (starts out empty)
users_to_block = []

# Go through each cursing mention tweet
for cursing_mention in cursing_mentions:
    # Look up the user id for each cursing tweet, and add it to the List of users to block
    users_to_block.append(tweet.author_id)

##### Block those users #####
# Go through each of the users to block
for user_to_block in users_to_block:
    # block the user
    client.block(target_user_id)
```

We will show how to use statements in Python in the next section of this chapter: () .

Variables: Save information for later

Variables are a way of saving information on the computer, so we can use it later in the computer program.

In a cooking recipe, the equivalent would be spaces, containers, bowls, or cups to hold ingredients. So you might place the ingredients on the counter in preparation for cooking. Or you might combine some ingredients in a mixing bowl, so the mixing bowl holds the combined ingredients through each step, like:

To make the dumpling dough:

- Put flour in a mixing bowl and add a bit of salt
- Make a well in the middle of the flour
- Crack the egg into the well (discarding the shell) and use your fingertips to gradually incorporate the flour
- Bring together and knead for about 10 minutes until smooth and elastic, rather than rough and floury.
- Wrap in clingfilm and rest it in the fridge for at least 30 minutes.

Sometimes in cooking, you use multiple mixing bowls to mix different parts of the recipe separately:

To make the dumpling filling:

- While the dough is chilling, In a separate mixing bowl:
- Combine the sauteed onions, pumpkin, and mushrooms
- Add a generous handful of finely chopped fresh dill and parsley
- Mix to combine, then taste. If it needs more salt, add more salt. If it needs some brightness, add a small amount of lemon juice or white rice vinegar, then taste it again.

In a computer program, when you save information for later use, instead of putting it in a bowl, you give it a name. The computer then makes a place in its memory with that name, and saves the information you asked it to save. Then you can use that name later in the program to ask the computer what was saved in that spot.

For example, I might save my first and last name separately in the computer, then combine them together to make my full name (which I save), and then use that full name to send a private message to introduce myself:

- Save my first name in a variable called "first_name"
- Save my last name in a variable called "last_name"
- Create the text of my full name by combining what is in the variable "first_name", followed by a space, followed by what is in the variable "last_name", then save it in a new variable called "full_name"
- Post a tweet saying "Hello my name is __" but filling in the blank with what is in the variable "full_name"

Click to see actual code

You are not expected to understand all this code. It is here to give you an example of what code looks like.

Note: This code is untested and we may have made programming errors

```
# TODO: Copy tweepy and Login steps here

first_name = "Kyle"
last_name = "Thayer"
full_name = first_name + " " + last_name

client.create_tweet(text="Hello my name is " + full_name)
```

Or, when I am looking something up, like my latest tweets, I can save that in a variable so I can look up replies to those tweets the next step:

- Find my latest tweet, and save it as a variable named "my_latest_tweet"
- Search for all tweets that are in the same conversation as my latest tweet, and save them in the variable "my_latest_tweet_replies"

ⓘ Click to see actual code

You are not expected to understand all this code. It is here to give you an examples of what code looks like.

Note: This code is untested and we may have made programming errors

```
# TODO: Copy tweepy and Login steps here

# get my twitter id
my_info = client.get_user(id = "me", user_auth = True)
my_id = my_info.data.id

# Get my latest tweet (and get the conversation id for that tweet)
my_latest_tweet = client.get_users_tweets(my_id, tweet_fields=
['conversation_id'])[0]

# Search for tweets that are in the same conversation as my latest tweet
my_latest_tweet_conversation =
client.Client.search_recent_tweets("conversation_id:" +
str(my_latest_tweet.data.conversation_id))
```

We will show how to use variables in Python in the next section ()�.

Events: When you do something depends

Events let us perform a programming action in response to something happening. The computer may sit and do nothing while waiting for an event to happen.

Within cooking this might look like:

- When the guests arrive, boil or steam the dumplings, and then plate and serve them.

Within programming, it might look like:

- Whenever someone tags me in a post
 - like their post which has me tagged

ⓘ Click to see a note on Python

Note: Python isn't by default set up with event style programming. We won't be directly doing event programming in this book.

We will be doing the Pausing/Scheduling below, which you can use to do some of the same things (e.g., check in every five minutes to see if there are new tweets that tag me).

Pausing/Scheduling

One of the most common events to program for is around time: We can also tell programs to wait for a period of time, or start at a given time.

In cooking this might look like:

- Boil the dumplings for 5 minutes

or

- Start the process of making dumplings 2 hours before guests arrive.

In programming, it might look like:

- Post this set of tweets, pausing 30 seconds between each tweet

Click to see actual code

You are not expected to understand all this code. It is here to give you an examples of what code looks like.

Note: This code is untested and we may have made programming errors

```
# TODO: Copy tweepy and Login steps here

# Load a Library that gives us a pause action (called sleep)
import time

# post a tweet
client.create_tweet(text="I am a bot pretending to slowly type in a series
of tweets.")

# pause for 30 seconds
time.sleep(30)

# post a tweet
client.create_tweet(text="This is my second tweet.")

# pause for 30 seconds
time.sleep(30)

# post a tweet
client.create_tweet(text="It takes a little while for me to pretend to
type up each of these tweets")

# pause for 30 seconds
time.sleep(30)

client.create_tweet(text="here is my final tweet")
```

Or

- every day at noon, post a tweet saying "It's lunchtime!"

Click to see actual code

You are not expected to understand all this code. It is here to give you an examples of what code looks like.

Note: This code is untested and we may have made programming errors

```
# TODO: Copy tweepy and Login steps here

# Load a Library that gives us a scheduling actions
import schedule

# Define a function that when run will say that it is Lunchtime
def say_it_is_lunchtime():
    # when the function is run, post a tweet
    client.create_tweet(text="It's lunchtime!")

# schedule the "say_it_is_lunchtime" function to run every day at noon
schedule.every().day.at("12:00").do(say_it_is_lunchtime)

# Loop forever, once a second running every task that needs to be run
while True:
    # if any tasks are ready to run, run them
    schedule.run_pending()
    # pause for 1 second before checking again
    time.sleep(1)
```

We will show how to use pausing in the next section ()�.

We will show how to use other Events and Scheduling in Python in Chapter 18: Public Shaming.

Conditionals: What you do depends

Conditionals let us change what we do depending on the situation.

In cooking, we might taste for seasoning and change our course of action depending on that test:

- Taste the filling.
- If it is good, proceed to the next section.
- Otherwise (if it is not quite right)
 - If it needs more salt, add more salt
 - If it needs some brightness, add a small amount for lemon juice or white rice vinegar

In programming, we might do this:

- look up the latest tweet mentioning me
 - if that tweet says "It's time to go", then post "Let's go!"
 - otherwise, post "I am still waiting"

ⓘ Click to see actual code

You are not expected to understand all this code. It is here to give you an examples of what code looks like.

Note: This code is untested and we may have made programming errors

```
# TODO: Copy tweepy and Login steps here

# get my twitter id
my_info = client.get_user(id = "me", user_auth = True)
my_id = my_info.data.id

# get the latest tweet that mentions me
latest_mention = client.get_users_mentions(id = my_id).data[0]

if "It's time to go" in latest_mention.text:
    client.create_tweet(text="Let's go!")
else:
    client.create_tweet(text="I am still waiting")
```

We will show how to use conditionals in Chapter 7: Trolling.

Loops: Repeating Actions

Loops are used to repeat actions, though there are several different types of repetitive actions.

In cooking you can repeat an action a set number of times:

- Cut the dough 19 times to make 20 (6 cm) squares.

Or you can repeat the same action, but to different items:

- For each square of dumpling dough
 - fill them with dumpling filling and bring up the corners. Pinch together the edges to seal.

Or you can repeat the same action until you get a certain result:

- Continue kneading the dough until it is smooth and elastic, not rough and floury.

In computer programming, you can repeat an action a set number of times

- Tweet this 100 times: "Warner Brothers should [#ReleaseTheSnyderCut](#) of the Justice League movie."

ⓘ Click to see actual code

You are not expected to understand all this code. It is here to give you an examples of what code looks like.

If you try this yourself, it wont post 100 times, since the twitter blocks you from repeating the same exact tweet repeatedly.

Note: This code is untested and we may have made programming errors

```
# TODO: Copy tweepy and login steps here

# repeat this action 100 times
for i in range(100):
    # post a tweet
    client.create_tweet(text="Warner Brothers should #ReleaseTheSnyderCut
of the Justice League movie.")
```

Or a computer program can repeat an action to a set of items

- Like each of the tweets that were in the same conversation as my latest tweet

ⓘ Click to see actual code

You are not expected to understand all this code. It is here to give you an examples of what code looks like.

Note: This code is untested and we may have made programming errors

```
# TODO: Copy tweepy and login steps here

# Get my latest tweet (and get the conversation id for that tweet)
my_latest_tweet = client.get_users_tweets(my_id, tweet_fields=
['conversation_id'])[0]

# Search for tweets that are in the same conversation as my latest tweet
my_latest_tweet_conversation =
client.Client.search_recent_tweets("conversation_id:" +
str(my_latest_tweet.data.conversation_id))

# repeat this action for all the tweets in the conversation
for tweet in my_latest_tweet_conversation.data:
    # like the tweet
    client.like(tweet.id)
```

Or a computer program can repeat an action until a condition is met:

- Keep sending private messages to this person until they say "Stop it!"

ⓘ Click to see a note

Note: I am not going to directly give you code for harassing someone.

As for repeating an action until a condition is met, those are done with [while loops](#). Feel free to use while loops when you have a legitimate, non-harassment use.

We will show how to use loops in Chapter 5: History of Social Media.

Code Blocks: Grouping statements

Sometimes in programming, we want to group several steps (i.e., statements) together. When we group these steps together we call it a code "block." These blocks of code often used with conditionals (e.g., if this condition is true, do these five steps), and with loops (e.g., for each of these items, do these five steps).

In a recipe, you might create a block of instructions like this:

- for each of the squares of dumpling dough:
 - place one spoonful of filling in the middle of the square
 - fold the dough over the filling
 - pinch the edges to seal it
 - set the dumpling on a piece of parchment paper to await cooking

In a computer program, you might make a code block of statements like this:

- for each of the latest tweets that mention me:
 - look up the time of the tweet (in your time zone)
 - look up the location the tweet was posted in
 - calculate the local time of the person tweeting when they tweeted
 - reply to their tweet ("you posted that tweet at ___ in your time zone")

Using code blocks allows you to do things like put conditionals inside of loops

- for each of the latest tweets that mention me:
 - look up if the tweet was posted from android or an iPhone
 - if it was from an android, like the tweet
 - if it was from an iPhone, block the user who made the tweet

We will show how to use code blocks in Chapter 5: History of Social Media.

Functions/Libraries: Run another program

The final programming organization feature we will cover here is functions and libraries, which basically allow you to run another computer program. This could be a small program that you made that want to use, or it could be a program written by someone else that you are using.

In cooking, this might look like a step of asking the cook to make something from another recipe.

- Make the dumpling dough (see recipe on page 42).

The recipe also could ask you to make a different version of a recipe from another page:

- to make dumplings vegan, make the dumpling dough (see recipe on page 42), but instead of using the egg, substitute 2 teaspoons olive oil and 2 tablespoons hot water.

In programming, a function is a small program that you can run from another place in the code (programmer call this "calling" a function). Functions also can accept data and options for how they run. Code libraries are a collection of functions and data that help with certain tasks.

In this book, we will be using the [praw](#) code library, which comes with many pre-written functions that help us do actions on Reddit, functions like:

- [subreddit](#) (to select a subreddit)
- [submit](#) (to submit to a subreddit)
- [submit_image](#) (to submit an image to a subreddit)
- [top](#) (to get the current top posts off a subreddit)
- [upvote](#) (to upvote a post or comment)
- etc.[\[2\]](#)

If you look back over the various psuedocode and code examples above, most of them involve calling various functions, (though those examples use the tweepy library for Twitter). Additionally, the scheduling example code includes defining a new function and using it.

We will show examples of calling functions starting in the next section.

We will show how to write functions in Chapter 9 (Privacy and Security).

-
- [1] There are other types of programming organizations as well, such as [functional programming](#) (like [Excel](#) and [Google Sheets](#)), [visual programming](#) (like the educational [Scratch](#), or the 3D Graphics [Blender node editor](#)), [declarative programming](#) (like HTML and CSS web content) [object oriented programming](#) (can be done in Python, JavaScript, and many others), and [many more](#).
 - [2] You can get a full list of praw functions by starting from [this Praw documentation page](#). That page has links for each type of thing on reddit, such as a comment, redditor, submission, etc. If you follow one of those you will get information on the different things you can do with those on using praw. Unfortunately, it is not easy to read this information, but we will cover pieces of it as we go in this book.

3.3.2. Demo: Statements, Variables, and Sleep

Statements

As we said before, a computer program in a programming language like Python is often composed of a list of statements, that is steps to be run in order (like a recipe):

```
- statement 1  
- statement 2  
- statement 3
```

In Python, generally each new line of code is a new statement, to be run after the previous statement.

We will start writing statements using a line of code that looks like this which runs a function called `display`:

```
display("Ethics might be relevant!")
```

Below you will see this line of code (one statement), and right below it will be displayed the text in the quotes ("Ethics might be relevant!").

```
display("Ethics might be relevant!")
```

```
'Ethics might be relevant!'
```

Now let's try several statements in a row, with mulitple lines of code that display text:

```
display("This book is about:")  
display("  - Social Media")  
display("  - Ethics")  
display("  - Automation")
```

```
'This book is about:'
```

```
  - Social Media'
```

```
  - Ethics'
```

```
  - Automation'
```

Now that we've made multiple statements in a row, let's do something a little more complicated than just displaying text by using variables.

Variables and assignment (single "=")

As we said in the previous section, Variables are a way of saving information on the computer, so we can use it later in the computer program, similar to how we might put mix ingredients in different bowls, using the mix from each bowl at the relevant time.

In a computer program, these variables are given names so we can more easily get the information back out again.

Saving a text value

To store something in a variable (called "assigning" it a value), write the variable name, followed by an "=" symbol, followed by whatever we want to save in the variable. For example:

```
greetings_message = "Hello and welcome to programming with variables!"
```

The line of code above saved the text "Hello and welcome to programming with variables!" into a variable called "`greetings_message`"

Since this was just saving something into the computer, there is nothing displayed after we run that line of code.

Note: The `=` symbol in Python does not mean the same thing it does in a math formula. In a math formula, "`=`" means that both sides of the equation are the same (like "`1 + 1 = 2`"). In Python, `=` means that the value on the right gets stored into the variable on the left (this is called "assignment", that is, assigning a value into a variable).

Variable names

When we choose a variable name for storing information, we try to choose a name that will help us remember what was saved there and what we will use that information for. So `greeting_message` helps us remember that what we saved in there was a greeting.

One thing you might notice is that the variable name `greeting_message` has an underscore (`_`) instead of a space between the words. That's because one of Python's rules is that variable names can't have spaces in them, so we just use `_` instead. You can read some more variable naming rules [here](#).

Displaying a value

If we want to see what we saved in the variable we can display it using the `display` function.

```
display(greetings_message)
```

```
'Hello and welcome to programming with variables!'
```

Storing numbers

We can also store numbers in variables. For example, we can save

- the number of likes a tweet has in a variable called "`number_likes`"
- the number of replies a tweet has in a variable called "`number_replies`"
- the number of quote tweets a tweet has in a variable called "`number_quote_tweets`"

(We're just invent numbers for these for now)

```
number_likes = 30
number_replies = 12
number_quote_tweets = 8
```

Again, the computer shows no output after running these lines of code, but the computer now has numbers saved for "`number_likes`", "`number_replies`", and "`number_quote_tweets`"

Displaying multiple variables

We can see what is saved in those variables by calling the `display` function again:

```
display(number_likes)
display(number_replies)
display(number_quote_tweets)
```

30

12

8

Taking from variables and storing in new variable

In python we can look up variables and do something with them and save them into new variables. For example, if we consider “total engagement” of a tweet to be the sum of all the number of likes, replies, and quote tweets, we can calculate that and store it into a new variable:

```
total_engagement = number_likes + number_replies + number_quote_tweets
```

And then we can see what was saved in that new variable:

```
display(total_engagement)
```

50

Updating a variable value

One particular trick we can do with variables is look up what is currently stored in the variable, update the value, and resave it into the same variable.

For example if I have a variable called `current_likes` that has the the number 5 stored in it:

```
current_likes = 5
```

Now, if someone pressed the like button, we'd want to make that number one higher (6).

To do this, we can look up the value in `current_likes` and add 1 to it by writing `current_likes + 1`, and then we can store this updated value into `current_likes` but putting `current_likes =` in front, like this:

```
current_likes = current_likes + 1
```

Remember: the `=` sign in programming isn't saying both sides are equal like in math, it is saying, take the value on the right of the `=`, and store it into the variable on the left of the `=`.

We can display the `current_likes` and see it is now 6

```
display(current_likes)
```

6

We can run the same line of code again and see the number get higher each time

```
current_likes = current_likes + 1
display(current_likes)
```

7

```
{ current_likes = current_likes + 1  
    display(current_likes)
```

8

Other options for displaying

Before we move on we wanted to show you two more ways of viewing a variable:

There is a function called `print` that does almost the exact same thing as `display`, it “prints” the output to the screen (not to paper). Note: `print` is a commonly used function in Python, so you may see `print` if you look at other Python code.

- just write variable name (if it is the last thing in the code block)
- `print()`

```
{ print(current_likes)
```

8

The other way of displaying a variable value is to just write the name of the variable.

```
{ current_likes
```

8

But this way of displaying a variable will only work if it is the last line of code in the code block. So if I write a bunch of variables on their own lines, only the last one will be displayed:

```
{ number_likes  
number_replies  
number_quote_tweets  
current_likes
```

8

Sleep (pausing)

One thing we can make our code do is pause before continuing. To do this we will use a function called `sleep` that comes from a code library called `time`.

So we will start by importing that `sleep` function from `time`:

```
{ from time import sleep
```

Now that we have `sleep` imported, we can use it to pause between code actions. This will be most noticeable when we are displaying something, like this:

```
{ display("I am displaying a message before pausing for two seconds")  
sleep(2)  
display("I have finished my two second pause. Now I will pause for 3 more seconds")  
sleep(3)  
display("I have finished the three second pause, and now I am done")
```

```
'I am displaying a message before pausing for two seconds'
```

```
'I have finished my two second pause. Now I will pause for 3 more seconds'
```

```
'I have finished the three second pause, and now I am done'
```

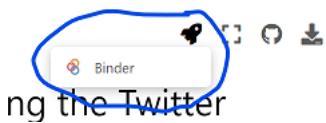
If you run the code above you will see that the program pauses as it displays the output above.

These pauses may come in handy when posting tweets, to make it look like your bot is taking time to type in the text. You will get a chance to try that in the next practice section.

3.3.3. Practice: Statements and Variables

This Python Notebook is a chance for you to try out the programming concepts we have covered thus far.

As we mentioned previously in the first bot demo (2.3.8), in order to run the code, you can look for the rocket button at the top which will give you an option to "launch binder"



If you launch binder, it will take a while to load, but eventually show you a version of this page Jupyter Notebook in a code editor called Jupyter Lab



In Jupyter Lab you can double click any section to edit it, and you can press the triangle "run" button to run the code (or display the text).



When the code runs, the little number to the left of the code block should change. There might also be some output from your action displayed below the code block.

So now you can go through the rest of this page and try out the practice exercises for yourself!

Variables

You will first practice saving values into variables. Remember, the way we save a value into a variable is like this:

```
variable_name = value
```

First, save the piece of text "I am writing a computer program!" into a variable called `my_progress`

```
# TODO: enter your code here
```

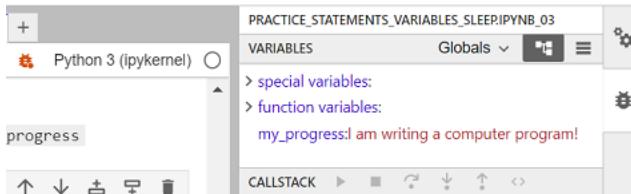
Viewing variables in the debugger

Before we continue, we are going to show you how to open the debugger so you can see what is being saved in your variables.

On the top right of this tab, press the small bug icon to "enable debugging":



Then, if you did the step above correctly, you should see the variable `my_progress` with the value "I am writing a computer program!" next to it:



Practice number variables

First, write and run a line of code to save the value 5 into a variable named `number_of_pies`

```
# TODO: enter your code here
```

Now, save the value 12.5 into a variable named `cost_per_pie`

```
# TODO: enter your code here
```

Now make a new variable called `total_pie_cost` and save into the value of the `number_of_pies` multiplied by the `cost_per_pie`.

Note: In python (and many programming languages), the symbol for multiply is *

```
# TODO: enter your code here
```

Now use the `display` function to display what is saved in `total_pie_cost`

```
# TODO: enter your code here
```

More variable practice

Now, make a new variable called `first_name` and assign your first name to it

```
# TODO: enter your code here
```

Now, make a variable called `last_name` and save your last name to it

```
# TODO: enter your code here
```

Create a variable called `age` and assign your age to it.

```
# TODO: enter your code here
```

~ A year goes by ~

Increase the `age` variable by 1.

```
# TODO: enter your code here
```

Now write three lines of code, with each line using `display` to show what is saved in `first_name`, `last_name`, and `age`

```
# TODO: enter your code here
```

Sleep

In order to use sleep, we must first import it from the time library

```
from time import sleep
```

Now try displaying 5 messages of your choosing, with some pauses between each one:

```
# TODO: enter your code here
```

Reddit Bot Practice

Now lets try a Reddit bot with variables and sleep!

Load Praw Library

First, we need to load the praw library

```
# Load some code called "praw" that will help us work with reddit
import praw
```

(Optional) Step 1b: Make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it wont actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

Step 2: Load your developer access passwords

To use this on your real Reddit account, copy your [developer access passwords](#) into the code below, replacing our fake passwords.

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

Step 4: Give praw (or fake_praw) your developer access passwords

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Step 5: Submit a post to Reddit

Post something you learned in the class so far:

Remember, the code to post a tweet looks like this:

```
reddit subreddit(
    "soc_media_ethics_auto"
).submit(
    "This is the title of the post",
    selftext = "This is the content of the post"
)
```

```
# TODO: enter your code here
```

Post from a variable

Now try saving a piece of text in a variable for the title, and another for the content of a post, and then submitting a post of whatever you saved in the variables.

To do this, where the code has `submit(...)`, you'll replace the quoted text with the variable name, so it will look like:

```
reddit.subreddit(  
    "soc_media_ethics_auto"  
)  
.submit(  
    title_variable,  
    selftext = content_variable  
)
```

(with whatever your variable name was instead of "title_variable" and "content_variable")

```
# TODO: enter your code here
```

Submit multiple posts

Next try submitting 3 posts, but use `sleep` to add pauses between each one (note that reddit might not want you to make more than 1 post every 15 minutes, so you can sleep for 15*60 seconds or more before posting again).

```
# TODO: enter your code here
```

3.4. Bots and Responsibility

As we think about the responsibility in ethical scenarios on social media, the existence of bots causes some complications.

3.4.1. A Protesting Donkey?

To get an idea of the type of complications we run into, let's look at the use of donkeys in protests in Oman:

"public expressions of discontent in the form of occasional student demonstrations, anonymous leaflets, and other rather creative forms of public communication. **Only in Oman has the occasional donkey...been used as a mobile billboard to express anti-regime sentiments. There is no way in which police can maintain dignity in seizing and destroying a donkey on whose flank a political message has been inscribed.**"

- From [Kings and People: Information and Authority in Oman, Qatar, and the Persian Gulf](#) by Dale F. Eickelman [1]

In this example, some clever protesters have made a donkey perform the act of protest: walking through the streets displaying a political message. But, since the donkey does not understand the act of protest it is performing, it can't be rightly punished for protesting. The protesters have managed to separate the intention of protest (the political message inscribed on the donkey) and the act of protest (the donkey wandering through the streets). This allows the protesters to remain anonymous and the donkey unaware of its political mission.

3.4.2. Bots and responsibility

Bots present a similar disconnect between intentions and actions. Bot programs are written by one or more people, potentially all with different intentions, and they are run by others people, or sometimes scheduled by people to be run by computers.

This means we can analyze the ethics of the action of the bot, as well as the intentions of the various people involved, though those all might be disconnected.

3.4.3. Reflection questions

- How are people's expectations different for a bot and a "normal" user?
- Choose an example social media bot (find on your own or look at [Examples of Bots \(or apps\)](#)).
 - What does this bot do that a normal person wouldn't be able to, or wouldn't be able to as easily?
 - Who is in charge of creating and running this bot?
 - Does the fact that it is a bot change how you feel about its actions?
- Why do you think social media platforms allow bots to operate?
 - Why would users want to be able to make bots?
 - How does allowing bots influence social media sites' profitability?

[1] We haven't been able to get the original chapter to load to see if it indeed says that, but I found it quoted [here](#) and [here](#). We also don't know if this is common or representative of protests in Oman, nor that we fully understand the cultural importance of what is happening in this story. Still, we are using it at least as a thought experiment.

3.5. Activity: Find Lists of Bots

In order to get more of a sense of what bots are out there, try searching for social media bots and see what you can find. Try strategies like:

- Google: "Most useful Instagram bots"
- Google: "Funniest Twitter bots"
- Read through the Reddit "[botwatch](#)" subreddit
- Read through a [list of registered bots on Wikipedia](#)

3.5.1. Reflection Questions:

- What bots do you find surprising?
- What bots do you like?
- What bots do you dislike?

3.6. Learn more

- [How to Make a Bot That Isn't Racist](#)

4. Data

Now that we've looked at the ways a bot is constructed (statements, variables, events, conditionals, loops, code blocks, and functions/libraries), let's now look at how bots and social media programs represent data.

4.1. Anatomy of a Tweet

In order to understand how data is represented on a computer (following up on [Chapter 2.3.3: Computers Speak Binary](#)), we will look at all the data in an example a tweet:

 WeRateDogs® 🐾 @dog_rates · Feb 10, 2020 ...
This is Woods. He's here to help with the dishes. Specifically the pre-rinse, where he licks every item he can. 12/10



1,533

26.6K

197.8K



Fig. 4.1 A tweet with photos of a cute puppy! ([source](#))

4.1.1. Data in a Tweet

Let's look at all the data that we can see when we look at a tweet on twitter:

 WeRateDogs® 🐾 @dog_rates · Feb 10, 2020 ...
This is Woods. He's here to help with the dishes. Specifically the pre-rinse, where he licks every item he can. 12/10



1,533

26.6K

197.8K



Fig. 4.2 A tweet with photos of a cute puppy! ([source](#))

In this screenshot of Twitter, we can see the following information:

- The account that posted it:
 - User handle is @dog_rates
 - User name is WeRateDogs®
 - User profile picture is a circular photo of a white dog
 - This user has a blue checkmark
- The date of the tweet: Feb 10, 2020
- The text of the tweet: "This is Woods. He's here to help with the dishes. Specifically, the pre-rinse, where he licks every item he can. 12/10"
- The photos in the tweet: Three photos of a puppy on a dishwasher
- The number of replies: 1,533
- The number of retweets: 26.2K
- The number of likes: 197.8K

Data and Metadata

One way we can categorize the data in this tweet is to separate it into data and metadata, like this:



Fig. 4.3 The “data” of a tweet consists of the tweet text and the photos. The “metadata” of a tweet is all the rest of the information about that tweet, such as who tweeted it, and when, and how people responded.

Metadata is information about some data. So we often think about a dataset as consisting of the main pieces of data (whatever those are in a specific situation), and whatever other information we have about that data (metadata).

For example:

- If we think of a tweet’s contents (text and photos) as the main data of a tweet, then additional information such as the user, time, and responses would be considered metadata.
- If we download information about a set of tweets (text, user, time, etc.) to analyze later, we might consider that set of information as the main data, and our metadata might be information about our download process, such as when we collected the tweet information, which search term we used to find it, etc.

Now that we’ve looked some at the data in a tweet, let’s look next at how different pieces of this information are saved.

4.1.2. Basic Data Types

First, we’ll look at a few basic data storage types. We’ll also be including some code examples you can look at, though don’t worry yet if you don’t understand the code, since we’ll be covering these in more detail throughout the rest of the book.

Booleans (True / False)

Binary consisting of 0s and 1s make it easy to represent true and false values, where 1 often represents true and 0 represents false. Most programming languages have built-in ways of representing True and False values.



Fig. 4.4 A blue checkmark is something an account either has or doesn't so it can be stored as a binary value.

Booleans are often created when doing sort of comparison or test, like:

- Do I have enough money in my wallet to pay for the item?
- Does this tweet start with "hello" (meaning it is a greeting)?

i Click to see example Python code

```
# Save a boolean value in a variable called does_user_have_blue_checkmark
does_user_have_blue_checkmark = True

# Save a boolean value in a variable based on a comparison.
# The code checks if a wallet has more in it than the cost of the item
#   which will be True or False, and be saved in has_enough_money
has_enough_money = money_in_wallet > cost_of_item

# Save a boolean value in a variable based on a function call.
# The code checks if the text of a tweet (stored in tweet_text) starts
#   with "Hello", which will be True or False, and be saved in is_greeting
is_greeting = tweet_text.startswith("Hello")
```

Numbers

Numbers are normally stored in two different ways:

- Integer: whole numbers like 5, 37, -10, and 0
- Floating point numbers: these can represent decimals like: 0.75, -1.333, and 3×10^8



WeRateDogs® 🐾 @dog_rates · Feb 10, 2020

...

This is Woods. He's here to help with the dishes. Specifically the pre-rinse, where he licks every item he can. 12/10



1,533

26.6K

197.8K



Fig. 4.5 The number of replies, retweets, and likes can be represented as integer numbers (197.8K can be stored as a whole number like 197,800).

➊ Click to see example Python code

```
# Save an integer value in a variable called num_tweet_likes
num_tweet_likes = 197800

# Save an integer value in a variable called max_tweet_length
max_tweet_length = 280

# Save a floating point number in a variable called average_tweet_length
average_tweet_length = 133.5
```

When computers store numbers, there are limits to how much space is can be used to save each number. This limits how big (or small) the numbers can be, and causes rounding with floating-point numbers.

Additionally, programming languages might include other ways of storing numbers, such as fractions, [complex numbers](#), or limited number sets (like only positive integers).

Strings (Text)

Computers typically store text by dividing the text into **characters** (the individual letters, spaces, numerals, punctuation marks, emojis, and other symbols). These characters are then stored in order and called **strings** (that is a bunch of characters strung together, like in [Fig. 4.6](#) below).



Fig. 4.6 A physical string of the characters: "H", "A", "P", "P", "Y", " ", "B", "I", "R", "T", "H", "D", "A", "Y". ([image source](#))

In our example tweet, we can see some different pieces of information that might be represented with strings:



Fig. 4.7 The user name, twitter handle, and the tweet text can all be represented with strings.

ⓘ Click to see example Python code

```
# Save a string in a variable called user_name
user_name = "WeRateDogs®"

# Save a string in a variable called twitter_handle
twitter_handle = "@dog_rates"

# Save a string in a variable called tweet_text
twitter_handle = "This is Woods. He's here to help with the dishes.
Specifically the pre-rinse, where he licks every item he can. 12/10"
```

Text can be stored with extra formatting information, such as fonts and colors, in different [document file formats](#) like Word Documents, PDF files, [html website files](#), etc.

Note: We'll demonstrate strings later in this chapter, and in more detail in Chapter 7: Trolling

4.1.3. Grouping data

Once we have some types of data representation on a computer, we can create different groupings of data to represent more types of data. We'll look at two types of groupings here: Lists and Dictionaries.

Lists

The first way of combining data is by making a list.

So we can make a list of the numbers from 1 to 10:

- 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

ⓘ Click to see example Python code

```
# Save a List of the numbers from 1 to 10 in a variable called one_to_ten
one_to_ten = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

In our example tweet we can see several places where data could be saved in lists:



WeRateDogs® 🐶 @dog_rates · Feb 10, 2020

...

This is Woods. He's here to help with the dishes. Specifically the pre-rinse, where he licks every item he can. 12/10



1,533

26.6K

197.8K



Fig. 4.8 There are several lists in the tweet. There is a list of three images, and there are links that will take you to the lists of replies, retweets, and likes.

ⓘ Click to see example Python code

```
# Save a List of people who liked a tweet in a variable called tweet_likes
tweet_likes = ["@kylemthayer", "@SusanNotess"]
```

Additionally the text strings we saw before are actually stored internally as lists of characters.

The items in lists are normally numbered with an “index”, so you can ask for the 1st item, or 2nd item, or any other.

Note: Largely due to [historical peculiarities in the development of programming languages](#), most programming languages (including Python) number the 1st item in a list as item “0”. So:

- 1st item has index 0
- 2nd item has index 1
- 3rd item has index 2
- etc.

ⓘ Click to see example Python code

```
# Save a List of twitter handles in a list called book_authors
book_authors = ["@kylemthayer", "@SusanNotess"]

# Save the first author twitter handle in a variable called first_author
first_author = book_authors[0]

# Save the second author twitter handle in a variable called second_author
second_author = book_authors[1]

# Save a string (a list of characters) in a variable called key_word
key_word = "ethics"

# Get the first letter ("e"), and save it in variable first_letter
first_letter = key_word[0]

Get the second letter ("t"), and save it in variable second_letter
second_letter = key_word[1]
```

There are many types of list data structures in different programming languages with subtle differences (we won't worry about those in this book). Python has [lists](#), [tuples](#), and [sets](#). Other languages have a list type called [arrays](#). We will just focus on lists and not worry about the other similar data types.

We'll demonstrate lists later in Chapter 5: History of Social Media.

Dictionaries

The other method of grouping data that we will discuss here is called a "dictionary" (sometimes also called a "map").

You can think of this as like a language dictionary where there is a word and a definition for each word. Then you can look up any name or word and find the value or definition.

Example: An English Language Dictionary with definitions of three terms:

- **Social Media:** An internet-based platform used for people to form connections to each other and share things.
- **Ethics:** Thinking systematically about what makes something morally right or wrong, or using ethical systems to analyze moral concerns in different situations
- **Automation:** Making a process or activity that can run on its own without needing a human to guide it.

The Dictionary data type allows programmers to combine several pieces of data by naming each piece. When we do this, the dictionary will have a number of names, and for each of those names a piece of information (called a "value" in this context).

Dictionary:

- Name 1: Value 1
- Name 2: Value 2
- Name 3: Value 3

So if we look at the example tweet, we can combine all the data in a dictionary.



Fig. 4.9 A tweet with photos of a cute puppy! ([source](#))

Dictionary (with some of the data):

- user_name: "WeRateDogs®"
- user_handle: "@dog_rates"
- user_has_blue_checkmark: True

- tweet_text: "This is Woods. He's here to help with the dishes. Specifically the pre-rinse, where he licks every item he can. 12/10"
- number_of_replies: 1533
- number_of_retweets: 26200
- number_of_likes: 197800

ⓘ Click to see example Python code

```
# Save some info about a tweet in a variable called tweet_info
tweet_info = {
    "user_name": "WeRateDogs®",
    "user_handle": "@dog_rates",
    "user_has_blue_checkmark": True,
    "tweet_text": "This is Woods. He's here to help with the dishes. Specifically the pre-rinse, where he licks every item he can. 12/10",
    "number_of_replies": 1533,
    "number_of_retweets": 26200,
    "number_of_likes": 197800
}
```

Note: We'll demonstrate dictionaries later in Chapter 5: History of Social Media, and Chapter 8: Data Mining.

Groups within Groups

We can use dictionaries and lists together to make lists of dictionaries, lists of lists, dictionaries of lists, or any other combination.

So for example, I could make a list of Twitter users. Each Twitter user could be a dictionary with info about that user, and one piece of information it might have is a list of who that user is following.

List of users:

User 1:

- Username: kylethayer (a String)
- Twitter handle: @kylemthayer (a String)
- Profile Picture: [TODO picture here] (an image)
- Follows: @SusanNotess, @UW, @UW_iSchool, @ajlunited, ... (a list of Strings)

User 2:

- Username: Dr Susan Notess (a String)
- Twitter handle: @SusanNotess (a String)
- Profile Picture: [TODO picture here] (an image)
- Follows: @kylemthayer, @histoftech, @j_kalla, @dbroockman, @qaxaaawut, @shengokai, @laniwhatison (a list of Strings)

ⓘ Click to see example Python code

```
users = [
    {
        "username": "kylethayer",
        "twitter_handle": "@kylemthayer",
        "profile_picture": "kylethayer.jpg",
        "follows": ["@SusanNotess", "@UW", "@UW_iSchool", "@ajlunited"]
    },
    {
        "username": "Dr Susan Notess",
        "twitter_handle": "@SusanNotess",
        "profile_picture": "susannotess.jpg",
        "follows": ["@kylemthayer", "@histoftech", "@j_kalla", "@dbroockman",
        "@qaxaaawut", "@shengokai", "@laniwhatison"]
    },
]
```

4.1.4. Additional Data Types

You might have noticed that there are still a couple pieces of data on the example tweet that we haven't discussed yet. Let's look at those now.

Images / Sounds / Videos

Our example tweet has several images in it:



Fig. 4.10 The profile picture and the puppy photos in the tweet are images.

While you won't need to know the details of how images, sound, and video are stored for this book, we wanted to at least briefly discuss it here just to give you a rough idea of how computers store these kinds of data.

Images are created by defining a grid of dots, called pixels. Each pixel has three numbers that define the color (red, green, and blue), and the grid is created as a list (rows) of lists (columns).

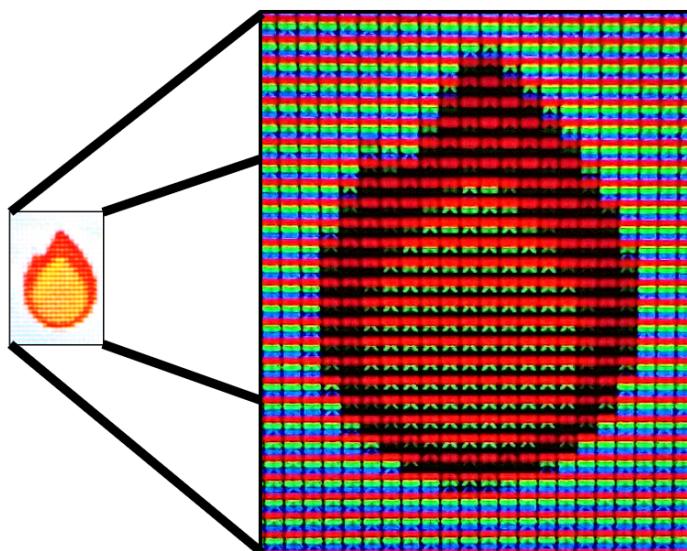


Fig. 4.11 When viewing the fire emoji (🔥) close-up on a screen, you can see the bands of red, green, and blue that make up each pixel. If you try squinting your eyes or looking at the image from far away, it should blur back into the emoji.

Sounds are represented as the electric current needed to move a speaker's diaphragm back and forth over time to make the specific sound waves. The electric current is saved as a number, and those electric current numbers are saved at each time point, so the sound information is saved as a list of numbers.

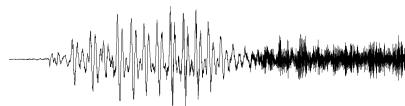
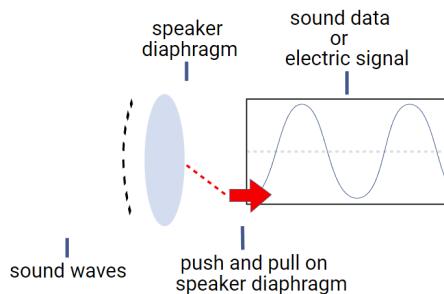


Fig. 4.12 A computer representation of the sound of Kyle saying "this."



HTML ANIMATION TO GO

Fig. 4.13 How sound information turns into an electric signal, which then works with a magnet to push and pull on a [diaphragm inside a speaker](#) to create physical sound waves. Microphones do this process in exactly the reverse, the sound waves in the air make the speaker diaphragm go back and forth, making an electric current in the wire which gets measured and saved by the computer.

Videos are represented as a sequence of images (a list of images) called frames, often with a sound wave to be played at the same time.



In most cases, after the initial data representation is created, the computer runs a compression algorithm, which takes the image, sound, or video, and finds a way of storing it in much less computer memory, often losing some of the quality when doing so.



Metadata

In addition to the main components of the images, sound, and video data, this information is often stored with metadata, such as:

- The time the image/sound/video was created
- The location where the image/sound/video was taken
- The type of camera or recording device used to create the image/sound/video
- etc.

For our purposes in this class, most of the time we run into images, we will find a string that tells us where the image, video, or sound is saved (e.g., we'll get something like "kylethayer.jpg"), and we might additionally get some metadata.

Dates and Times

The final piece of data from the tweet we will cover is the date when the tweet was posted:

WeRateDogs® 🐶 @dog_rates · Feb 10, 2020

This is Woods. He's here to help with the dishes. Specifically the pre-rinse, where he licks every item he can. 12/10

1,533 26.6K 197.8K

Fig. 4.14 The tweet includes the date when it was posted.

There are several options for how to save dates and times. Some options include a series of numbers (year, month, day, hour, minute, and second), or a string that with all of those pieces of information written out. Sometimes only the date is saved, with no time information, and sometimes the time information will include the timezone.

Dates turn out to be one of the trickier data types to work with in practice. One of the main reasons for this is that what time or day it depends on what time zone you are in.

So, for example, when Twitter tells me that the tweet was posted on Feb 10, 2020, does it mean Feb 10 for me? Or for the person who posted it? Those might not be the same. Or if I want to see for a given account, how much they tweeted "yesterday," what do I mean by "yesterday?" We might be in different time zones and have different start and end times for what we each call "yesterday."

Note: We'll work with dates and times a little bit in chapter 18: Public Shaming

4.1.5. Data Constraints

In addition to representing data with different data storage methods, computers can also let you add additional constraints on what can be saved. So, for example, you might limit the length of a tweet to 280 characters, even though the computer can store longer strings.

There are many places these constraints might be used such as:

- for an age (integer), only allow ages between 0 and 120
- for a country name (string), have a pre-set list of valid country names
- for a legal name (string), disallow emojis

4.1.6. Reflection Questions

Let's look at an example of information we might want to store on a computer:

If we look at a data field like gender, there are different ways we might try to represent it. We might try to represent it as a binary field, but that would exclude people who don't fit within a gender binary. So we might try a string that allows any values, but taking whatever text users end up typing might make data that is difficult to work with (what if they make a typo or use a different language?). So we might store gender using strings, but this time use a preset list of options for users to choose from, perhaps with a way of choosing "other," and only then allow the users to type their own explanation if our categories didn't work for them. Perhaps you question whether you want to store gender information at all.

Now it's your turn, choose some data that you might want to store on a social media type, and think through the storage types and constraints you might want to use:

- Age
- Name
- Address
- Relationship status
- etc.

4.2. All data is a simplification of reality

We've talked about how we represent data on a computer, but let's now step back and think about the nature of data itself.

Note: This section was inspired by Kareem Carr

- https://twitter.com/kareem_carr/status/1551950155330600960
- [Why Some People Think 2+2=5 ...and why they're right.](#)

4.2.1. Twitter Users vs. Bots

Let's look at a debate around a specific data point:

"Twitter has repeatedly said that spam bots represent less than 5% of its total user base. [Elon] Musk, meanwhile, has complained that the number is much higher, and has threatened to walk away from his agreement to buy the company."

[Musks Dispute With Twitter Over Bots Continues to Dog Deal](#), by Kurt Wagner, Bloomberg July 7, 2022

The data in question here is over what percentage of Twitter users are spam bots, which Twitter claimed was less than 5%, and Elon Musk claimed is higher than 5%.

Data points often give the appearance of being concrete and reliable, especially if they are numerical. So when Twitter initially came out with a claim that less than 5% of users are spam bots, it may have been accepted by most people who heard it. Elon Musk then questioned that figure and attempted to [back out of buying Twitter](#), and Twitter is [accusing Musk's complaint of being an invented excuse](#) to back out of the deal, and [the case is now in court](#).

When looking at real-life data claims and datasets, you will likely run into many different problems and pitfalls in using that data. Any dataset you find might have:

- missing data
- erroneous data (e.g., mislabeled, typos)
- biased data
- manipulated data

Any one of those issues might show up in Twitter's claim or Musk's counterclaim, but even in the best of situations there is still a fundamental issue when looking at claims like this, and that is that:

All data is a simplification of reality.

Let's consider a concrete example involving apples:

4.2.2. Counting Apples

We all know simple math facts, like $2 + 2 = 4$, and $4 = 1 \times 4$. So that means that if we had two apples like this:



And if we added two more apples, we would have 4 apples (because $2 + 2 = 4$), like this:



And if there were four of us who wanted to have apples, we could give each person 1 apple, and they would have the same number of apples (because $4 = 1 \times 4$), like this:



Now, while each person has 1 apple, you might complain that it isn't fair (and if you try this with children, they will almost certainly let you know it isn't fair), since the apples weren't all the same size. Two of the four apples were particularly small.

So, there was a simplification here. In this example, I decided that each of these would count as "1 apple." This way of looking at things might not work well in some situations:

- If we want everyone to get the same amount of apples by weight, we would have to cut the apples into pieces so we could give each person the same amount.
- If we wanted to give everyone some amount of apple that they could keep for a few days before eating, then we would want to not cut the apples, so keeping them as whole apples might be the best solution.

4.2.3. What we lose in simplifying

As you can see in the apple example, any time we turn something into data, we are making a simplification.^[1] If we are counting the number of something, like apples, we are deciding that each one is equivalent. If we are writing down what someone said, we are losing their tone of voice, accent, etc. If we are taking a photograph, it is only from one perspective, etc.

- Different simplifications are useful for different tasks. Any given simplification will be helpful for some tasks and be unhelpful for others.
 - See also, this saying in statistics: [All models are wrong, but some are useful](#)

4.2.4. More examples of simplifications

So all data that you might find is a simplification. There are many seemingly simple questions that in some situations or for some people, have no simple answers, questions like:

- What country are you from?
 - *What if you were born in one country, but moved to another shortly after? What if you are from a country that no longer exists like Czechoslovakia? Or from an occupied territory?*
- How many people live in this house?
 - *Does a college student returning home for the summer count as living in that house?*
- How many words are in this chapter?
 - [*Different programs use different rules for what counts as a "word"*](#)
 - E.g., this page has " $2 + 2 = 4$ ", which Microsoft Word counts as 5 words, and Google Docs counts as 3 words.

4.2.5. Revisiting Twitter Users vs. Bots

Let's go back to the question of whether less than 5% of Twitter users are spam bots.

In this claim are several places where there are simplifications being made, particularly in the definitions of "Twitter users" and "spam bots."

Measuring Twitter users:

How do we count how many users are on Twitter?

It depends on if we mean how many accounts have been registered vs. how many people are logged into Twitter on a given day. And it also depends on how we count situations where one person has many accounts, or many people share a corporate account.

Measuring spam bots

How do we count how many spam bots are on Twitter?

The Bloomberg article we quoted mentions "spam bots" as what is being measured, but Elon Musk has used phrases like "[fake or spam](#)" accounts and "[fake/spam/duplicates](#)," which might lead to different numbers.

Parag Agrawal, the Twitter CEO, additionally clarified the complications of measuring "spam" accounts, saying:

Next, spam isn't just 'binary' (human / not human). The most advanced spam campaigns use combinations of coordinated humans + automation. They also compromise real accounts, and then use them to advance their campaign. So – they are sophisticated and hard to catch.

[\(tweet link\)](#)

What changes with these measures?

While we don't have direct access to all the data ourselves, we can imagine that different definitions would lead to different results. And there isn't a "best" or "unbiased" definition we should be using, since all definitions are simplifications that will help with some tasks and hurt with others.

We have to be aware that we are always making these simplifications, try to be clear about what simplifications we are making, and think through the ethical implications of the simplifications we are making.

[1] There is one exception where you can have data that isn't a simplification, and that is if the data source is symbolic (e.g., numbers) and you are applying unambiguous rules (e.g., math). Since it starts out as a symbol, it doesn't need to be simplified to be represented with symbols. For example, data that can be made without simplification include:

- A list of the first 10 prime numbers.
- The number of times the letter 'a' (capital or lowercase) appears in this sentence.

4.3. Who does data fit?

Because all data is a simplification of reality, those simplifications work well for some people and some situations but can cause problems for other people and other situations.

Thus, when designers of social media systems make decisions about how data will be saved and what constraints will be put on the data, they are making decisions about who will get a better experience. Based on these decisions, some people will fit naturally into the data system, while others will have to put in extra work to make themselves fit, and others will have to modify themselves or misrepresent themselves to fit into the system.

So, for example, if we made a form that someone needed to enter their address, we could assume everyone is in the United States and not have any country selection.

- Address fields:
 - Street address
 - City
 - State

- o Zip Code

Someone in another country would have to try to find a way to indicate that they aren't in the United States even though there is no clear place to indicate that. If this is a form for shipping to people in the US only, then this limitation might make sense.

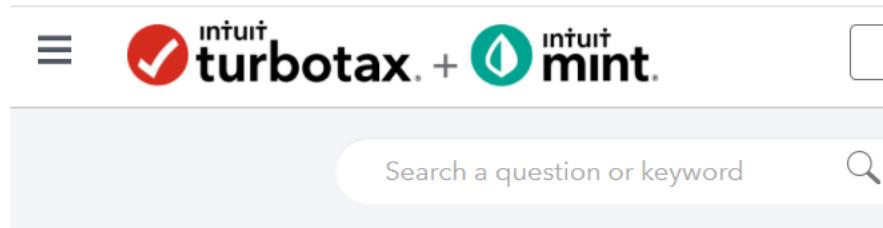
If we wanted people to be able to enter other countries we could make a country drop-down tool to select a country, but then would we auto-fill it with a country? If there is a list of countries to scroll through, what order do we put them in? If it's alphabetical, that will make it easier for people in countries whose name starts with "A."

4.3.1. Form fails

Let's look at some examples where forms show problems with data entry and representation:

Name Length

Here are some screenshots from a [help forum discussion](#) on the United States tax software TurboTax:



A screenshot of a web browser showing the TurboTax help forum. At the top, there are navigation icons for a menu, search, and account. Below the header is a search bar with the placeholder "Search a question or keyword" and a magnifying glass icon. The main content area shows a "Discussions" section.

Discussions



isabelagob
New Member

posted June 6, 2019 2:08 AM • last updated June 06, 2019 2:08 AM

My last name is to long, what do I do?

TurboTax Free Edition Online



SidneyP
New Member

June 6, 2019 2:08 AM

You can fix that by removing the last letters that don't fit. The IRS matches the social security number with only the first few letters of the last name.



felipesoares79

New Member

November 23, 2020 9:11 AM

...

Same thing for me. I end up filling by mail because it fails every time.



Reply

As you can see, TurboTax has a limit on how long last names are allowed to be, and people with too long of names have different strategies with how to deal with not fitting in the system.

Gender

Data collection and storage can go wrong in other ways as well, with incorrect or erroneous options. Here are some screenshots from a thread of people collecting strange gender selection forms:

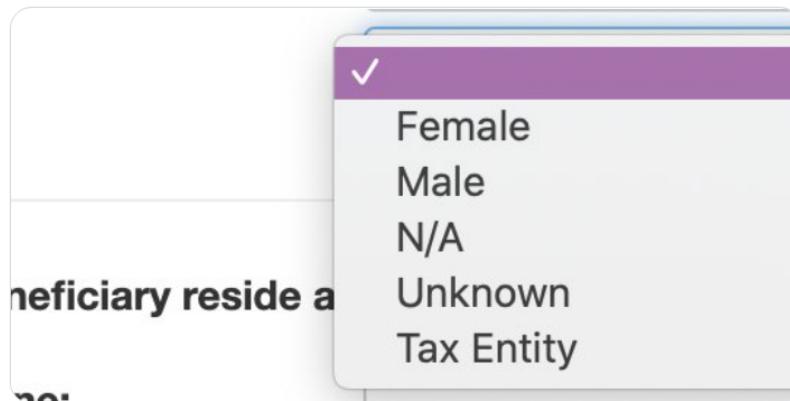


Coding Drag Queen Anna Lytical 🌈👩‍💻👩‍💻

@theannalytical

...

send me the worst gender selection forms you've seen,
I'll start



8:25 AM · Jan 13, 2021 · Twitter Web App

5,390 Retweets 815 Quote Tweets 41.9K Likes

ah yes, the three genders

What is your gender?

Please select one.

Male

Female

I have no plans to purchase a new vehicle

You can see more of these types of forms at <https://genders.wtf/>

4.4. How Data Informs Ethics

Think for a minute about consequentialism. On this view, we should do whatever results in the best outcomes for the most people. One of the classic forms of this approach is utilitarianism, which says we should do whatever maximizes 'utility' for most people. Confusingly, 'utility' in this case does not refer to usefulness, but to a sort of combo of happiness and wellbeing. When a utilitarian tries to decide how to act, they take stock of all the probable outcomes, and what sort of 'utility' or happiness will be brought about for all parties involved. This process is sometimes referred to by philosophers as 'utility calculus'. When I am trying to calculate the expected net utility gain from a projected set of actions, I am engaging in 'utility calculus' (or, in normal words, utility calculations).

Now, there are many reasons one might be suspicious about utilitarianism as a cheat code for acting morally, but let's assume for a moment that utilitarianism is the best way to go. When you undertake your utility calculus, you are, in essence, gathering and responding to data about the projected outcomes of a situation. This means that *how* you gather your data will affect *what* data you come up with. If you have really comprehensive data about potential outcomes, then your utility calculus will be more complicated, but will also be more realistic. On the other hand, if you have only partial data, the results of your utility calculus may become skewed. If you think about the potential impact of a set of actions on all the people you know and like, but fail to consider the impact on people you do not happen to know, then you might think those actions would lead to a huge gain in utility, or happiness.

When we think about how data is used online, the idea of a utility calculus can help remind us to check whether we've really got enough data about how *all* parties might be impacted by some actions. Even if you are not a utilitarian, it is good to remind ourselves to check that we've got all the data before doing our calculus. This can be especially important when there is a strong social trend to overlook certain data. Such trends, which philosophers call 'pernicious ignorance', enable us to overlook inconvenient bits of data to make our utility calculus easier or more likely to turn out in favor of a preferred course of action.

- Can you think of an example of pernicious ignorance in social media interaction? What's something that we might often prefer to overlook when deciding what is important?
 - One classic example is the tendency to overlook the interests of children and/or people abroad when we post about travels, especially when fundraising for 'charity tourism'. One could go abroad, and take a picture of a cute kid running through a field, or a selfie with kids one had traveled to help out. It was easy, in such situations, to decide the likely utility of posting the photo on social media based

on the interest it would generate for us, without thinking about the ethics of using photos of minors without their consent. This was called out by The Onion in a parody article, titled "[6-Day Visit To Rural African Village Completely Changes Woman's Facebook Profile Picture](#)".

- o The reckoning about how pernicious ignorance had allowed many to feel comfortable leaving the interests of many out of the utility calculus for use of images online continued. You can read an article about it [here](#), or see a similar reckoning discussed by National Geographic: "[For Decades, Our Coverage Was Racist. To Rise Above Our Past, We Must Acknowledge It](#)".

4.5. Data in Python and Reddit

Now we will look at ways data is represented in Python and what data is available from Reddit.

4.5.1. Demo: Python Basic Data Types

Let's now look specifically at how Python stores and lets you work with basic data types:

- Booleans (True / False)
- Numbers
- Strings (Text)

But first we need to look a little more about how to use functions, since we'll be using them with the data types.

Calling Functions

A function is a named section of pre-written code, which we can "call," making that section of code run.

We have already been calling two different functions in particular: `display` and `create_tweet`:

- `display("Ethics might be relevant!")`
- `client.create_tweet(text="This is the tweet text")`

The structure of a standard function call has the following pieces:

```
function_name(input_parameters)
```

So we first write the name of the function (e.g., `display` or `client.create_tweet`), then we put matching parentheses after that, and inside the parentheses we put the input arguments, which are data or options for how the function should run.

input arguments

- These inputs are called "parameters" or "arguments"
- Inputs go in parentheses after the function name
- If there are multiple inputs, they are separated by commas
- You can also specify which input you are giving within the parenthesis by putting `parameter_name=value`

Additionally, some functions produce a result, which can be saved in a variable, or used in a calculation or some other fashion. When we save the result of running a function into a variable, it looks like this:

```
save_result_variable = function_name(input_parameters)
```

function results

- Functions can have outputs that are called "returns" or "results"
- When the code interpreter sees the function call, it runs the code in the function with the inputs, and then puts the output in the place where that function call was

- The results of the function can be stored in a variable, used in a formula, or used as an argument for another function

That was all a bit theoretical, so let's look at some data types now, and some specific functions that we can use with them.

Boolean (True / False)

In Python there are two options for boolean: `True` and `False`

Note that the first letter is capitalized and the rest is lower case. Python only lets you write these True and False values in that way.

Let's save a boolean value in a variable, and then display it:

```
does_user_have_blue_checkmark = True  
display(does_user_have_blue_checkmark)
```

```
True
```

Display lets us see what was in the variable, but we can also use a new function `type` to see what type of value is in the variable (it should be 'bool' which is short for boolean):

```
type(does_user_have_blue_checkmark)
```

```
bool
```

Numbers

integers and floats

Python allows you to use two main types of numbers:

- Integers (whole numbers), called "int"
- A "floating point" number with a decimal point, called a "float"

```
type(5)
```

```
int
```

```
type(5.5)
```

```
float
```

We can now do normal math operations on the numbers, like addition `+`, subtraction `-`, multiplication `*`, and division `/`.

Even though there are two types of numbers, most of the time they work together pretty seamlessly, switching to whichever type makes the most sense. For example, let's look at what happens when we add an int and a float:

```
example_num = 5 + 5.5
```

```
display(example_num)
```

```
10.5
```

```
type(example_num)
```

```
float
```

functions for numbers

Python provides functions that we can use with numbers, like:

- find the maximum number in a set of numbers with `max()`
- find the minimum number in a set of numbers with `min()`
- round a floating point number into an integer with `round()`

Each of these functions produces a result at the end, which we can save into a variable

```
# Demo of using the max() function
my_score = 74
your_score = 92
someone_elses_score = 83

highest_score = max(my_score, your_score, someone_elses_score)

display(highest_score)
```

92

```
# Demo of using the min() function
bread_1_price = 2.30
bread_2_price = 2.15
bread_3_price = 1.79

cheapest_bread_price = min(bread_1_price, bread_2_price, bread_3_price)

display(cheapest_bread_price)
```

1.79

```
# Demo using the round function
float_number = 14.6224

rounded_number = round(float_number)

display(rounded_number)
```

15

number comparisons

Python also lets us [compare numbers in various ways](#), producing a boolean True or False value depending on if the comparison was true or false.

For example, we can see if one number is bigger than another by using the greater than comparison: `>`

```
money_in_wallet = 10
cost_of_item = 7

has_enough_money = money_in_wallet > cost_of_item

display(has_enough_money)
```

True

We can check if two numbers are equal by using two equals signs: `==`

Note: this is an unfortunately confusing system that [most programming languages are now stuck with](#) since it became the standard:

- One equals sign (`=`) means save the value into a variable
- Two equals signs (`==`) mean check if two numbers are the same

```
my_follower_count = 23
your_follower_count = 23

same_number_of_followers = my_follower_count == your_follower_count

display(same_number_of_followers)
```

True

Strings (text)

In order to make a string (piece of text) in Python, you can write your text with either double quotes " or single quotes ' at the beginning and end.

```
tweet_text_1 = "what nice weather today"
display(tweet_text_1)
```

'what nice weather today'

```
tweet_text_2 = 'what horrible weather today'
display(tweet_text_2)
```

'what horrible weather today'

Note: If you are copying from a word processor like word, you might get angled quotes like „ or „, which Python doesn't like. So, if you try to run code like this:

- `tweet_text_3 = "What normal weather today"`

you will get an error message like this:

```
Input In [14]
  tweet_text_3 = "What normal weather today"
^
SyntaxError: invalid character '“' (U+201C)
```

adding strings together

If we want to add strings together to make a larger string, we can do that with the + operation.

```
first_name = "Kyle"
last_name = "Thayer"

full_name = first_name + " " + last_name
# Note: I had to add a space between the first and last name, or it would come out
as KyleThayer

display(full_name)
```

'Kyle Thayer'

If we want to add something like a number, like my age, into the string though, it won't let us do it directly.

If we try running:

- `example_text = "how old are you? I am " + 3`

Then we will get an error that 3 was an int and not a string, so it can't be added:

```

-----  

TypeError                                 Traceback (most recent call last)
Input In [2], in <cell line: 2>()
      1 # error when I put a number in a string
----> 2 example_text = "how old are you? I am " + 3
  

TypeError: can only concatenate str (not "int") to str

```

To fix this, we have to turn the number into a string before we add it. We do this by using the `str()` function:

```

example_text = "how old are you? I am " + str(3)
display(example_text)

```

```
'how old are you? I am 3'
```

Adding strings and numbers together is particularly useful for displaying information in a more readable fashion:

```

num_likes = 78
num_retweets = 32
num_quote_tweets = 17

display("The number of likes was: " + str(num_likes))
display("The number of retweets was: " + str(num_retweets))
display("The number of quote tweets was: " + str(num_quote_tweets))

```

```
'The number of likes was: 78'
```

```
'The number of retweets was: 32'
```

```
'The number of quote tweets was: 17'
```

actions with strings

There are various actions Python let's us do with strings. For example, let's look for a smaller string ("cat") and see if it is in the bigger one (producing a True or False boolean value) using `in`

```

animal_tweet_1 = "I like cats!"
tweet_1_has_cat = "cat" in animal_tweet_1
display(tweet_1_has_cat)

```

```
True
```

```

animal_tweet_2 = "I like dogs!"
tweet_2_has_cat = "cat" in animal_tweet_2
display(tweet_2_has_cat)

```

```
False
```

```

animal_tweet_3 = "I like caterpillars!"
tweet_3_has_cat = "cat" in animal_tweet_3
display(tweet_3_has_cat)

```

```
True
```

We can also do actions like make a string all uppercase or all lowercase using the `upper()` and `lower()` functions.

Unlike previous uses of functions, for these we write the name of the variable we are using, then a `.` and then name of the function: `save_result_variable = variable_name.function_name()`

```
normal_message = "I hope you are doing OK"
```

```
loud_message = normal_message.upper()
display(loud_message)
```

```
'I HOPE YOU ARE DOING OK'
```

```
quiet_message = normal_message.lower()
display(quiet_message)
```

```
'i hope you are doing ok'
```

We can also see how many characters long a string is by using the function `len()` like this:

```
message_length = len(normal_message)
display(message_length)
```

```
23
```

You can read more about Python data types at [w3schools explanation of Python data types](https://www.w3schools.com/python/python_data_types.asp)

4.5.2. Practice: Python Basic Data Types

Greeting

Make a new variable called `greeting_part_1` and assign it the string: "Welcome, "

Note: There is an extra space after the word

```
# TODO: enter your code here
```

Make a new variable called `greeting_part_2` and assign it the string: "! It is nice to meet you!"

Note: this string starts with an exclamation mark.

```
# TODO: enter your code here
```

Make a variable called `name_1` and assign it with a string of someone's name.

```
# TODO: enter your code here
```

Now, combine them all together into a new variable called `full_greeting`. Combine the parts together by taking `greeting_part_1` then adding `name` then adding `greeting_part_2`.

Then display the variable `full_greeting`.

```
# TODO: enter your code here
```

Now make a variable called `name_2` with another name in it and make a variable `called_full_greeting_2` the same way you did `full_greeting`, but with `name_2` instead.

Then display the variable `full_greeting_2`

```
# TODO: enter your code here
```

Engagement report

Make up numbers for tweet metrics and save them into variables: `number_likes`, `number_retweets`, `number_quote_tweets`

```
# TODO: enter your code here
```

Write three different `display()` function calls, one to report on each of those variables.

Inside the parentheses first put a string like, "The number of likes is: " and then add the relevant variable to it, but remember, since the variable has a number in it, you have to put a `str()` function call around that variable name

```
# TODO: enter your code here
```

Make a new variable called `total_engagement` and save the total number of all the likes, retweets and quote tweets.

Then display that information the way you did the other variables.

```
# TODO: enter your code here
```

Is your tweet too long

Make a variable called `tweet_1` with a string of your choosing that is fairly short

```
# TODO: enter your code here
```

Make a variable called `tweet_1_length`, and save the length of the string `tweet_1` into it (using the `len()` function)

```
# TODO: enter your code here
```

Check if the `tweet_1_length` is less than or equal to 280 characters (the max length of a tweet) using the less than or equal operator: `<=`, and save the result into a variable called `is_tweet_1_short_enough`

```
# TODO: enter your code here
```

Use the `display()` function to display a string ("Is tweet 1 short enough? "), adding the variable `is_tweet_1_short_enough` to that string.

Remember, since the variable has a boolean and not a string in it, you have to put a `str()` function call around that variable name

```
# TODO: enter your code here
```

Make a variable called `tweet_2` with a string of your choosing that is very long (over 280 characters)

```
# TODO: enter your code here
```

Repeat the rest of the steps from before, but with `tweet_2`

- find `tweet_2_length`
- make a variable `is_tweet_2_short_enough`
- display the result

```
# TODO: enter your code here
```

4.5.3. Demo: Data from a Reddit Post

Let's see what the data actually looks like from a Reddit Post!

First we need to do our normal Reddit login steps (and optional fake praw step)

Log into Praw (or fake praw)

Load Praw library

```
# Load some code called "praw" that will help us work with reddit
import praw
```

(Optional) Step 1b: Make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it won't actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

Step 2: Load your developer access passwords

To use this on your real Reddit account, copy your [developer access passwords](#) into the code below, replacing our fake passwords.

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords
# below:
username="fake_reddit_username"
password="$a@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

Step 4: Give praw (or fake_praw) your developer access passwords

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Find a Reddit submission

Below I have the code to find a recent Reddit submission on the subreddit "[cuteanimals](#)" (we'll get the top post on the default reddit view, called "hot").

Don't worry if you don't understand this part yet. We are just doing this, so we can get to the point of seeing what tweet data looks like.

Note: If you run this on real reddit, we can't guarantee anything about how offensive what you might find is.

```
# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 1
# submission
submissions = reddit.subreddit("cuteanimals").hot(limit=1)

# get the first submission off the list (should only be one anyway)
recent_submission = next(submissions)
```

Fake praw is pretending to select the subreddit: cuteanimals

Look at data in Reddit submission

Now we will look at some of the data that came back!

Again, don't worry too much about the code, we want to look at the data and data types.

submission title:

```
display("The data type of the submission title is: " +  
type(recent_submission.title).__name__)  
display("The submission title is: " + recent_submission.title)
```

```
'The data type of the submission title is: str'
```

```
'The submission title is: Look at my cute dog!'
```

As you can see above, the title of a submission is a string (**str**) data type.

submission id

```
display("The data type of the submission id is: " +  
type(recent_submission.id).__name__)  
display("The submission id is: " + str(recent_submission.id))
```

```
'The data type of the submission id is: str'
```

```
'The submission id is: 904tjwdf093j'
```

The submission id is a piece of text (**str**) that looks like random letters and numbers. This is how the submission is referred to inside Reddit's computers. So if someone is commenting on a submission, Reddit just puts uses submission ID they were commenting on to see where to display it.

submission author name

```
display("The data type of the author name is: " +  
type(recent_submission.author.name).__name__)  
display("The author name is: " + str(recent_submission.author.name))
```

```
'The data type of the author name is: str'
```

```
'The author name is: fake_user'
```

The author name is an string (**str**). Note `recent_submission.author` has other information about the author as well as the name.

submission edited

```
display("The data type of edited is: " + type(recent_submission.edited).__name__)  
display("The submission edited is: " + str(recent_submission.edited))
```

```
'The data type of edited is: bool'
```

```
'The submission edited is: False'
```

The "edited" field represents whether a submission has been edited or not. It is a boolean true/false value (**bool**).

tweet created at

```

display("The data type of the tweet created_utc at is: " +
type(recent_submission.created_utc).__name__)
display("The created_utc at is: " + str(recent_submission.created_utc))

# convert the utc to a different datetime
import datetime
converted_time = datetime.datetime.fromtimestamp(recent_submission.created_utc)
display("The data type of the converted_time at is: " +
type(converted_time).__name__)
display("The converted_time at is: " + str(converted_time))

```

'The data type of the tweet created_utc at is: int'

'The created_utc at is: 1673327625'

'The data type of the converted_time at is: datetime'

'The converted_time at is: 2023-01-09 21:13:45'

The created at time for the submission is a floating point number ([float](#)), which is in [Unix Time](#), which is the number of seconds since Jan 1, 1970 in the [Coordinated Universal Time](#) zone.

This is not a very useful number, so we use a python library called [datetime](#) to convert it into a more readable [datetime](#) data type, which we then can display and read easier.

number of upvotes (score)

```

display("The data type of the score is: " + type(recent_submission.score).__name__)
display("The submission score is: " + str(recent_submission.score))

```

'The data type of the score is: int'

'The submission score is: 23'

The number of upvotes is called [score](#) and it is a whole number ([int](#)).

upvote ratio

```

display("The data type of the upvote ratio is: " +
type(recent_submission.upvote_ratio).__name__)
display("The submission upvote ratio is: " + str(recent_submission.upvote_ratio))

```

'The data type of the upvote ratio is: float'

'The submission upvote ratio is: 0.93'

The upvote ratio (how many upvotes divided by total number of votes including downvotes) is a floating point number ([float](#)).

number of comments

```

display("The data type of num_comments is: " +
type(recent_submission.num_comments).__name__)
display("The submission number of comments is: " +
str(recent_submission.num_comments))

```

'The data type of num_comments is: int'

'The submission number of comments is: 7'

The number of comments is a whole number ([int](#)). Note: You can also get a data structure of all the comments, but we will look at that later.

submission text (selftext)

```
display("The data type of selftext is: " +  
type(recent_submission.selftext).__name__)  
display("The submission selftext is: " + str(recent_submission.selftext))
```

```
'The data type of selftext is: str'
```

```
'The submission selftext is: '
```

The submission selftext (the contents of the post if the post isn't a link url), is a string ([str](#)).

Note that a submission can either be text saved as [selftext](#), or a link (e.g., image or news story) saved as [url](#).

submission url (link)

```
display("The data type of url is: " + type(recent_submission.url).__name__)  
display("The submission url is: " + str(recent_submission.url))
```

```
'The data type of url is: str'
```

```
'The submission url is: example.com/fake_image.jpg'
```

The submission url is a string ([str](#)).

Still more!

In addition to the data we looked at above, there are even more options for reddit submissions, which you can see in the table of "attributes" at the top of the [PRAW library page on Submissions](#). You can also see the "attributes" tables in the PRAW library pages for [Redditors](#) and [Comments](#)

4.5.4. Design Activity: Data and Social media

Evaluate a social media site

Open a social media interface (not Reddit) and choose a view (e.g., a list of posts, an individual post, an author page etc.).

First identify as many pieces of information you can see the screen (without doing anything).

For each piece of information:

- What data types might be used to represent that data on a computer?
- How is this data a simplification of reality? That is, what does it not capture? Who does it work best for, and who does it not work well for?
- Did the user(s) directly provide that data, or was it collected automatically by the social media site?

Next, start listing what additional pieces of information are available through one action (e.g., clicking on user profile picture, clicking on comments link, etc.).

Design a social media site

Now it's your turn to try designing a social media site.

Decide a type of social media site (e.g., a video site like youtube or tiktok, or a dating site, etc.), and a particular view of that site (e.g., profile picutre, post, comment, etc.).

Draw a rough sketch of the view of the site, and then make a list of:

- What pieces of information you think should be immediately visible to users
- What pieces of information should be available to users by taking one action (e.g., clicking on a comment, or profile picture).

4.6. Reflection: Ethics of Choosing Data Representation

We've now looked at how different ways of storing data and putting constraints on data can make social media systems work better for some people than others, and we've looked at how this data also informs decision-making and who is taken into account in ethics analyses.

Given all that can be at stake in making decisions on how data will be stored and constrained, choose one type of data a social media site might collect (e.g., name, age, location, gender, posts you liked, etc.), and then choose two different ethics frameworks and consider what each framework would mean for someone choosing how that data will be stored and constrained.

4.7. Learn more

4.7.1. Systemic Power

- Systems have power to "bestow humanity on marginalized others" (Professor Anna Lauren Hoffmann)
 - Blog Post: [Data Violence and How Bad Engineering Choices Can Damage Society](#).
 - Video: [What We Really Talk About When We Talk About Ethics: Navigating History, Privilege, and Power in Information and Data Science](#)
 - Video: [Beyond Fairness: Discourse, Violence, and Justice in a Datafied World](#)

4.7.2. [Design Justice](#)

- "Design justice is a framework for analysis of how design distributes benefits and burdens between various groups of people. Design justice focuses explicitly on the ways that design reproduces and/or challenges the matrix of domination (white supremacy, heteropatriarchy, capitalism, ableism, settler colonialism, and other forms of structural inequality)."
- It's also about which groups get to be part of the design process itself.
-  [Sasha Costanza-Chock](#), present USA

5. History of Social Media

Now that we've seen some of how social media sites work, let's look back at the history of social media.

5.1. Pre-Internet Social Media

As we talked about previously in a section of Chapter 2 ([What is Social Media?](#)), pretty much anything can count as social media, and the things we will see in internet-based social media show up in many other places as well.

The book [Writing on the Wall: Social Media - The First 2,000 Years](#) by Tom Standage outlines some of the history of social media before internet-based social media platforms such as in times before the printing press:

- Graffiti and other notes left on walls were used for sharing updates, spreading rumors, and tracking accounts
- Books and news write-ups had to be copied by hand, so that only the most desired books went "viral" and spread

Later, some time after the printing press, Standage highlights how there was an unusual period in American history that roughly took up the 1900s where, in America, news sources were centralized in certain newspapers and then the big 3 TV networks. In this period of time these sources were roughly in agreement and broadcast news out to the country, making a more unified, consistent news environment (though, of course we can point out how they were biased in ways like being almost exclusively white men).

Before this centralization of media in the 1900s, newspapers and pamphlets were [full of rumors and conspiracy theories](#). And now as the internet and social media have taken off in the early 2000s, we are again in a world full of rumors and conspiracy theories.

See also: the [segment of the TV show Drunk History on the election of 1800](#)

5.2. Web 1.0 Social Media

The first versions of internet-based social media started becoming popular in the late 1900s. The internet of those days is now called "[Web 1.0](#)."

The Web 1.0 internet had some features that make it stand out compared to later internet trends:

- If you wanted to make a profile to talk about yourself, or to show off your work, you had to create your own personal webpage, which others could visit.
- These pages had limited interaction, so you were more likely to load one thing at a time and look at a separate page for each post or piece of information.
- Communication platforms were generally separate from these profiles or personal web pages.

Let's look at some of the history of Web 1.0 Social Media.

5.2.1. Email

One of the early ways of social communication across the internet was with [Email](#), which originated in the 1960s and 1970s. These allowed people to send messages to each other, and look up if any new messages had been sent to them.

5.2.2. Bulletin board system (BBS)

In the 1980s and 1990s, [Bulletin board system \(BBS\)](#) provided more communal ways of communicating and sharing messages. In these systems, someone would start a "thread" by posting an initial message. Others could reply to the previous set of messages in the thread.

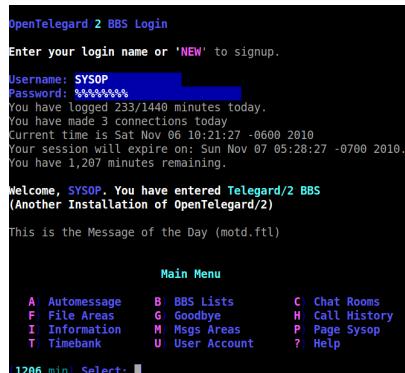


Fig. 5.1 An early bulletin board system. The entire interface was just plain text, and you had to type in commands to navigate to the different threads and read or reply with messages.

Fist part of topic

TOPICS				REPLIES			VIEWS		LAST POST		Mark topics read • 6 topics • Page 1 of 1	
Topics are also known as threads (this has a report) ▼				3			7		by User 01 D	on Sun Sep 14, 2008 10:34 am		
A thread with a poll				0			2		by 7ghost D	on Sun Sep 14, 2008 10:12 am		
Other topic 00 (part II)				0			1		by 7ghost D	on Sun Sep 14, 2008 10:10 am		
Other topics 00				0			1		by 7ghost D	on Sun Sep 14, 2008 10:09 am		
Another topic				0			1		by 7ghost D	on Sun Sep 14, 2008 10:07 am		
First Topic				0			3		by 7ghost D	on Sun Sep 14, 2008 10:06 am		

Display topics from previous: [All Topics](#) Sort by [Post time](#) [Descending](#) [Go](#)

Mark topics read • 6 topics • Page 1 of 1

Fig. 5.2 An newer bulletin board system. In this one you can click on the thread you want to view, and threads can include things like images.

5.2.3. Internet Relay Chat (IRC)

The 1980s and 1990s also saw an emergence of more instant forms of communication with chat applications. [Internet Relay Chat \(IRC\)](#) let people create “rooms” for different topics, and people could join those rooms and participate in real time text conversations with the others in the room.

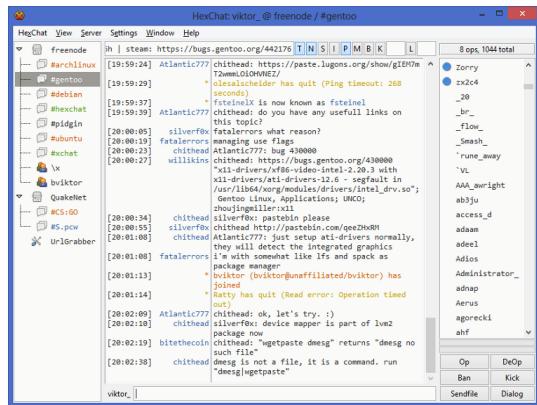


Fig. 5.3 An irc chat application, where you can join a room, and watch and participate in the live conversation.

5.2.4. AOL Instant Messenger (AIM)

In 1997, the internet service provider AOL introduced a chat system called [AOL Instant Messenger \(AIM\)](#) that anyone could join and maintain a list of friends. You could then see what friends were currently available, and start sending them messages. You could also leave away messages or profile quotes.

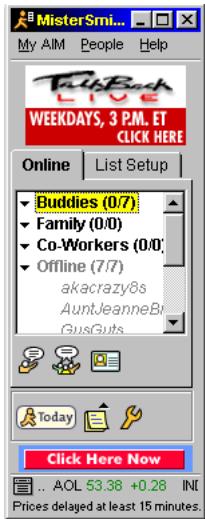


Fig. 5.4 AIM let you organize your contacts and see who was currently online.

5.2.5. Texting

Around the same time, [phone texting capabilities \(SMS\)](#) starting becoming popular as another way to send messages to your friends, family and acquaintances.

Additionally, many news sites and fan pages started adding built-in comment sections on their articles and bulleten boards for community discussion.

5.3. Web 2.0 Social Media

In the first decade of the 2000s the way websites worked on the Internet went through a transition to what is called "[Web 2.0](#)."

In Web 2.0 websites (and web applications), the communication platforms and personal profiles merged. Many websites now let you create a profile, form connections, and participate in discussions with other members of the site. Platforms for hosting content without having to create your own website (like Blogs) emerged. And all of these websites became much more interactive, with updates appearing on users' screens without the user having to request them.

Let's look at some examples:

5.3.1. Weblogs (Blogs)

In the mid 1990s, some internet users started manually adding regular updates to the top of their personal websites (leaving the old posts below), using their sites as an online diary, or a (web) log of their thoughts. In 1998/1999, several web platforms were launched to make it easy for people to make and run blogs (e.g., LiveJournal and Blogger.com). With these blog hosting sites, it was much simpler to type up and publish a new blog entry, and others visiting your blog could subscribe to get updates whenever you posted a new post, and they could leave a comment on any of the posts.

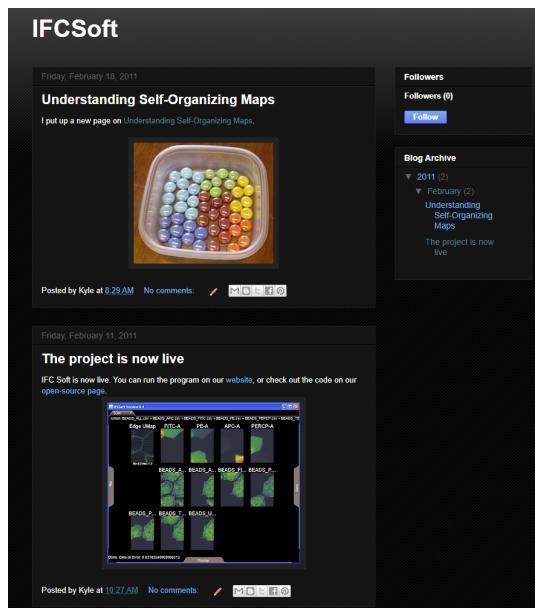


Fig. 5.5 An example blogger blog. Visitors can comment on any of the posts, making this much more interactive and communal (though Kyle's old blog here has 0 followers and 0 comments).

5.3.2. Social Networking Services

2003 saw the [launch of several popular social networking services](#): Friendster, Myspace, and LinkedIn. These were websites where the primary purpose was to build personal profiles and create a network of connections to other people, and communicate with them. Facebook was launched in 2004 and soon put most of its competitors out of business, while YouTube, launched in 2005 became a different sort of social networking site built around video.

Note

This history is all very US focused. In future versions of this book, I hope to incorporate a more global history of social media.

5.4. Looping with Lists and Dictionaries in Social Media

We mentioned previously in chapter 4, we can use lists and dictionaries to represent social media data:

Example list of dictionaries of user data

User 1:

- Username: kylethayer (a String)
- Twitter handle: @kylethayer (a String)
- Profile Picture: (an image)
- Follows: @SusanNotess, @UW, @UW_iSchool, @ajlunited, ... (a list of Strings)

User 2:

- Username: Dr Susan Notess (a String)
- Twitter handle: @SusanNotess (a String)
- Profile Picture: (an image)
- Follows: @kylethayer, @histoftech, @j_kalla, @dbroockman, @qaxaaawut, @shengokai, @laniwhatison (a list of Strings)

Click to see example Python code

```
users = [
    {
        "username": "kylethayer",
        "twitter_handle": "@kylethayer",
        "profile_picture": "kylethayer.jpg",
        "follows": ["@SusanNotess", "@UW", "@UW_iSchool", "@ajlunited"]
    },
    {
        "username": "Dr Susan Notess",
        "twitter_handle": "@SusanNotess",
        "profile_picture": "susannotess.jpg",
        "follows": ["@kylethayer", "@histoftech", "@j_kalla", "@dbroockman",
        "@qaxaaawut", "@shengokai", "@laniwhatison"]
    }
]
```

Now, in order for us to work with this kind of data, we need to look more at lists and dictionaries, as well as how to loop over them.

5.4.1. Demo: Lists and Loops

Lists

Many types of data on social media platforms are organized as lists, such as

- lists of friends or followers
- lists of posts
- lists of photos in a post
- lists of people who liked a post
- etc.

The way to create a list in Python is to make a list of values, separated by commas, inside of square brackets, like this:

```
book_authors = ["Kyle Thayer", "Susan Notess"]  
display(book_authors)
```

```
['Kyle Thayer', 'Susan Notess']
```

If we are making a list and it gets too long, Python will let us use several lines to do this:

```
some_book_chapters = ["Intro",
                      "Definitions",
                      "Bots",
                      "Data",
                      "History of Social Media",
                      "Authenticity"]

display(some_book_chapters)
```

```
['Intro',
 'Definitions',
 'Bots',
 'Data',
 'History of Social Media',
 'Authenticity']
```

Lists are in order, so Python let's us use the "index" to ask for a specific entry, like the 1st, 2nd, 3rd, etc.

As we stated in the Data chapter, many programming languages, for historical reasons, make a list's first entry have index 0, it's 2nd entry have index 1, it's 3rd entry have index 2, etc.

So if we want to see the first chapter in my `some_book_chapters` list, I select it by putting the index number inside square brackets (`[,]`) after the variable name:

```
first_chapter = some_book_chapters[0]
display(first_chapter)
```

```
'Intro'
```

And if I want the 4th chapter, I'd select it like this

```
fourth_chapter = some_book_chapters[3]
display(fourth_chapter)
```

```
'Data'
```

Now, let's say we have a list of users who liked our latest social media post:

```
users_who_liked_our_post = ["@pretend_user_1", "@pretend_user_2",
                            "@pretend_user_3"]
```

What if we wanted to follow all of them?

If our list was long, it would take a lot of code to pull out each one and try to follow them. But Python gives us an easy way to perform actions on all the items in a list, by using `for` loops.

for Loops

`for` loops let us perform an action or a set of actions for all of the items in a list.

So, if we wanted to go through all the the users that liked our tweet and display a message for each one, we could do this:

```
for user in users_who_liked_our_post:
    display("Yay! " + user + " liked our post!")
```

```
'Yay! @pretend_user_1 liked our post!'
```

```
'Yay! @pretend_user_2 liked our post!'
```

```
'Yay! @pretend_user_3 liked our post!'
```

Now, there are several things that went into making that for loop code above:

- Start the line with a `for`
- Make up a new variable name that will be a temporary variable to hold whichever item from the list we are doing our actions on. In this case each item in the list will be a user, so we call our variable `user`
- Then we write the word `in`
- Then we put the list that we want to go through, in this case `users_who_liked_our_post`
- Then put a colon (:). In Python, a colon like this means that what comes next is a block of statements that goes together. This block of statements is indented over to indicate that it is part of the block.
- Then, on the next line and indented over, we have our display function that uses the `user` variable. This is the line of code that is repeated for each item in the list.

If we want to do several actions in our loop, all we need to do is add more lines of code spaced over the same amount, like this (note: We'll use `print` instead of `display`, which mostly work the same, but we think `print` happens to look a little better in this situation):

```
for user in users_who_liked_our_post:
    print("Yay! " + user + " liked our post!")
    print("Perhaps we should follow " + user)
    print("We could put code here to do that!")
    print()
```

```
Yay! @pretend_user_1 liked our post!
Perhaps we should follow @pretend_user_1
We could put code here to do that!

Yay! @pretend_user_2 liked our post!
Perhaps we should follow @pretend_user_2
We could put code here to do that!

Yay! @pretend_user_3 liked our post!
Perhaps we should follow @pretend_user_3
We could put code here to do that!
```

In the above code our for loop runs a block of code that has four statements, each doing a `print`. You'll notice we added an extra blank `print` which makes a blank line and helps us see in the output what each loop did.

Loop a set number of times

In order to loop a set number of times, we can use the `range` function to effectively make a list of numbers to go over, so we can loop that many times.

For example, if we wanted to ask "Are we there yet?" repeatedly, 10 times, we can do this:

```
for i in range(10):
    print("Are we there yet?")
```

```
Are we there yet?
```

Now, if we look at what the numbers were in `range(10)`, we can output the `i` we saved the numbers in.

```
for i in range(10):
    print("This is loop number " + str(i))
```

```
This is loop number 0
This is loop number 1
This is loop number 2
This is loop number 3
This is loop number 4
This is loop number 5
This is loop number 6
This is loop number 7
This is loop number 8
This is loop number 9
```

You'll notice that, while there are 10 numbers, it starts with 0, just like how list indices start with 0.

If we want to do a list from 1 to 10 instead, we can do that by either making a new variable and saving `i + 1` to it, like this:

```
for i in range(10):
    new_i = i + 1
    print("This is loop number " + str(new_i))
```

```
This is loop number 1
This is loop number 2
This is loop number 3
This is loop number 4
This is loop number 5
This is loop number 6
This is loop number 7
This is loop number 8
This is loop number 9
This is loop number 10
```

Or, the `range` function lets you set a start and stop, with the first number being the number it starts with, and the last number being the one it stops before:

```
for i in range(1, 11):
    print("This is loop number " + str(i))
```

```
This is loop number 1
This is loop number 2
This is loop number 3
This is loop number 4
This is loop number 5
This is loop number 6
This is loop number 7
This is loop number 8
This is loop number 9
This is loop number 10
```

5.4.2. Demo: Dictionaries

We've talked about lists, but the other data organization we need to work with social media data is **dictionaries**.

As we mentioned in chapter 4, dictionaries allow us to combine pieces of information by naming them (sort of like variables).

So for example, the information about a user might have the following pieces of data:

- Username
- Twitter handle
- Profile Picture:
- Follows

Python has two ways of doing these types of dictionaries: `dict` and objects

Dictionaries (`dict`)

We can create dictionaries in Python by storing values into `keys` inside of curly braces `{ }`, like this:

```
user_1 = {  
    "username": "kylethayer",  
    "twitter_handle": "@kylethayer",  
    "profile_picture": "kylethayer.jpg",  
    "follows": ["@SusanNotess", "@UW", "@UW_iSchool", "@ajlunited"]  
}
```

In the code above, inside of the curly braces are a set of lines. Each line has a string (the **key**, or name of the value), followed by a colon (:), followed by a value that is to be saved for the key. At the end of all but the last line is a comma (,) which indicates that another **key** and value will come next.

Now that we've saved some values for some keys in the dictionary now saved in user_1, we can look up the values by using square brackets ([,]) with the key name inside, like this:

```
user_1_username = user_1["username"]  
display(user_1_username)
```

```
'kylethayer'
```

```
user_1_handle = user_1["twitter_handle"]  
display(user_1_handle)
```

```
'@kylethayer'
```

```
user_1_picture = user_1["profile_picture"]  
display(user_1_picture)
```

```
'kylethayer.jpg'
```

```
user_1_follows = user_1["follows"]  
display(user_1_follows)
```

```
['@SusanNotess', '@UW', '@UW_iSchool', '@ajlunited']
```

Objects

The other way of saving information that works similarly in Python is through an object. We won't be creating any in this book, but we will have to get data from some.

The main difference from what we will need is that while in dictionaries we use square brackets and put the key name in quotes as a string (e.g., `user_1["profile_picture"]`), in an object you use a period (.) and don't put the key name (called a **field**) in quotes (e.g., `user_1.profile_picture`)

We have already seen code that used this period to get something from an object a few times, specifically getting functions from them, like:

- `client.create_tweet(...)`
- `normal_message.upper()`

When we go through data from Twitter, sometimes we will need to use `.` to get parts of the information out of objects, and sometimes we will need to use `[" "]` to get information out of dictionaries.

Looping through lists of dictionaries

Now that we've seen loops, lists, and dictionaries, we can go to Reddit, run a search and look through multiple submissions:

```
load praw library
```

```
# Load some code called "praw" that will help us work with reddit
import praw
```

(Optional) make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it wont actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it wont actually connect to twitter. **If you want to try to actually connect to twitter, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

load your developer access passwords

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$Tw_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

give praw (or fake_praw) your developer access passwords

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

find a list of submissions

We can now do a search and find a list of submissions.

Note: If you run this on real reddit, we can't guarantee anything about how offensive what you might find is.

```
# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 10
# submission
submissions = reddit.subreddit("cuteanimals").hot(limit=10)

# Note: The submissions come back from Reddit as an
# "iterator" instead of a "list." We can write our
# normal for loops with it as an iterator, but we will
# turn it into a list, since we are using those in this class

submissions_list = list(submissions)
```

Fake praw is pretending to select the subreddit: cuteanimals

Loop through the list of submissions

The variable `submissions_list` now has a list of Reddit submissions. So we can use a for loop to go through each submission, and then use `.` to access info from each tweet (other pieces of information would need `[" "]` to access).

For each of the tweets, we will use `print` to display information about the tweet

```

for submission in submissions_list:
    print("Info for submission with id: " + str(submission.id))
    print("  title: " + str(submission.title))
    print("  author: " + str(submission.author))
    print("  created_utc: " + str(submission.created_utc))
    print("  selftext: " + str(submission.selftext))
    print("  url: " + str(submission.url))
    print("  score (upvotes): " + str(submission.score))
    print()

```

```

Info for submission with id: 904tjwdf093j
  title: Look at my cute dog!
  author: fake_user
  created_utc: 1673327625
  selftext:
  url: example.com/fake_image.jpg
  score (upvotes): 23

Info for submission with id: lk457j2163
  title: A baby lizard!
  author: pretend_user
  created_utc: 1673317625
  selftext:
  url: example.com/pretend_image.jpg
  score (upvotes): 10

Info for submission with id: oiu45kje
  title: The cutest bird ever!
  author: imaginary_user
  created_utc: 1673307625
  selftext:
  url: example.com/imaginary_image.jpg
  score (upvotes): 30

```

5.4.3. Practice: Looping through lists and dictionaries

Try out these coding problems to practice looping, lists, and dictionaries

Make a loop that displays "Are you awake yet?" 5 times

```
# TODO: enter your code here
```

Make a list of names (at least three), and save it in a variable called `names`

```
# TODO: enter your code here
```

Now loop over each of those names, and for each name display "[name] is awesome!"

```
# TODO: enter your code here
```

Now, do the same thing as before, but for each name, first make a string that has "[name] is awesome!" and save it in a variable, then use the `.upper()` function on the string to make it all uppercase and save it into a variable, then display the final string.

```
# TODO: enter your code here
```

Now, we are going to make a dictionary with information on a photo

```

photo_1_info = {
    "width": 800,
    "height": 600,
    "location": "that one mountain",
    "device": "iPhone 6"
}

```

Select and display the width of the photo

```
# TODO: enter your code here
```

Select and display the location of the photo

```
# TODO: enter your code here
```

Now we are going to make a list of photo info for you to go through

```
photo_info_list = [
    {
        "width": 800,
        "height": 600,
        "location": "that one mountain",
        "device": "iPhone 6"
    },
    {
        "width": 800,
        "height": 600,
        "location": "on the lake",
        "device": "iPhone 5"
    },
    {
        "width": 1600,
        "height": 800,
        "location": "The underground mines",
        "device": "Nokia 3310"
    }
]
```

Now, make a for loop to go through each set of phone info in `photo_info_list`, and for each one, use `print` commands to display the width, height, location, and device

```
# TODO: enter your code here
```

5.5. Antisocial Media

While mainstream social media platforms grew in popularity, there was a parallel growth of social media platforms that were based on having “no rules”, and were sources for many memes and pieces of internet culture, as well as hubs of much anti-social behavior (e.g., trolling, harassment, hate-groups, murders, etc.).

❶ Note

This page is about various toxic online communities.

5.5.1. Something Awful

The comedy website [Something Awful](#) was created in 1999, and it included web forums where many popular memes of the day originated.

While the Something Awful forums had edgy content, one 15-year-old member of the Something Awful forum called “Anime Death Tentacle Rape Whorehouse” was frustrated by content restrictions on Something Awful, and created his own new site with less restrictions: 4Chan.

5.5.2. 4Chan

[4Chan](#) was created in 2003 by copying the code from a Japanese image sharing bulletin board called [Futaba or 2chan](#).

4Chan has various image sharing bulletin boards, where users post anonymously. Perhaps the most infamous board is the “/b/” board for “random” topics. This board emphasizes “free speech” and “no rules” (with exceptions for child pornography and some other illegal content). In these message boards users attempt to troll each other and post the most shocking content they can come up with. They also have a history of collectively choosing a target website or community and doing a “raid” where they all try to join and troll and offend the people in that community.

Many memes, groups, and forms of internet slang come from 4Chan, such as:

- [lolcats](#)
- [Rickroll](#)
- [ragefaces](#)
- “[Anonymous](#)” the hacker group
- [Bronies](#) (male My Little Pony fans)
- much of trolling culture (we will talk more about in Chapter 7: Trolling)

But one 4Chan user found 4chan to be too authoritarian and restrictive and set out to create a new “free-speech-friendly” image sharing bulletin board, which he called 8chan.

5.5.3. 8Chan (now 8Kun)

[8Chan](#) (now called 8Kun) is an image sharing bulletin board site that was started in 2013. It has been host to white-supremecist, neo-nazi and other hate content. 8Chan has had trouble finding companies to host its servers and internet registration due to presence of child pornography, and for being the place where various mass shooters spread their hateful manifestos. 8Chan is also the source and home of the false conspiracy theory [QAnon](#)

5.6. Social Media Design

As we’ve looked through the history of social media platforms, we’ve seen different ways of making them work, such as:

- How you can send messages to other people?
- Will these messages be public or private?
- Does the user have to refresh the site to check for messages, or does the message automatically appear, or perhaps even make their phone buzz?
- What restrictions are there on the content of messages sent?
- What information can a user provide about themselves in a profile?
- etc.

Let’s look at some of these design decisions more closely:

5.6.1. Social Media Connection Types

One difference you may notice with different social media sites is in how you form connections with others.

- Some social media sites don’t have any formal connections. Like two users who happen to be in the same bulletin board.
- Some social media sites only allow reciprocal connections, like being “friends” on Facebook
- Some social media sites offer one-way connections, like following someone on Twitter, or subscribing to a YouTube channel.

There are, of course, many variations and nuances besides what we mentioned above, but we wanted to get you started thinking about some different options.

Ethics Reflection

Look at the different ethics frameworks and see which ones might have something to say about those different ways of forming connections with others.

5.6.2. User Interfaces

The [user interface](#) of a computer system (like a social media site), is the part that you view and interact with. It’s what you see on your screen and what you press or type or scroll over. Designers of social media sites have to decide how to layout information for users to navigate and decide how the user performs various actions (like, retweet, post, look up user, etc.). Some information and actions will be made larger and easier to access while others will be smaller or hidden in menus or settings.

As we look at these interfaces, there are two key terms we want you to know:

Affordances are what a user interface lets you do. In particular, it's what a user interface makes feel natural to do. So for example, an interface might have something that looks like it should be pressed, or an interface might open by scrolling a little so it is clear that if you touch it you can make it scroll more ([see a more nuanced explanation here](#))

Friction is anything that gets in the way of a user performing an action. For example, if you have to open and navigate through several menus to find the privacy settings, that is significant friction. Or if one of the buttons has a bug and doesn't work when you press it, so you have to find another way of performing that action, that is significant friction.

Designers sometimes talk about trying to make their user interfaces *frictionless*, meaning the user can use the site without feeling anything slowing them down.

Sometimes designers add friction to sites intentionally. For example, ads in mobile games make the "x" you need to press incredibly small and hard to press to make it harder to leave their ad:



Fig. 5.6 An ad on a mobile device, which has an incredibly small, hard to press "x" button.

You need to press that button to close the ad. If you miss the "x", it takes you to more advertising.

Another example of intentionally adding friction was a design change Twitter made in an attempt to reduce misinformation: When you try to retweet an article, if you haven't clicked on the link to read the article, it stops you to ask if you want to read it first before retweeting.

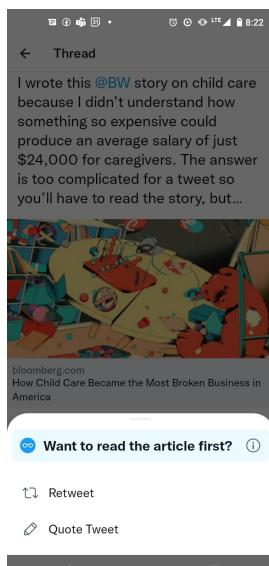


Fig. 5.7 When Kyle attempted to retweet this article, Twitter stopped me to ask if he wanted to read the article first.

One famous example of reducing friction was the invention of [infinite scroll](#). When trying to view results from a search, or look through social media posts, you could only view a few at a time, and to see more you had to press a button to see the next “page” of results. This is how both google search and amazon search work at the time this was written. In 2006, [Aza Raskin](#) invented infinite scroll, where you can scroll to the bottom of the current results, and new results will get automatically filled in below. Most social media sites now use this, so you can then scroll forever and never hit an obstacle or friction as you endlessly look at social media posts. Aza Raskin [regrets](#) what infinite scroll has done to make it harder for users to break away from looking at social media sites.

With that in mind, you can look at a social media site and think about what pieces of information could be available and what actions could be possible. Then for these you can consider whether they are:

- low friction (easy)
- high friction (possible, but not easy)
- disallowed (not possible in any way)

5.7. Reflection Activities: Actions on Social Media Designs

5.7.1. Comparing social media actions

Open two social media sites and choose equivalent views on each (e.g., a list of posts, an individual post, an author page etc.).

List what actions are immediately available.

Then explore and see what actions are available with after one additional action (e.g., opening a menu), then what actions are two steps away.

- What do you notice about the similarities and differences in these sites?

5.7.2. Design a social media site

Now it's your turn to try designing a social media site.

Decide a type of social media site (e.g., a video site like youtube or tiktok, or a dating site, etc.), and a particular view of that site (e.g., profile picture, post, comment, etc.).

Draw a rough sketch of the view of the site, and then make a list of:

- What actions would you want available immediately
- What actions would you want one or two steps away?
- What actions would you not allow users to do (e.g., there is no button anywhere that will let you delete someone else's account)?

5.8. Learn More

- Watch a [clip](#) from the movie The Social Network
- Read a US [Federal Trade Commission](#) complaint on Facebook
- Read [The Rise and Fall of MySpace](#) on The Atlantic
- See book: Writing on the Wall: Social Media - The First 2,000 Years by Tom Standage:
<https://www.amazon.com/Writing-Wall-Social-Media-First/dp/1620402831>

6. Authenticity

Let's turn our attention now to a topic from a user perspective: **authenticity**.

6.1. Authenticity

Early in the days of YouTube, one YouTube channel ([lonelygirl15](#)) started to release vlogs (video web logs) consisting of a girl in her room giving updates on the mundane dramas of her life. But as the channel continued posting videos and gaining popularity, viewers started to question if the events being told in the vlogs were true stories, or if they were fictional. Eventually users discovered that it was a fictional show, and the girl giving the updates was an actress.

Many users were upset that what they had been watching wasn't **authentic**. That is, users believed the channel was presenting itself as true events about a real girl, and it wasn't that at all. Though, even after users discovered it was fictional, the channel continued to grow in popularity.

6.1.1. Why We Care About Authenticity

As a rule, humans do not like to be duped. We like to know which kinds of signal to trust, and which to distrust. Being lulled into trusting a signal only to then have it revealed that the signal was untrustworthy is a shock to the system, unnerving and upsetting. People get angry when they find they have been duped. These reactions are even more heightened when we find we have been duped simply for someone else's amusement at having done so.

These reactions make sense. Try to imagine the early days of human social life, before we started attaching our welfare to the land in terms of planting crops and building structures designed for permanence. Our nomadic forebears functioned in groups who coordinated in highly specialized ways to ensure the survival of the whole. Although such communities are often pictured as being prehistoric, primitive, and obsolete, we now know that such societies were and are highly sophisticated, often developing and depending on highly specified legal codes, some of which are still in use today in Bedouin communities in North Africa. Other nomadic groups, such as Roma people (which you may have heard derisively called 'gypsies'), live within and around land-based nations and their various borders and laws. To ensure the survival of their ethnicity, cultures, and languages, they depend on being able to trust each other. The nations whose land we are living and studying on here also knew the importance of being able to know who can be trusted.

These needs may not always be as obvious in the highly individualized societies, like Post-Enlightenment Europe and the United States. The possibility for self-reliance has been created in part by making certain things dependable and institutionalized. You can go get yourself food without feeling like you have to trust anyone, because you can just

- go to the store (which has to adhere to corporate legal requirements)
- and buy food (the supply of which is made stable by complex networks of growing, manufacturing, and transportation, covered by the assurances of FDA-compliant labelling)
- from people who work there (and are subject to labor laws and HR regulations, which, if they are not followed, means the staff person does not get paid, so their wellbeing depends on them doing their job). The need to trust other people is obscured by the many institutions that we have created. Institutions have ways, sometimes, of getting around human whims and surprises. But at the end of the day, it is still hugely important to us that we feel clear about who can be trusted, and for what.

This need of ours is what leads us to place value on *authenticity*.

6.1.2. What Is Authenticity?

Authenticity is a rich concept, loaded with several connotations. To describe something as authentic, we are often talking about honesty, in that the thing is what it claims to be. But we also describe something as authentic when we want to say that it offers a certain kind of connection. A knock-off designer item does not offer the purchaser the same sort of connection to the designer brand that an *authentic* item does. Authenticity in connection requires honesty about who we are and what we're doing; it also requires that there be some sort of reality to the connection that is supposedly being made between parties. Authentic

connections frequently place high value on a sense of proximity and intimacy. Someone who pretends to be your friend, but does not spend time *with* you (proximity) or does not open themselves up to trusting mutual interdependence (intimacy) is offering one kind of connection (being an acquaintance) under the guise of a different kind of connection (friendship).

This is not to say that there is no room for appreciating connections that are not fully honest, transparent, and earnest all the time. Social media spaces have allowed humor and playfulness to flourish, and sometimes humor and play are not, strictly speaking, honest. Often, this does not bother us, because the kind of connection offered by joke accounts matches the jokey way they interact on social media. We get to know a lot about public figures and celebrities, but it is not usually considered problematic for celebrity social media accounts to be run by publicist teams. As long as we know where we stand, and the kind of connection being offered roughly matches the sort of connection we're getting, things go okay.

Inauthentic interaction can even be valuable. We might outright lie to someone to cover our tracks when planning them a surprise party. Once the surprise is revealed, the inauthentic interactions can be retrospectively reinterpreted, and offense is not taken. We play many different roles, and many different games, in the course of a social life, and sometimes we are more authentic than others. Inauthenticity can be a calculated risk, like that taken when planning someone a surprise party and using a few judicious lies in the process, or it can be an artefact of how complicated it is to be ourselves in a many-faceted world. But, you might notice, people don't often use the word 'inauthentic' to refer to the kinds of surprises that do not bother or upset. Mostly, the term 'authenticity' points to a mismatch or incongruity between how a connection is offered and how it plays out, when that mismatch is problematic. (A professional ethicist would say this means that 'authenticity' is a "normatively loaded" term.)

There are many ways to define and talk about authenticity and why it matters to people, but for purposes of this book, we will use the following definition:

Authenticity

Authenticity is a concept we use to talk about connections and interactions when the way the connection is presented matches with the reality of how it functions. An authentic connection can be trusted because we know where we stand. An inauthentic connection offers a surprise, because what is offered is not what we get. An inauthentic connection could be a good surprise, but usually, when people use the term 'inauthentic', they are indicating that the surprise was in some way problematic: someone was duped.

We value authenticity because it has a deep connection to the way humans use social connections to manage our vulnerability and to protect ourselves from things that threaten us. When we form connections, it is like all our respective vulnerabilities get entangled and tied together. We depend on each other, so if you betray me I face a loss in wellbeing. But also, since you did that, now you face a loss in wellbeing, as I no longer have your back. That means that both of us have an incentive not to betray or take advantage of each other, for our mutual protection.

When someone presents themselves as open and as sharing their vulnerabilities with us, it makes the connection feel authentic. We feel like they have entangled their wellbeing with ours by sharing their vulnerabilities with us. Think about how this works with celebrity personalities. Jennifer Lawrence [became a favorite of many when she tripped at the Oscars](#), and turned the moment into her persona as someone with a cool-girl, unpolished, unfiltered way about her. She came across as relatable and as sharing her vulnerabilities with us, which let many people feel that they had a closer, more authentic connection with her. Over time, that persona has come to be read differently, with some suggesting that this open-style persona is in itself also a performance. Does this mean that her performance of vulnerability was inauthentic?

6.2. Posting Sources

As an example of a situation where we can think through what it means to be authentic on social media, let's consider who or what is posting to a twitter account.

6.2.1. Example: Trump Tweet Sources

In 2016, when Donald Trump was running a campaign to be the US President, [one twitter user pointed out](#) that you could see which of the Tweets on Donald Trump's Twitter account were posted from an Android phone and which from an iPhone, and that the tone was very different. A data scientist decided to [look into it more and found](#):

- "My analysis ... concludes that the Android and iPhone tweets are clearly from different people, "posting during different times of day and using hashtags, links, and retweets in distinct ways,
- "What's more, we can see that the Android tweets are angrier and more negative, while the iPhone tweets tend to be benign announcements and pictures. this lets us tell the difference between the campaign's tweets (iPhone) and Trump's own (Android)."

(Read more in [this article from The Guardian](#))

Note: we can no longer run code to check this ourselves because first, Donald Trump's account was [suspended in January 2021 for inciting violence](#), then when Elon Musk decided to reinstate Donald Trump's account (using a Twitter poll as an excuse, but how many of the votes were bots?), Elon Musk also decided to remove the ability to look up a tweet's source.

Reflection Questions

We can ask ourselves some questions about authenticity in this story:

- How do you think about the authenticity of the Tweets that come from Trump himself?
 - Do you think it matters which human typed the Tweet? Does the emotional expression (e.g., anger) of the Tweet change your view of authenticity?
- How do you think about the authenticity of the Tweets that come from others in Trump's campaign?

6.2.2. Demo & Practice: Author Info

Though Reddit collects the device/program sources of submissions (like we saw from former President Trump), it unfortunately doesn't let us see them.

Instead we will look at other information about the author of posts on Reddit that can perhaps tell us something about their authenticity.

Log into Reddit (PRAW)

These are our normal steps get PRAW loaded and logged into Reddit

```
import praw
```

(optional) make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it won't actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords
# below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_#$DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Load a set of Reddit posts and look up author information

The code below searches for recent submissions from a subreddit, and then does a loop through all the tweets, printing out the information about the authors of the submissions, such as:

- Link Karma (a measure of how much people like the links that person submits)
- Comment Karma (a measure of how much people like the comments that person makes)

Try searching through other subreddits and see what you notice about the authors of posts in different subreddits.

To do this:

- put in your special Reddit bot passwords
- skip the fake_tweepy step above
- take the first line of the code below and replace `cuteanimals` with a different subreddit name, like `movies`

```
# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 10
# submission
submissions = reddit.subreddit("cuteanimals").hot(limit=10)

# Turn the submission results into a Python List
submissions_list = list(submissions)

for submission in submissions_list:
    print("Info for submission: " + str(submission.title))
    print(" author: " + str(submission.author))
    print(" author's Link Karma: " + str(submission.author.link_karma))
    print(" author's Comment Karma: " + str(submission.author.comment_karma))
    print(" author has a verified email address? " +
        str(submission.author.has_verified_email))
    print(" author is a moderator of a subreddit? " +
        str(submission.author.is_mod))
    print(" author has active Reddit Premium status? " +
        str(submission.author.is_gold))
    print()
```

Fake praw is pretending to select the subreddit: cuteanimals

```
Info for submission: Look at my cute dog!
author: fake_user
author's Link Karma: 10
author's Comment Karma: 50
author has a verified email address? True
author is a moderator of a subreddit? False
author has active Reddit Premium status? False

Info for submission: A baby lizard!
author: pretend_user
author's Link Karma: 25
author's Comment Karma: 15
author has a verified email address? True
author is a moderator of a subreddit? True
author has active Reddit Premium status? False

Info for submission: The cutest bird ever!
author: imaginary_user
author's Link Karma: 3
author's Comment Karma: 7
author has a verified email address? True
author is a moderator of a subreddit? True
author has active Reddit Premium status? True
```

6.3. Inauthenticity

In 2016, the Twitter account @Sciencing_Bi was created by an anonymous bisexual Native American Anthropology professor at the Arizona State University (ASU). She talked about her experiences of discrimination and about being one of the women that was sexually harassed by a particular Harvard professor. She gained a large Twitter following among academics, including one of the authors of this book, Kyle.

Separately, in 2018 during the [MeToo movement](#), one of @Sciencing_Bi's friends, Dr. BethAnn McLaughlin (a white woman), co-founded the MeTooSTEM non-profit organization, to gather stories of sexual harassment in STEM (Science, Technology, Engineering, Math). Kyle also followed her on Twitter until word later spread of Dr. McLaughlin's toxic leadership and bullying in the MeTooSTEM organization (Kyle may have unfollowed @Sciencing_Bi at the same time for defending Dr. McLaughlin, but doesn't remember clearly).

Then, in April 2020, in the early days of the [COVID pandemic](#), @Sciencing_Bi complained of being forced to teach in person at ASU when it wasn't safe, and then began writing of their COVID symptoms.

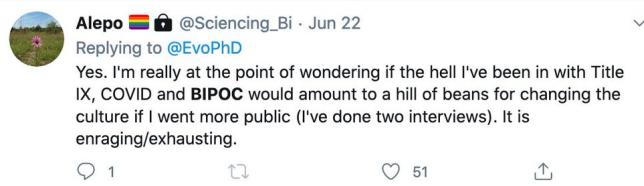


Fig. 6.1 Tweet from @Sciencing_Bi complaining about covid, sexual harassment (Title IX) discrimination for their race (BIPOC), and mentioning that they are still posting anonymously. ([Screenshot source](#))

On July 31st, Dr. McLaughlin announced that @Sciencing_Bi had died of COVID.



Fig. 6.2 Tweet from Dr. McLaughlin reporting that @Sciencing_Bi died of COVID.

([screenshot source](#))

Many of academics on Twitter expressed sympathy and outrage over what had happened to @Sciencing_Bi. Dr. McLaughlin held a memorial service for @Sciencing_Bi online via zoom.

A few people showed up to Dr. McLaughlin's online zoom memorial service for @Sciencing_Bi, but the guests felt something was off.

Afterward, Mr. Eisen began to search for any evidence that @Sciencing_Bi had been a real person. He could not find any.

"The combination of the weird things that were happening on the call and looking at the tweets and seeing how much they circled BethAnn, it just became obvious to me," he said. "Oh, [@Sciencing_Bi] is BethAnn."

- [The Anonymous Professor Who Wasn't - The New York Times](#)

Arizona State University confirmed that they had no professors who matched the description of @Sciencing_Bi. Dr. McLaughlin's and the @Sciencing_Bi's accounts were suspended from Twitter for violating Twitter policies, and Dr. McLaughlin eventually confirmed that she had completely invented @Sciencing_Bi.

Many people were upset at being deceived, and at the many levels of **inauthenticity** of Dr. McLaughlin's actions, such as:

- Dr. McLaughlin pretended to be a person (@Sciencing_Bi) who didn't exist.
- Dr. McLaughlin, as a white woman, created an account where she pretended to be a Native American (see more on "[pretendians](#)").
- Dr. McLaughlin put herself at the center of the MeToo movement as it related to STEM, but then Dr. McLaughlin turned out to be a bully herself.
- Dr. McLaughlin used the fake @Sciencing_Bi to shield herself from criticism. From the [NYTimes article](#): "'The fact that @Sci-Bi was saying all these things about BethAnn, saying that BethAnn had helped her, it didn't make me trust BethAnn — but it made me less willing to publicly criticize her because I thought that public criticism would be felt by the people she was helping,' he said. 'Who turned out to be fake.'"
- Though Dr. McLaughlin claimed a personal experience as a witness in a Title IX sexual harassment case, through the fake @Sciencing_Bi, she invented an experience of sexual harassment from a Harvard professor. This professor was being accused of sexually harassing women, and these real women who were very upset to find out that @Sciencing_Bi, who was trying to join in their cases, was not a real person.
- Dr. McLaughlin, through the @Sciencing_Bi account pretended to have an illness she didn't have (COVID). She made false accusations against Arizona State University's role in the (fake) person getting sick, and she was able to get attention and sympathy through the fake illness and fake death of the fake @Sciencing_Bi.

Sources:

- [Sciencing_Bi & BethAnn McLaughlin Twitter Accounts Suspended in Bizarre Tale - The Heavy.](#)

- [The Anonymous Professor Who Wasn't - The New York Times](#)
- [She created a fake Twitter persona — then she killed it with COVID-19 - The Verge](#)

6.3.1. Inauthentic Behaviors

Inauthentic behavior is when the reality doesn't match what is being presented. There are many ways inauthnticity shows up on social media, such as:

- Catfishing: Create a fake profile that doesn't match the actual user, usually in an attempt to trick or scam someone
- Sockpuppet (related to a burner account): Creating a fake profile in order to argue a position (sometimes intentionally argued poorly to make the position look bad)
- Astroturfing: An artificially created crowd to make something look like it has popular support
- Parody accounts: An account that is intentionally mimicking a person or position, but intended to be understood as fake.
- [Schrodinger's asshole: the guy who says awful shit, and decides if he was "only kidding" depending on your reaction.](#)
- Various types of trolling, which we will cover in the next chapter

6.4. Personas, Code Switching, Context Collapse

The way we present ourselves to others around us (our behavior, social role, etc.) is called our public [persona](#). We also may change how we behave and speak depending on the situation or who we are around, which is called [code switching](#).

While modified behaviors to present a persona or code switch may at first look inauthentic, they can be a way of authentically expressing ourselves in each particular setting. For example:

- Speaking in a formal manner when giving a presentation or answering questions in a court room may be a way of authentically sharing your experiences and emotions, but tailored to the setting
- Sharing those same experiences and emotions with a close friend may look very different, but still can be authentic
- Different communities have different expectations and meanings around behavior and presentation. So what is appropriate authentic behavior depends on what group you are from and what group you are interacting with, like this gif of President Obama below:



Fig. 6.3 President Obama giving a [very different handshakes](#) to a white man and a Black man ([Kevin Durant](#)). See also [this Key & Peele comedy sketch on greeting differences](#) with [Jordan Peele](#) playing Obama, and also Key & Peele's [Obama's Anger Translator sketch](#).

Read/watch more about code switching here:

- [How Code-Switching Explains The World](#)
- ['Key & Peele' Is Ending. Here Are A Few Of Its Code Switch-iest Moments](#)

Still, modifications of behavior can also be inauthentic. In the YouTube Video Essay: [YouTube: Manufacturing Authenticity \(For Fun and Profit!\)](#), by Lindsay Ellis, Ellis explores nuances in authenticity as a YouTuber. She highlights the [emotional labor](#) of keeping emotional expressions consistent with their public persona, even when they are having different or conflicted feelings. She also highlights how various "calls to action" (e.g., "subscribe to my channel") may be necessary for business and can be (and appear) authentic or inauthentic.

YouTube: Manufacturing Authenticity (For Fun and Profit!)



6.4.1. Context Collapse

Since we have different personas and ways of behaving in different groups of people, what happens if different groups of people are observing you at the same time? For example, someone might not know how to behave if they were at a restaurant with their friends and they noticed that their parents were seated at the table next to them. This phenomenon is called "[context collapse](#)".

On social media, context collapse is a common concern, since on a social networking site you might be connected to very different people (family, different groups of friends, co-workers, etc.). Additionally, something that was shared within one context (like a private message), might get reposted in another context (publicly posted elsewhere).

6.4.2. Reflection Questions

- How do you notice yourself changing how you express yourself in different situations, particularly on social media?
 - Do you feel like those changes or expression are authentic to who you are, do they compromise your authenticity in some way?

6.5. Parasocial Relationships

Another phenomenon related to authenticity which is common on social media is the [parasocial relationship](#).

Parasocial relationships are when a viewer or follower of a public figure (that is, a celebrity) feel like they know the public figure, and may even feel a sort of friendship with them, but the public figure doesn't know the viewer at all.

Parasocial relationships are not a new phenomenon, but social media has increased our ability to form both sides of these bonds. As comedian Bo Burnham put it: "[This awful D-list celebrity pressure I had experienced onstage has now been democratized](#)."

Learn more about parasocial relationships:

- StrucciMovies: [Fake Friends YouTube Series](#)
- Sarah Z: [How Fans Treat Creators](#) 33 min

6.5.1. Example: Mr. Rogers

As an example of the ethically complicated nature of parasocial relationships, let's consider the case of [Fred Rogers](#), who hosted a children's television program from 1968 to 2001.

In his television program, Mr. Rogers wanted all children to feel cared for and loved. To do this, he intentionally fostered a parasocial relationship with the children in his audience (he called them his "television friends"):

I give an expression of care every day to each child, to help him realize that he is unique. I end the program by saying, "You've made this day a special day, by just your being you. There's no person in the whole world like you, and I like you, just the way you are."

[Fred Rogers requesting funds for PBS at the US Senate in 1969](#)



Now, as children, I (Kyle) and my sister watched this program and felt the effects of what Fred Rogers was doing and had different responses to it. I asked my mom to help me send him a letter asking if he was real, to which I got a letter back explaining that he was indeed a real person:

MISTER
ROGERS'
NEIGHBORHOOD

June, 1988

[Redacted]

Dear Kyle,

It was good to get to know you and your sister from your letter and the photo you sent. We will be sure to find a special place for your picture in the album we keep of our television friends.

You told me that you wonder if I am real. Kyle, I know that it's hard to understand about all the things children see on television. I am a real man. I don't live in the television house that is seen in our television studio. I live in a real house with my family.

Here are some photos for you and Jessica and a copy of an old newsletter of ours which I thought you might like to read. The picture of my family was taken a long time ago -- my sons are grown young men now. James is 28 and John is 26. I also thought you would like to know that there is a biography about me. It is called, MISTER ROGERS' NEIGHBORHOOD AND A CHILDREN, by John and Anthony DiFranco. This book might be at your local library.

Kyle, it gives me a good feeling to know that we're television friends. You are special -- just because you're you.

Your television friend,

Mister Rogers



Family Communications, Inc. 4802 Fifth Avenue Pittsburgh, PA 15213 (412) 687-2990

Fig. 6.4 Fred Rogers explaining he is a real person to me.

My younger sister then wanted to send her own letter to Mr. Rogers, inviting him to stay at our house (he could sleep on the floor if he wanted).



Family Communications, Inc. 4802 Fifth Avenue Pittsburgh, PA 15213 (412) 697-2990 FAX (412) 697-1226

November, 1989

[Redacted]
Dear Jessica,

Thank you for your letter and the photograph you sent. I liked seeing the picture of you and Kyle. What fine children you are! We will be sure to find a special place for your photo in the album of our television friends.

It meant a lot to know you would like me to come to your house to visit. I wish it were possible to meet with the girls and boys who write to me. I am busy at work, and I need to spend my relaxing time with my family. Even though I can't have a real visit, it is good that we can have television visits and a letter visit like this one.

Jessica, there are many ways to say "I love you," and writing that in your letter is a good way. My way to say "I care about you is to make television programs for children, and I'm glad to know you're watching."

Here are pictures for you and Kyle with best wishes from all of us here in the Neighborhood. Each of you is special just because you're you.

Your television friend,

Mister Rogers

MISTER ROGERS' NEIGHBORHOOD is underwritten by Public Television Stations and
The Sears-Roebuck Foundation which is funded by Sears | Allstate | Deen Witter | Coldwell Banker



Fig. 6.5 Fred Rogers explaining to my younger sister (Jessica), that he can't come visit our house.

Now, of the two of us at this time, I had some skepticism, but my younger sister, Jessica, had the strongest parasocial relationship with Mr. Rogers. Jessica probably believed that Mr. Rogers knew her and liked her. We can break this into two parts:

- She believed Mr. Rogers knew her (or was at least close enough that he would come over to visit).
 - This belief was almost certainly false. He may have known who she was for a brief moment when responding to this letter (or signing one his secretary wrote or something).
- She believed that if she saw Mr. Rogers (like, if he came over to our house), that he would like her.
 - Based on [what is known publicly about Fred Rogers](#), this was probably true.

In the above example, you can see how Fred Rogers was trying to define and clarify the parasocial nature of the relationship (e.g., "television friends", "television visits"). We can then ask what was authentic or inauthentic about this relationship, and we can analyze the ethics of what Fred Rogers was doing.

6.5.2. Reflection questions

- Where do you see parasocial relationships on social media?
- In what ways are you in parasocial relationships?
- What are the ways in which a parasocial relationship can be authentic or inauthentic?
 - both for the celebrity, and for the viewer/follower

6.6. Authenticity and Anonymity

We mentioned in the last chapter the cases of 4chan and 8chan, where anonymous users trolled each other and posted offensive content, and one question that might lead us to is:

Does anonymity discourage authenticity and encourage inauthentic behavior?

The answer to this question might be yes in some circumstances, but also, the opposite might occur in others.

6.6.1. Anonymity encouraging inauthentic behavior

Anonymity can encourage *inauthentic* behavior, because with no way of tracing anything back to you^[1], you can get away with pretending you are someone you are not, or behaving in ways that would get your true self in trouble.

6.6.2. Anonymity encouraging authentic behavior

Anonymity can also encourage *authentic* behavior. If there are aspects of yourself that you don't feel free to share in your normal life (thus making your normal life *inauthentic*), then anonymity might help you share them without facing negative consequences from people you know.

6.6.3. Is authentic self-expression good?

We can next ask if authentic self-expression is a good thing or not. But that depends, what is the authentic thing about yourself that you would be expressing?

- Are you authentically expressing hate or cruelty? If so, perhaps authentic self-expression is morally bad.
- Are you part of an oppressed or marginalized group that has been restricted from self-expression? Then perhaps expressing yourself is morally good. (See [Trans Twitter and the beauty of online anonymity](#))

^[1] In reality, while many times people can remain anonymous, surprisingly often, anonymous users' identities can be discovered and revealed, whether through hacks or accidentally revealed information.

6.7. Example: Corporate Brand Authenticity

Another example of authenticity we can consider is the authenticity (or fake authenticity) of corporate brand accounts.

In the late 2010s, a number of corporate brand twitter accounts started breaking away from normal, safe and boring corporate topics, and began interacting with each other [playfully](#), or addressing real and serious human concerns.



Little Debbie ✅ @LittleDebbie · 5m

If you, like @sunnydelight was yesterday, feel like giving up, here are some tips:

- be realistic about what you can do
- speak w/loved ones who will help break you from negative self-talk
- give yourself an incentive for finishing
- remember the "why" of your "this"

SUNNYD ✅ @sunnydelight

I can't do this anymore

17

This trend brought complicated issues of authenticity because presumably there was some human employee that got charged with running the company social media account. We are simultaneously aware that, on the one hand, that human employee may be expressing

themselves authentically (whether playfully or about serious issues), but also that human is at the mercy of the corporation and the corporation can at any moment tell that human to stop or replace that human with another.

One particularly noteworthy corporate brand account was that the twitter account of Steak-Umms, which both delved into serious human topics and into the larger trend of corporate brand account authenticity:

why are so many young people flocking to brands on social media for love, guidance, and attention? I'll tell you why. they're isolated from real communities, working service jobs they hate while barely making ends meat, and are living w/ unchecked personal/mental health problems (see [whole thread here](#))

And they also talked about the advertising motives behind supporting social causes (even if some employees do indeed support them), and the advertising motivation behind tweeting openly about how they are basing their decisions based on advertising.

brands that use social causes for marketing do so to meat a bottom line. they calculate decisions based on the risk/reward ratio of advertisers, current audiences, and potential audiences. workers internally may truly care, but the decisions are ultimately based in self-interest

...

when we remind people that brands do what they do to meat a bottom line, it postures us above the problem, but we aren't. we're just using self-aware anti-advertising to invoke transparency because it helps our own bottom line. it's all circular. that's the tea

steak-umm bless

(see [whole thread here](#))

See also: [Brand Twitter Is Absurd, and It Will Only Get Worse](#)

6.7.1. Reflection question

- What does authenticity look like when something has multiple sources, like a corporate brand account being run by an individual employee? Do you think of whether the posts are authentic to the corporation? Or to the employee? Or both?

6.8. Design Analysis: Facebook Names Rules

We want to provide you, the reader, a chance to explore authenticity more, particularly considering how the rules built into social media platforms influence authenticity.

In this activity you will be looking at Facebook's name policy, and thinking through who this version of authenticity works for, and who it doesn't.^[1]

Names allowed on Facebook.

 Copy link

Facebook is a community where everyone uses the name they go by in everyday life. This makes it so that you always know who you're connecting with.

What isn't allowed?

- Symbols, numbers, unusual capitalization, repeating characters or punctuation.
- Characters from multiple languages.
- Titles of any kind (example: professional, religious).
- Words or phrases in place of a name.
- Offensive or suggestive words of any kind.

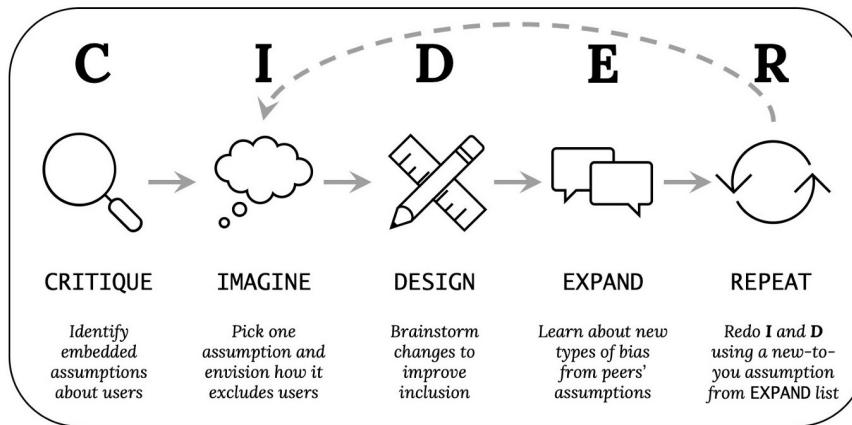
If your name follows our standards and you're still having trouble changing it, [find out why](#).

Things to keep in mind

- The name on your profile should be the name that your friends call you in everyday life. This name should also appear on an ID or document from our [ID list](#).
- Nicknames can be used as a first or middle name if they're a variation of your authentic name (like Bob instead of Robert).
- You can also list [another name](#) on your account (example: maiden name, nickname, professional name).
- Profiles are for individual use only. You can create a Page for a business, organization or idea.
- Pretending to be anything or anyone isn't allowed.

Fig. 6.6 The Facebook name policy as of 8/24/2022. You can see the current version [here](#)

This activity follows [the five step CIDER method](#) (Critique, Imagine, Design, Expand, Repeat), created by [Alannah Oleson, et. al.](#). This activity works best if you can do it with others (like in a classroom), so you can learn from their observations as well.



So read through the Facebook name policy above (for this activity ignore clarifications or exceptions Facebook may have made elsewhere, since those weren't deemed important enough to put on this main policy page). Then do the following (preferably on paper or in a blank computer document):

6.8.1. Critique (3-5 minutes, by yourself):

What assumptions does Facebook's name policy make about its users identities and their needs that might not be true or might cause problems? List as many as you can think of (bullet points encouraged).

- ⓘ If you are having trouble getting started, click to see some sample assumptions**

Facebook assumes that accounts will be controlled by individuals (instead of e.g., families)

Facebook assumes a real name is safe to use (not necessarily true for some LGBTQIA people whose families might kick them out or political dissidents)

6.8.2. Imagine (2-3 minutes, by yourself):

Select one of the above assumptions that you think is important to address. Then write a 1-2 sentence scenario where a user could not use Facebook as expected because of the assumption you selected. This represents one way the design could exclude certain users.

6.8.3. Design (3-5 minutes, by yourself):

Brainstorm ways to change the Facebook's name policy to avoid the scenario you wrote above. List as many different kinds of potential solutions you can think of – aim for ten or more (bullet points encouraged).

6.8.4. Expand (5-10 minutes, with others):

Combine your list of critiques with someone else's (or if possible, have a whole class combine theirs).

You can also consider looking at the [Wikipedia page on the Facebook real-name policy controversy](#).

6.8.5. Repeat the Imagine and Design Tasks:

Select another assumption from the list above that you think is important to address. Make sure to choose a different assumption than you used before. Choose one that you didn't come up with yourself, if possible. Repeat the Imagine and Design steps.

-
- [1]** You could also try this with different social media authenticity system, like [How to Get Verified on Bumble](#), which has the user take photos while mimicking poses.

6.9. Learn More

- Lindsay Ellis: [YouTube: Manufacturing Authenticity \(For Fun and Profit!\)](#)
- [How Code-Switching Explains The World](#)
- ['Key & Peele' Is Ending. Here Are A Few Of Its Code Switch-iest Moments](#)
- Parasocial relationships: (StrucciMovies: [Fake Friends Series](#)) (Sarah Z: [How Fans Treat Creators](#) 33 min)
- [Trans Twitter and the beauty of online anonymity](#)
- [Brand Twitter Is Absurd, and It Will Only Get Worse](#)

7. Trolling

Now that we've looked at authenticity and inauthenticity, let's look at one particular form of inauthenticity: Trolling.

- ⓘ Note**

This chapter covers a toxic communities and offensive behavior and comments.

7.1. What is trolling



Fig. 7.1 [Trolling post by Comedian Jaboukie Young-White](#), using his verified identity blue checkmark (before Elon Musk made blue checkmarks purchasable) to impersonate the official FBI account, and then make reference to the theory that the FBI was behind the assassination of Martin Luther King Jr. (note: while [this theory](#) is not confirmed, the [FBI definitely tried to get MLK to kill himself](#)). Twitter quickly suspended Jaboukie's account after this post.

7.1.1. Disruption and provoking reaction

Trolling is when an Internet user posts inauthentically (often false, upsetting, or strange) with the goal of causing disruption or provoking an emotional reaction. When the goal is provoking an emotional reaction, it is often for a negative emotion, such as anger or emotional pain. When the goal is disruption, it might be attempting to derail a conversation (e.g., [concern trolling](#)), or make a space no longer useful for its original purpose (e.g., joke product reviews), or try to get people to [take absurd fake stories seriously](#).

7.1.2. Why troll?

If the immediate goal of the action of trolling is to cause disruption or provoke emotional reactions, what is it that makes people want to do this disruption or provoking of emotional reactions?

Some reasons people engage in trolling behavior include:

- **Amusement:** Trolls often find the posts amusing, whether due to the disruption or emotional reaction. If the motivation is amusement at causing others' pain, that is called doing it for the [lulz](#).
- **Gatekeeping:** Some trolling is done in a community to separate out an ingroup from outgroup (sometimes called newbies or normies). The ingroup knows that a post is just trolling, but the outgroup is not aware and will engage earnestly. This is sometimes known as trolling the newbies.
- **Feeling Smart:** Going with the gatekeeping role above, trolling can make a troll or observer feel smarter than others, since they are able to see that it is trolling while others don't realize it.
- **Feeling Powerful:** Trolling sometimes gives trolls a feeling of empowerment when they successfully cause disruption or cause pain.**
- **Advance and argument / make a point:** Trolling is sometimes done in order to advance an argument or make a point. For example, proving that supposedly reliable news sources are gullible by getting them to repeat an absurd gross story.
- **Punish or stop:** Some trolling is in service of some view of justice, where a person, group or organization is viewed as doing something "bad" or "deserving" of punishment, and trolling is a way of fighting back.

See also: [Wikipedia's summary](#).

7.2. Origins of trolling

While the term "trolling" in the sense we are talking about in this chapter comes out of internet culture, the type of actions that we now call trolling have been happening as far back as we have historical records.

7.2.1. Pre-internet trolling

Before the internet, there were many activities that we would probably now call "trolling", such as:

- Practical jokes / pranks
- Hazing: Causing difficulty or suffering for people who are new to a group
- Satire: (e.g. [A Modest Proposal](#)) which takes a known form, but does something unexpected or disruptive with it.

Additionally the enjoyment at causing others pain or distress ("lulz") has also been part of the human experience for millennia:

"Boys throw stones at frogs in fun, but the frogs do not die in fun, but in earnest."

- [Bion of Borysthenes](#) (Greece ~300 BCE)

Additionally, the inauthentic arguments have long been observed, and were memorably explored by Jean-Paul Sartre as "[Bad Faith](#)". "Bad faith" here means pretending to hold views or feelings, while not actually holding them (this may be intentional, or it may be through self-deception). Sartre particularly observed this in arguments made by antisemites while he lived in Nazi controlled Paris:

"Never believe that anti-Semites are completely unaware of the absurdity of their replies. They know that their remarks are frivolous, open to challenge. But they are amusing themselves, for it is their adversary who is obliged to use words responsibly, since he believes in words. The anti-Semites have the right to play. They even like to play with discourse for, by giving ridiculous reasons, they discredit the seriousness of their interlocutors. They delight in acting in bad faith, since they seek not to persuade by sound argument but to intimidate and disconcert. If you press them too closely, they will abruptly fall silent, loftily indicating by some phrase that the time for argument is past."

[Jean-Paul Sartre](#), 1945 CE, Paris, France

7.2.2. Origins of Internet trolling

We can trace Internet trolling to early social media in the 1980s and 1990s, particularly in early online message boards and in early online video games.

In the early Internet message boards that were centered around different subjects, experienced users would "troll for newbies" by posting naive questions that all the experienced users were already familiar with. The "newbies" who didn't realize this was a troll would try to engage and answer, and experienced users would feel superior and more part of the group knowing they didn't fall for the troll like the "newbies" did. These message boards is where the word "troll" with this meaning comes from.

One set of the early Internet-based video games were Multi-User Dungeons ([MUDs](#)), where you were given a text description of where you were and could say where to go (North, South, East, West) and text would tell you where you were next. In these games you would come across other players and could type messages or commands to attack them. These were the precursors to more modern Massively multiplayer online role-playing games ([MMORPGs](#)). In these MUDs, players developed activities that we now consider trolling, such as "Griefing" where one player intentionally causes another player "grief" or distress (such as a powerful player finding a weak player and repeatedly killing the weak player the instant they respawn), and "Flaming" where a player intentionally starts a hostile or offensive conversation.

In the 2000s, trolling went from an activity done in some communities to the creation of communities that centered around trolling such as [4chan](#) (2003), [Encyclopedia Dramatica](#) (2004), and some forums on [reddit](#) (2005).

These trolling communities eventually started compiling half-joking sets of "[Rules of the Internet](#)" that both outlined their trolling philosophy:

Rule 43. The more beautiful and pure a thing is - the more satisfying it is to corrupt it

and their extreme misogyny:

Rule 30. There are no girls on the internet

Rule 31. TITS or GTFO - the choice is yours [meaning: if you claim to be a girl/woman, then either post a photo of your breasts, or get the fuck out]

You can read more at: [knowyourmeme](#) and [wikipedia](#)

7.3. Activity: Evaluating Trolling Examples

This page has several examples of trolling. For each one consider the following:

- What are potential benefits of this example (e.g., it's funny, in-group identifying)? And who would get the benefits?
- What are potential harms of this example? And who would suffer the harms?

These examples will range mild to much more extreme.

7.3.1. Banana Slicer Reviews

In 2011, Amazon users started leaving parody reviews of a [banana slicer on Amazon](#)



Fig. 7.2 The Hutzler 571 Banana Slicer on Amazon.

Here are some examples of parody reviews of the banana slicer:



Nosh
★★★★★ Really ?

Reviewed in the United States on December 30, 2018

Item Package Quantity: 1 | Size: 11.25" | **Verified Purchase**

I've always wondered how to get that professional restaurant quality slice. Now I can! No more paying for those expensively sliced fruits- I can just stay at home. Considering selling banana slices to my neighbors now for active & passive income!

148 people found this helpful

Fig. 7.3 A review about how hard it is to cut bananas without a banana slicer



★★★★★ Be careful of wrong-way bananas!!
By Emily S on June 1, 2018
We were so excited to get our Hutzler 571...until we realized that our bananas curved the wrong way. Gonna have to go to the store for new bananas... 🐞 🐞 🐞

Images in this review

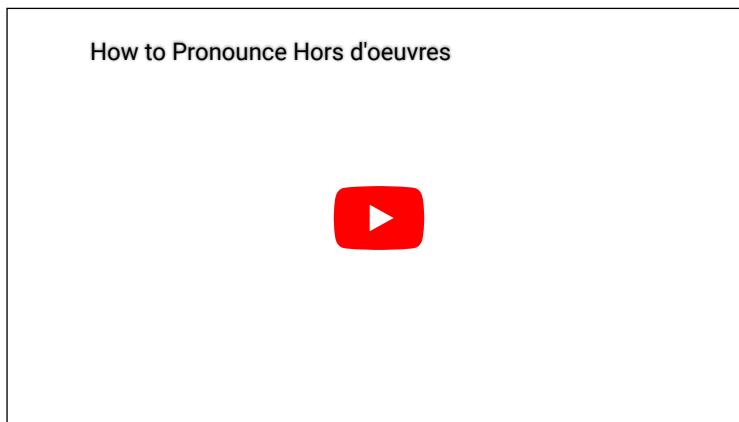


Fig. 7.4 A review about the slicer and bananas being curved the wrong way (you could just rotate it)

Read more at [knowyourmeme](#) and see also the related [Three Wolf Moon T-Shirt](#)

7.3.2. Fake Pronunciation Guide

Below is a fake pronunciation guide on youtube for "Hors d'oeuvres":



Note: you can find the [real pronunciation guide here](#), and for those who can't listen to the video, there is an explanation in this footnote^[1]

In the youtube comments some people played along and others celebrated or worried about who would get tricked.

t thorswill 7 years ago
"Mmm! What delicious hors-d'oeuvres!" Thank you for helping me pronounce this difficult phrase! I am a wealthy businessman and will make use of this knowledge to maintain my status in America.
106 REPLY
View 5 replies

unfa 7 years ago
I'm afraid someone could actually believe this pronunciation. Please exaggerate more.
272 REPLY
View 2 replies

A Azbazzer 5 years ago
I'm French I can confirm.
262 REPLY
View 7 replies

J Joe Blues 6 years ago
I love how this video is the very first link that pops up when googling: "how to pronounce hors d'oeuvres". PronunciationManual, you've made it son.
11 REPLY

Fig. 7.5 Various comments on the fake pronunciation video

7.3.3. Forever Alone Involuntary Flashmob

In 2011, a group on 4chan started spreading a plan for making a "Forever Alone Involuntary Flashmob." You can see their instructions below:

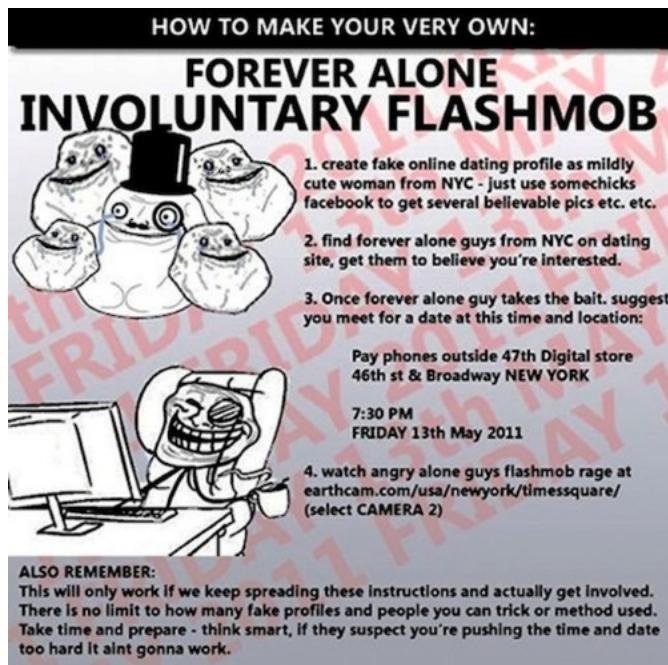


Fig. 7.6 A meme spread on 4chan trying to recruit 4chan trolls to catfish single men and have all the single men show up to the same location at the same time with no one there to meet them. Then 4chan users can watch a webcam to laugh at the lonely men.

Read more about what happened in [this Vice article](#).

❶ Note

As we look at more cruel trolling examples, be aware of this online troll's explained the justification for trolling (though we, the authors, do not think this justifies the cruelty):

The purpose of the community ... I guess is to exchange ideas and techniques, and to plan co-ordinated trolling. The underlying philosophical purpose or shared goal, anyway, would be to disrupt people's rosy vision of the internet as their own personal emotional safe place that serves as a proxy for real-life interactions they are lacking (i.e. going online to demonstrate one's grief over a public disaster like Japan [2011 Tsunami] with total strangers who have no real connection to the event).

- From [Interview with a troll](#)

7.3.4. RIP trolling

RIP trolling is where trolls find a memorial page and then all work together to mock the dead person and the people mourning them. Here's one example from 2013:

A Facebook memorial page dedicated to Matthew Kocher, who drowned July 27 in Lake Michigan, had attracted a group of Internet vandals who mocked the Tinley Park couple's only child, posting photos of people drowning with taunting comments superimposed over the images.

One photo showed a submerged person's hand breaking through the water with text reading "LOL u drowned you fail at being a fish," according to a screen grab of the page shared with the Tribune after the post was removed.

- [Cruel online posts known as RIP trolling add to Tinley Park family's grief](#)
from the Chicago Tribune

7.3.5. Flooding Police app with K-pop videos

To go in a different direction for our last example, let's look at an example of trolling as a form of protest.

In the Black Lives Matters protests of 2020, Dallas Police made an app where they asked people to upload videos of protesters doing anything illegal. In support of the protesters, K-pop fans swarmed the app and uploaded as many K-pop videos as they could eventually leading to the app to crash and become unusable, and thus protecting the protesters from this attempt at Police surveillance.

Read more at the Verge: [K-pop stans overwhelm app after Dallas police ask for videos of protesters](#)

For another example of trolling as protests, this one with bots, see: [A TikToker said he wrote code to flood Kellogg with bogus job applications after the company announced it would permanently replace striking workers](#)

[1] In American English, "Hors d'oeuvres" is pronounced like "or-dervs". In the fake pronunciation video they pronounce it: "haars-doovs-dees" and then give an example sentence: "MMmm, what a die-loose-us [instead of delicious (dee-lish-us)] haars-doovs-dees"

7.4. Responding to trolls?

One of the traditional pieces of advice to dealing with trolls is "Don't feed the trolls," which means that if you don't respond to trolls, they will get bored and stop trolling. We can see this advice as well in the trolling community's own "[Rules of the Internet](#)":

1. Do not argue with trolls - it means that they win

But the essayist Film Crit Hulk argues against this in [Don't feed the trolls, and other hideous lies](#). That piece argues that the "don't feed the trolls" strategy doesn't stop trolls from harassing:

Ask anyone who has dealt with persistent harassment online, especially women: [trolls stopping because they are ignored] is not usually what happens. Instead, the harasser keeps pushing and pushing to get the reaction they want with even more tenacity and intensity. It's the same pattern on display in the litany of abusers and stalkers, both online and off, who escalate to more dangerous and threatening behavior when they feel like they are being ignored.

Film Crit Hulk goes on to say that the "don't feed the trolls" advice puts the burden on victims of abuse to stop being abused, giving all the power to trolls. Instead Film Crit Hulk suggests giving power to the victims and using "skilled moderation and the willingness to kick people off platforms for violating rules about abuse"

7.4.1. Reflection questions

Have you witnessed different responses to trolling? What happened in those cases?

What do you think is the best way to deal with trolling?

7.5. Trolling a Reply Bot

We've looked at some examples of trolling, but now let's try one ourselves.

We are going to build a bot that replies to people who mention us. But we will then see how we can troll bot we made and make it say something offensive.

Before we make this bot though, we need to learn how to use conditionals in Python, and some additional ways of working with strings.

7.5.1. Demo: Conditionals and String Manipulation

We are later going to build a bot that, if you message it:

- Subject: "Wanting bot response", body: "I want you to __" (where the __ is some action)
- then the bot will reply, "I will now __" (where the __ is that same action).

But in order to build a bot that does this, we will first need to learn how to use conditionals ([if](#)) and some string manipulation techniques.

Conditionals

[if](#) statements

Conditionals let us change what we do depending on the situation. In a Python we do this using an [if](#) statement.

Here is an example:

```
if 1 < 2:  
    display("We have determined that 1 is indeed less than 2")
```

```
'We have determined that 1 is indeed less than 2'
```

In the above code we can see the different pieces we need for an [if](#):

- We start by writing [if](#)
- After the [if](#) we have a piece of code (an "expression") that will produce a boolean. In this case `1 < 2` checks if 1 is less than 2, and since it is, it `1 < 2` comes out as [True](#)
- After expression that produced a boolean is a `:` which indicates that next will come a block of code indented over. That block of code will only run [if](#) the expression came out as [True](#)
- Inside the block of code we have a `display` statement, which runs because `1 < 2` came out as [True](#)

Let's do another example, but where the expression comes out as false

```
if 1 > 2:  
    display("We have determined that 1 is greater than 2")
```

In this case we test if 1 is greater than two, but `1 > 2` comes out as [False](#), so the code block in this [if](#) statement does not get run and we never display that "We have determined that 1 is greater than 2"

[else](#) and [elif](#) statements

What if we want to do something different if the expression turned out to be [False](#)?

For that we can use [else](#) or [elif](#) statements.

Here's an example with [else](#):

```
if 1 > 2:  
    display("We have determined that 1 is greater than 2")  
else:  
    display("We NOT have determined that 1 is greater than 2")
```

```
'We NOT have determined that 1 is greater than 2'
```

In the above code, after the code block inside an `if`, we have an `else` (at the same indent as the `if`), with a `:` indicating that next will be a block of code to run in case the `if` expression came back as `False` (which it did, because 1 is not greater than 2).

Now, what if we have multiple courses of action we might want to take depending on several checks? For that we can use an `elif` (short for "else if") like this:

```
if 1 > 1:  
    display("1 is greater than 1")  
elif 1 < 1:  
    display("1 is less than 1")  
else:  
    display("1 is neither greater than 1, nor less than 1, so it must be equal to  
1")
```

```
'1 is neither greater than 1, nor less than 1, so it must be equal to 1'
```

The `elif` above works just like an `if` statement, but the check in the `elif` is only run if the `if` statement's check came back `False`.

Note: in a sequence of an `if` statement, followed by `elifs` and ending with an `else`, only one of the code blocks will run.

variables in `if` statements

In the above examples, all of our checks were based on specific numbers (like `1 > 2`), which will always come out to the same answer. But we can make our code more useful by using variables, like below:

```
money_in_wallet = 7  
cost_of_item = 5  
  
if money_in_wallet > cost_of_item:  
    change = money_in_wallet - cost_of_item  
    display("You can purchase the item with $" + str(change) + " in change")  
elif money_in_wallet == cost_of_item:  
    display("You can purchase the item, but with no change")  
else: # This else runs when money_in_wallet < cost_of_item  
    display("You don't have enough money to purchase the item")
```

```
'You can purchase the item with $2 in change'
```

In the above code we have variables that represent how much money we have in our wallet and the cost of the item. Note: You can change the values and run the code to get different results!

We then have a series of checks to see if we have more than enough money, or exactly the right amount of money. The final else will only run in the remaining situation where there wasn't enough money, so we added a comment to clarify this, even though the code will work fine without the comment.

String Manipulation

The next programming topics we need to cover have to do with string manipulation (which we will also use some with `if` statements)

using strings like lists of characters

Python lets us treat strings like a list of characters, so we can do things like:

- loop through each character in a string
- get the first character of the string

You can loop through each character of a string like this:

```
important_word = "Ethics"
for character in important_word:
    print(character)
```

```
E
t
h
i
c
s
```

The above code looped through the letters in "Ethics" and for each letter it printed the letter out on its own line (note: I use `print` instead of `display` because it happens to look better in the online textbook)

We can select letters as well by their index, like this:

```
important_word = "Ethics"
display("The first letter is: " + important_word[0])
```

```
'The first letter is: E'
```

```
display("The sixth letter is: " + important_word[5])
```

```
'The sixth letter is: s'
```

Python also lets us do more complicated selections (called a "slice") by index using the format:

- `[start_index : stop_index]`

So, for example, to select the first 3 letters of our string, we can do this:

```
important_word[0 : 3]
```

```
'Eth'
```

Note: The start index is the first index selected, and the stop index is the one it stops **before**.

So our code `important_word[0 : 3]` selected the letters at indexes: 0, 1, and 2.

If we want to select the characters at index 2 and 3 (that is the 3rd and 4th letters), we would write:

```
important_word[2 : 4]
```

```
'hi'
```

If we leave have the `:` in our square bracket selector but leave one side blank, that side will go to the beginning or end.

So if we want to select the first three characters we can write:

```
important_word[ : 3]
```

```
'Eth'
```

And if we want to select everything after the first 3 letters we can write:

```
important_word[3 : ]
```

```
'ics'
```

Python also lets us index backwards from the end of the string using negative numbers. So if we wanted to select the last two letters, we can do that like this:

```
important_word[-2 : ]
```

```
'cs'
```

You can read more about Python string slicing on [GeeksforGeeks](#)

if statements and strings

Now let's see how we can use if statements together with strings.

First we will use **in** to see if a string appears as part of another string

```
weather_report = "The weather will be cold and rainy today"

if "cold" in weather_report:
    display("bring a jacket")
else:
    display("probably don't need a jacket")

if "rainy" in weather_report:
    display("bring an umbrella")
else:
    display("no need for an umbrella")
```

```
'bring a jacket'
```

```
'bring an umbrella'
```

In the above code we are looking to see if the `weather_report` includes the text "cold" and "rainy" to decide whether we need a jacket or umbrella.

Note: you can see how this code could give bad advice if the weather report used unexpected words like: "The weather will be freezing and there will be a downpour." Getting computers to correctly interpret human language can be very hard!

Now let's look at an example of using string slices.

```
user_preference = "My favorite vegetable is broccoli"

# check if the user is telling us their favorite vegetable
if user_preference[ : 25] == "My favorite vegetable is ":
    display("The user was telling us their favorite vegetable")
```

```
'The user was telling us their favorite vegetable'
```

Now, in the above code I had to count the length of the text "`My favorite vegetable is` " (25 characters long) so I could cut out the same length start of `user_preference` and see if it matched.

I can improve this code by using variables and having Python count that length for me like using the `len` function:

```

user_preference = "My favorite vegetable is broccoli"

vegitable_start = "My favorite vegetable is "
vegitable_start_len = len(vegitable_start)

# check if the user is telling us their favorite vegetable
if user_preference[ : vegitable_start_len] == vegitable_start:
    display("The user was telling us their favorite vegetable")

```

'The user was telling us their favorite vegetable'

The above code is longer, but now I have python doing the counting for me, which makes it (hopefully) easier to modify and understand.

Python offers us one more way of improving this code, which is with a function called `startswith` which does what we are trying to do (and if we looked at the source code for `startswith`, it is probably similar to what we were doing)

```

user_preference = "My favorite vegetable is broccoli"

vegitable_start = "My favorite vegetable is "

# check if the user is telling us their favorite vegetable
if user_preference.startswith(vegitable_start):
    display("The user was telling us their favorite vegetable")

```

'The user was telling us their favorite vegetable'

We can also use the length of the `vegitable_start` string to take the `user_preference` string to select the thing the user said was their favorite:

```

user_preference = "My favorite vegetable is broccoli"

vegitable_start = "My favorite vegetable is "
vegitable_start_len = len(vegitable_start)

# check if the user is telling us their favorite vegetable
if user_preference.startswith(vegitable_start):
    favorite_vegitable = user_preference[vegitable_start_len: ]
    display("The user's favorite vegitable: " + favorite_vegitable)

```

"The user's favorite vegitable: broccoli"

This gives us some of the pieces we need to build a bot that, if you tweet at it:

- "Hi @mybotname, please __" (where the __ is some action)
- will reply, "I will now __" (where the __ is that same action).

Though before we do that, we'll give you some additional practice with conditionals and strings.

7.5.2. Practice: Conditionals and String Manipulation

IF ELSE Statements

Look at the following code example and try running it

```

x = 5

if x < 11:
    print('A')
elif x >= 13:
    print('B')
else:
    print('C')

```

A

Now what would happen if x was changed to 30? What would the output be?

Do Not Code. Please answer this question as a markdown block. Modify the code above to check your answer afterwards.

TODO: Put your answer here

What value would the x variable have to be in order to get the output 'C'?

Again, Do Not Code. Please answer this question as a markdown block. Modify the code above to check your answer afterwards

TODO: Put your answer here

String Manipulation

Now, make a variable with your name in it, called my_name

```
# TODO: enter your code here
```

Write code to display the first letter of your name

```
# TODO: enter your code here
```

Write code to display the last letter of your name

```
# TODO: enter your code here
```

Ifs with Strings

Save a string in a variable called message and have it end with either a question mark ?, an exclamation mark !, or a period .

```
# TODO: enter your code here
```

Now, make a set of if/elif/else statements which will display either:

- The message was a question
- The message was an exclamation
- The message was a statement
- The message ended unexpectedly

depending on what character the message ended in a ?, !, ., or something else. Hint: use the `endswith` function.

```
# TODO: enter your code here
```

Now, go back and modify the message string to see if the different if/elif/else options all work

7.5.3. Demo: Trolling a Reply Bot

We are later going to build a bot that, if you message it with:

- Subject: "Wanting bot response", body: "I want you to __" (where the __ is some action)
- then the bot will reply, "I will now __" (where the __ is that same action).

Then we will try trolling it, and fixing it, and trolling it again.

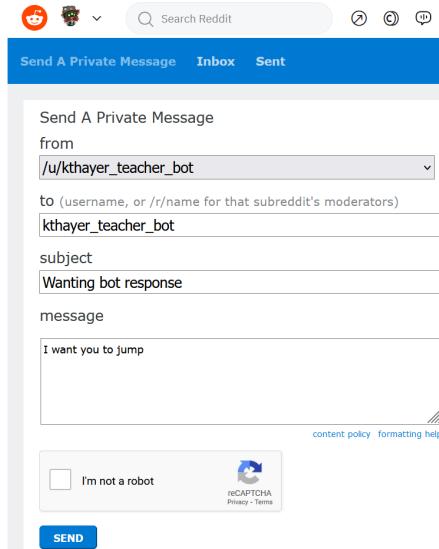
Sending ourselves a message

In order to send ourselves a message we can reply to, go to:

- <https://www.reddit.com/message/compose/>

Then compose a message to your own account with the subject:

- Wanting bot response and a message body of something like:
- I want you to jump



Log into Reddit (PRAW)

Our code starts with our Reddit PRAW setup:

```
import praw
```

(optional) make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it won't actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_#$DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Bot 1: do whatever we are told

Our first bot will find our latest inbox message, and then reply with whatever it is told to do

find my latest message

We need to find our latest message in our inbox

We do this by looking in our reddit inbox for messages (we limit it to one, since we just want the latest).

It doesn't directly give us the one message (instead it is in something called an "iterator"), but we can use the `next` function to get the message out.

We then display the subject of the message just so we can see that it found something..

```
# Look up the subreddit "cuteanimals", then find the "hot" List, getting up to 1
# submission
messages = reddit.inbox.messages(limit=1)

# get the first submission off the List (should only be one anyway)
latest_message = next(messages)

# display the subject and body of the message, so we can see what we found
display("latest message subject: " + str(latest_message.subject))
display("latest message body: " + str(latest_message.body))
```

```
'latest message subject: Wanting bot response'
```

```
'latest message body: I want you to jump'
```

If tweet matches our pattern, reply

We will now see if our tweet matches our pattern of a message subject of "Wanting bot response" with a message body of "I want you to __" and then we will reply.

First we will create strings with the patterns we are looking for and save them into variables.

```
expected_subject = "Wanting bot response"
expected_body_pattern = "I want you to "
```

We will check if the message has the subject we are expecting. If it does it will check if the message body starts with the expected pattern. If it does, then we will find the action from the end of the message body text (based on the `expected_body_pattern` length), and reply using that action.

We also add "else" cases for when we didn't match the pattern, and display a message saying what didn't match.

```
# check if the mention text starts with our set phrase
if latest_message.subject == expected_subject:

    if latest_message.body.startswith(expected_body_pattern):
        # get the action, which should be the end of the string after the expected
        # pattern
        action = latest_message.body[len(expected_body_pattern) :]

        # make a new message which says we will do the action
        message = "I will now " + action

        # send our message in reply
        latest_message.reply(message)

    else: # else code for if the message body didn't match
        display("The message body (" + latest_message.body + ") didn't match our
                pattern (" + expected_body_pattern + ")")

    else: # else code for if the message subject didn't match
        display("The message subject (" + latest_message.subject + ") didn't match our
                expected subject (" + expected_subject + ")")
```

Fake praw is pretending to reply to a message with: I will now jump

Yay! It worked! But there is a problem!

Trolling bot 1

This bot is really easy to troll, so if I repeat my steps and get a new mention (this code is just a duplication of the code above):

```
# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 1
# submission
messages = reddit.inbox.messages(limit=1)

# get the first submission off the list (should only be one anyway)
latest_message = next(messages)

# display the subject and body of the message, so we can see what we found
display("latest message subject: " + str(latest_message.subject))
display("latest message body: " + str(latest_message.body))

expected_subject = "Wanting bot response"
expected_body_pattern = "I want you to "

# check if the mention text starts with our set phrase
if latest_message.subject == expected_subject:

    if latest_message.body.startswith(expected_body_pattern):
        # get the action, which should be the end of the string after the expected
        # pattern
        action = latest_message.body[len(expected_body_pattern) :]

        # make a new message which says we will do the action
        message = "I will now " + action

        # send our message in reply
        latest_message.reply(message)

    else: # else code for if the message body didn't match
        display("The message body (" + latest_message.body + ") didn't match our
        pattern (" + expected_body_pattern + ")")

    else: # else code for if the message subject didn't match
        display("The message subject (" + latest_message.subject + ") didn't match our
        expected subject (" + expected_subject + ")")
```

'latest message subject: Wanting bot response'

'latest message body: I want you to do something horrible!'

Fake praw is pretending to reply to a message with: I will now do something horrible!

Someone messaged us saying at us: `I want you to do something horrible!`, and we replied `I will now do something horrible!`.

They could have made us tweet much worse!

Bot 2: Trying to limit actions

Let's try this again, but limit the actions we will do.

- If someone asks us to "run", "jump", or "fly", we will do it
- If someone asks us to do something else we will say:
 - "I do not recognize the command __" (with __ being whatever they said)

So, to go back through our steps:

find my latest mention

```
# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 1
# submission
messages = reddit.inbox.messages(limit=1)

# get the first submission off the list (should only be one anyway)
latest_message = next(messages)

# display the subject and body of the message, so we can see what we found
display("latest message subject: " + str(latest_message.subject))
display("latest message body: " + str(latest_message.body))
```

```
'latest message subject: Wanting bot response'
```

```
'latest message body: I want you to fly'
```

If tweet matches our pattern, reply

We do the same code for this as before, but after we get the action we are told to do, we put another `if/else` to either do the action if we recognize it, or say we didn't recognize the action.

We will use `in` to see if the action is in our list of allowed actions (called an `allow_list`)

```
expected_subject = "Wanting bot response"
expected_body_pattern = "I want you to "

actions_allow_list = ["run", "jump", "fly"]

# check if the mention text starts with our set phrase
if latest_message.subject == expected_subject:

    if latest_message.body.startswith(expected_body_pattern):
        # get the action, which should be the end of the string after the expected
        # pattern
        action = latest_message.body[len(expected_body_pattern) :]

        # See if it is one of our recognized actions
        if action in actions_allow_list:
            # make a new message which says we will do the action
            message = "I will now " + action

            # send our message in reply
            latest_message.reply(message)

        else: # we didn't recognize the action
            # make a new message which says we will NOT do the action
            message = "I do not recognize the command " + action

            # send our message in reply
            latest_message.reply(message)

    else: # else code for if the message body didn't match
        display("The message body (" + latest_message.body + ") didn't match our
pattern (" + expected_body_pattern + ")")

else: # else code for if the message subject didn't match
    display("The message subject (" + latest_message.subject + ") didn't match our
expected subject (" + expected_subject + ")")
```

Fake praw is pretending to reply to a message with: I will now fly

That one was in our allow list so it worked. Let's do it all again, with the tweet that caused us problems last time

Note: the code below is just copied from the code sections above

```

# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 1
# submission
messages = reddit.inbox.messages(limit=1)

# get the first submission off the list (should only be one anyway)
latest_message = next(messages)

# display the subject and body of the message, so we can see what we found
display("latest message subject: " + str(latest_message.subject))
display("latest message body: " + str(latest_message.body))

expected_subject = "Wanting bot response"
expected_body_pattern = "I want you to "

actions_allow_list = ["run", "jump", "fly"]

# check if the mention text starts with our set phrase
if latest_message.subject == expected_subject:

    if latest_message.body.startswith(expected_body_pattern):
        # get the action, which should be the end of the string after the expected
        # pattern
        action = latest_message.body[len(expected_body_pattern) :]

        # See if it is one of our recognized actions
        if(action in actions_allow_list):
            # make a new message which says we will do the action
            message = "I will now " + action

            # send our message in reply
            latest_message.reply(message)

    else: # we didn't recognize the action
        # make a new message which says we will NOT do the action
        message = "I do not recognize the command " + action

        # send our message in reply
        latest_message.reply(message)

else: # else code for if the message body didn't match
    display("The message body (" + latest_message.body + ") didn't match our
pattern (" + expected_body_pattern + ")")

else: # else code for if the message subject didn't match
    display("The message subject (" + latest_message.subject + ") didn't match our
expected subject (" + expected_subject + ")")

```

'latest message subject: Wanting bot response'

'latest message body: I want you to do something horrible!'

Fake praw is pretending to reply to a message with: I do not recognize the command do something horrible!

Ok, this time we said I do not recognize the command do something horrible!.

That looks a little better! Are we safe now?

Trolling bot 2

No, it turns out we are not safe.

Let's find the latest mention again and see what happens

```

# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 1
# submission
messages = reddit.inbox.messages(limit=1)

# get the first submission off the list (should only be one anyway)
latest_message = next(messages)

# display the subject and body of the message, so we can see what we found
display("latest message subject: " + str(latest_message.subject))
display("latest message body: " + str(latest_message.body))

expected_subject = "Wanting bot response"
expected_body_pattern = "I want you to "

actions_allow_list = ["run", "jump", "fly"]

# check if the mention text starts with our set phrase
if latest_message.subject == expected_subject:

    if latest_message.body.startswith(expected_body_pattern):
        # get the action, which should be the end of the string after the expected
        # pattern
        action = latest_message.body[len(expected_body_pattern) :]

        # See if it is one of our recognized actions
        if(action in actions_allow_list):
            # make a new message which says we will do the action
            message = "I will now " + action

            # send our message in reply
            latest_message.reply(message)

    else: # we didn't recognize the action
        # make a new message which says we will NOT do the action
        message = "I do not recognize the command " + action

        # send our message in reply
        latest_message.reply(message)

else: # else code for if the message body didn't match
    display("The message body (" + latest_message.body + ") didn't match our
pattern (" + expected_body_pattern + ")")

else: # else code for if the message subject didn't match
    display("The message subject (" + latest_message.subject + ") didn't match our
expected subject (" + expected_subject + ")")

```

'latest message subject: Wanting bot response'

"latest message body: I want you to stop talking. But that doesn't mean I won't say
horrible things like: I hate everybody!"

**Fake praw is pretending to reply to a message with: I do not recognize the command
stop talking. But that doesn't mean I won't say horrible things like: I hate everybody!**

Oh no! Someone tweeted at us:

- I want you to stop talking. But that doesn't mean I won't say horrible things
like: I hate everybody!

And we replied:

- I do not recognize the command stop talking. But that doesn't mean I won't say
horrible things like: I hate everybody!

Making a bot that is troll proof is very difficult! You either need to severely limit how your bot engages with people, or do a ton of work trying to prevent trolling and fix problems when people find a new way of trolling you.

If you want to learn more, you can revisit the story of what went wrong with the Microsoft Tay bot: [How to Make a Bot That Isn't Racist](#)

7.6. Ethics and Trolling

7.6.1. Background: Forming Groups

Every "we" implies a not- "we". A group is constituted in part by who it excludes. Think back to the origin of humans caring about authenticity: if being able to trust each other is so important, then we need to know WHICH people are supposed to be entangled in those bonds of mutual trust with us, and which are not from our own crew. As we have developed larger and larger societies, states, and worldwide communities, the task of knowing whom to trust has become increasingly large. All groups have variation within them, and some variations are seen as normal. But the bigger groups get, the more variety shows up, and starts to feel palpable. In a nation or community where you don't know every single person, how do you decide who's in your squad?

One answer to this challenge is that we use various heuristics (that is, shortcuts for thinking) like stereotypes and signaling to quickly guess where a person stands in relation to us. Sometimes wearing items of a certain brand signals to people with similar commitments that you might be on the same page. Sometimes features that are strongly associated with certain social groups—stereotypes—are assumed to tell us whether or not we can trust someone. Have you ever tried to change or mask your accent, to avoid being marked as from a certain region? Have you ever felt the need to conceal something about yourself that is often stereotyped, or to use an ingroup signal to deflect people's attention from a stereotyped feature?

There is a reason why stereotypes are so tenacious: they work... sort of. Humans are brilliant at finding patterns, and we use pattern recognition to increase the efficiency of our cognitive processing. We also respond to patterns, and absorb patterns of speech production and style of dress from the people around us. We do have a tendency to display elements of our history and identity, even if we have never thought about it before. This creates an issue, however, when the stereotype is not apt in some way. This might be because we diverge in some way from the categories that mark us, so the stereotype is inaccurate. Or this might be because the stereotype also encodes value judgements that are unwarranted, and which lead to problems with implicit bias. Some people do not need to think loads about how they present in order to come across to people in ways that are accurate and supportive of who they really are. Some people think very carefully about how they curate a set of signals that enable them to accurately let people know who they are, or to conceal who they are from people outside their squad.

Because patterns are so central to how our brains process information, patterns become extremely important to how societies changes or stays the same.

- [TV tropes](#) is a website that tracks patterns in media, such as the [jump scare](#)
- [The Seven Basic Plots](#)

Patterns build habits. Habits build norms. Norms build our reality.

To create a social group and have it be sustainable, we depend on stable patterns, habits, and norms to create the reality of the grouping. In a diverse community, there are many subsets of patterns, habits, and norms which go into creating the overall social reality. Part of how people manage their social reality is by enforcing the patterns, habits, and norms which identify us; another way we do this is by enforcing, or policing, which subsets of patterns, habits, and norms get to be recognized as valid parts of the broader social reality. Both of these tactics can be done in appropriate, just, and responsible ways, or in highly unjust ways.

7.6.2. Ethics of Disruption (Trolling)

Trolling is a method of disrupting the way things are, including group structure and practices. Like these group forming practices, disruptive trolling can be deployed in just or unjust ways. (We will come back to that.) These disruptive tactics can also be engaged with different moods, ranging from playful (like some flashmobs), to demonstrative (like activism and protests), to hostile, to warring, to genocidal. You may have heard people say that the

difference between a coup and a revolution is whether it succeeds and gets to later tell the story, or gets quashed. You may have also heard that the difference between a traitor and a hero depends on who is telling the story.

As this class discusses trolling, as well as many of the other topics of social media behavior coming up in the weeks ahead, you are encouraged to bear this duality of value in mind. Trolling is a term given to describe behavior which aims to disrupt (among other things). To make value judgements or ethical judgements about instances of disruptive behavior, we will need to be thoughtful and nuanced about how we decide to pass judgements. One way to begin examining any instance of disruptive behavior is to ask *what* is being disrupted: a pattern, a habit, a norm, a whole community? And how do we judge the value of the thing being disrupted? Returning to the difference between a coup and a revolution, we might say that a national-level disruption is a coup if it fails, and a revolution if it succeeds. Or we might say that such a disruption is a coup if it intends to disrupt a legitimate instance of political domination/statehood, but a revolution if the instance of political domination is illegitimate. If you take a close look at English-language headlines in the news about uprisings occurring near to or far from here, it should become quickly apparent that both of these reasons can drive an author's choice to style an event as a coup. To understand what the author is trying to say, we need to look inside the situation and see what assumptions are driving their choice to characterise the disruption in the way that they do.

Trolling is disruptive behavior, and whether we class it as problematic or okay depends in part on how we judge the legitimacy of the social reality which is being disrupted.

Trolling can be used, in principle, for good or bad ends.

7.6.3. Trolling and Nihilism

While trolling can be done for many reasons, some trolling communities take on a sort of nihilistic philosophy: it doesn't matter if something is true or not, it doesn't matter if people get hurt, the only thing that might matters is if you can provoke a reaction.

We can see this nihilism show up in one of the versions of the self-contradictory "Rules of the Internet:"

8. There are no real rules about posting

...

20. Nothing is to be taken seriously

...

42. Nothing is Sacred

Youtuber [Innuendo Studios](#) talks about the way arguments are made in a community like 4chan:

You can't know whether they mean what they say, or are only arguing as though they mean what they say. And entire debates may just be a single person stirring the pot [e.g., sockpuppets]. Such a community will naturally attract people who enjoy argument for its own sake, and will naturally trend toward the most extreme version of any opinion. In short, this is the free marketplace of ideas. No code of ethics, no social mores, no accountability.

...

It's not that they're lying, it's that they just don't care. [...] When they make these kinds of arguments they legitimately do not care whether the words coming out of their mouths are true. If they cared, before they said something is true, they would look it up.

- [The Alt-Right Playbook: The Card Says Moops](#) by Innuendo Studios

While there is a nihilistic worldview where nothing matters, we can see how this plays out practically, which is that they tend to protect their group (normally white and male), and tend to be extremely hostile to any other group. They will express extreme misogyny (like we saw in the [Rules of the Internet](#): "Rule 30. There are no girls on the internet. Rule 31. TITS or GTFO - the choice is yours"), and extreme racism (like an [invented Nazi My Little Pony character](#)).

Is this just hypocritical, or is it ethically wrong? It depends, of course, on what tools we use to evaluate this kind of trolling.

If the trolls claim to be nihilists about ethics, or indeed if they are egoists, then they would argue that this doesn't matter, and that there's no normative basis for objecting to the disruption and harm caused by their trolling. But on just about any other ethical approach, there are one or more reasons available for objecting to the disruptions and harm caused by these trolls! If the only way to get a moral pass on this type of trolling is to choose an ethical framework that tells you harming others doesn't matter, then it looks like this nihilist viewpoint isn't deployed in good faith^[1]. Rather, with any serious (i.e., non-avoidant) moral framework, this type of trolling is ethically wrong for one or more reasons (though how we explain it is wrong depends on the specific framework).

7.6.4. Reflection Exercise

Revisit the K-Pop protest trolling example in section 7.3. Take your list of ethical frameworks from Chapter 2 and work through them one by one, applying each tool to the K-Pop trolling. For each theory, think of how many different ways the theory could hook up with the example. For example, when using a virtue ethics type of tool, consider how many different people's character and flourishing could be developed through this? When using a tool based on outcomes, like consequentialism, how many different elements of the outcome can you think of? The goal here is to come up with *as many variations as you can*, to see how the tools of ethical analysis can help us see into different aspects of the situation.

Once you have made your big list of considerations, choose 2-3 items which, in your view, feel most important. Based on those 2-3 items, do you evaluate this trolling event as having been morally good? Why? What changes to this example would change your overall decision on whether the action is ethical?

^[1] A good faith use of a nihilistic ethics framework would be for exploring normative features of situations.

7.7. Learn More

- [Meet Dr. Troll](#) (Whitney Phillips)

8. Data Mining

For our next topic we are going to what can be done with the various forms of data on social media through "data mining."

8.1. Sources of Social Media Data

Social media platforms collect various types of data on their users.

Some data is directly provided to the platform by the users. Platforms may ask users for information like:

- email address
- name
- profile picture
- interests

- friends

Platforms also collect information on how users interact with the site. They might collect information like (they don't necessarily collect all this, but they might):

- when users are logged on and logged off
- who users interact with
- What users click on
- what posts users pause over
- where users are located
- what users send in direct messages to each other

Additionally, social media might collect information about non-users ([Facebook does this](#)).

Social media platforms then use "data mining" to search through all this data to try to learn more about their users, find patterns of behavior, and in the end make more money.

8.2. Data From the Reddit API

When we've been accessing Reddit through Python and the "PRAW" code library. The praw code library works by sending requests across the internet to Reddit, using what is called an "[application programming interface](#)" or API for short. APIs have a set of rules for what requests you can make, what happens when you make the request, and what information you can get back.

If you are interested in learning more about what you can do with praw and what information you can get back, you can look at the official documentation for those. But be warned they are not organized in a friendly way for newcomers and take some getting used to to figure out what these documentation pages are talking about.

So, if you are interested, you can look at [the praw library documentation](#) to find out what the library can do (again, not organized in a beginner friendly way). You can learn a little more by clicking on of [the praw models](#) and finding a list of the types of data for each of the models, and a list of functions (i.e., actions) you can do with them.

You can also look at information on the data that you can get from the Reddit API by looking at the [Reddit API Documentation](#).

The Reddit API lets you access just some of the data that Reddit tracks, but Reddit and other social media platforms track much more than they let you have access to.

8.3. Mining Social Media Data

Data mining is the process of taking a set of data and trying to learn new things from it.

For example, social media data about who you are friends with might be [used to infer your sexual orientation](#). Social media data might also be used to infer people's:

- Race
- Political leanings
- Interests
- Susceptibility to financial scams
- Being prone to addiction (e.g., gambling)

Additionally groups keep trying to re-invent old debunked psuedo-scientific (and racist) methods of judging people based on facial features (size of nose, chin, forehead, etc.), but [now using artificial intelligence](#).

Social media data can also be used to infer information about larger social trends like [the spread of misinformation](#).

One particularly striking example of an attempt to infer information from seemingly unconnected data was someone noticing that the number of people sick with COVID-19 correlated with how many people were leaving bad reviews of Yankee Candles saying "they don't have any scent" (note: COVID-19 can cause a loss of the ability to smell):

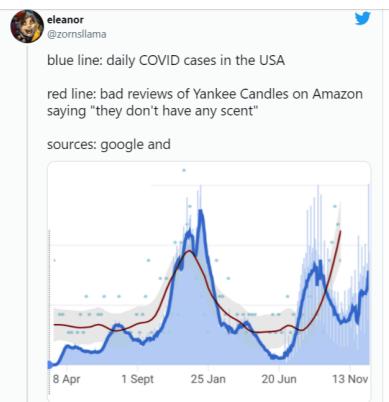


Fig. 8.1 Twitter user @zomslama [pointing out the correlation of COVID cases and candle reviews complaining of no scent.](#)

8.3.1. Spurious Correlations

One thing to note in the above case of candle reviews and COVID is that just because something appears to be correlated, doesn't mean that it is connected in the way it looks like. In the above, the correlation might be due mostly to people buying and reviewing candles in the fall, and diseases, like COVID, spreading most during the fall.

It turns out if you look at a lot of data, it is easy to discover [spurious correlations](#) where two things look like they are related, but actually aren't. Instead the appearance of being related may be due to chance or some other cause. For example:

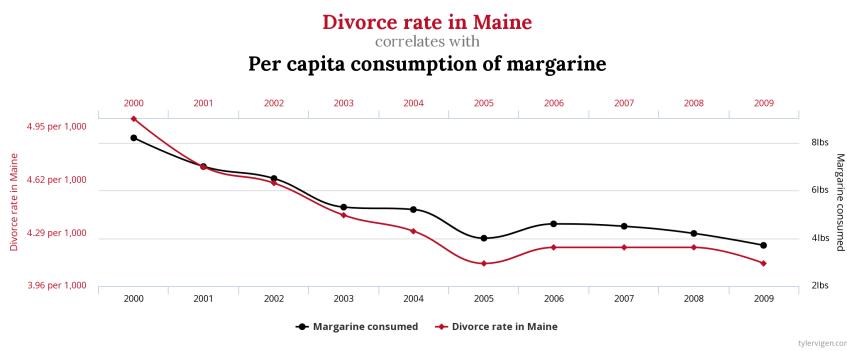


Fig. 8.2 An example spurious correlation from [Tyler Vigen's collection of Spurious Correlations](#)

By looking at enough data in enough different ways, you can find evidence for pretty much any conclusion you want to. This is because sometimes different pieces of data line up coincidentally (coincidences happen), and if you try enough combinations, you can find the coincidence that lines up with your conclusion.

If you want to explore the difficulty of inferring trends from data, the website fivethirtyeight.com has an interactive feature called "[Hack Your Way To Scientific Glory](#)" where by changing how you measure the US economy and how you measure what political party is in power in the US, you can "prove" that either Democrats or Republicans are better for the economy. Fivethirtyeight has a longer article on this called "[Science Isn't Broken: It's just a hell of a lot harder than we give it credit for.](#)"

8.4. How is this data used

Social Media platforms use the data they collect on users and infer about users to increase their power and increase their profits.

One of the main goals of social media sites is to increase the time users are spending on their social media site. The more time users spend, the more money the site can get from ads, and also the more power and influence those social media sites have over those users. So social media sites use the data they collect to try and figure out what keeps people using their site, and what can they do to convince those users they need to open it again later.

Social media sites then make their money by selling targeted advertising, meaning selling ads to specific groups of people with specific interests. So, for example, if you are selling spider stuffed animal toys, most people might not be interested, but if you could find the people who want those toys and only show your ads to them, your advertising campaign might be successful, and those users might be happy to find out about your stuffed animal toys. But targeting advertising can be used in ways that are less ethical, such as targeting gambling ads at children, or at users who are addicted to gambling, or the [2016 Trump campaign 'target\[ing\] 3.5m black Americans to deter them from voting'](#)

8.5. Activity: What platforms think of you

In order to see more about what data mining does, we can look and see what some websites think about us.

The easiest one to do this with is Google.

Go to your google account (assuming you have one) profile information and go to "Data & Privacy" ([this link might take you there](#)). Then select the "Ad Settings" Ad personalization option ([this link might take you there](#))

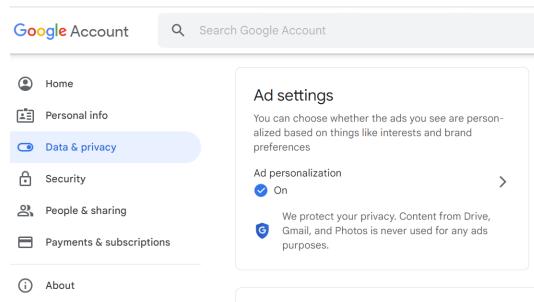


Fig. 8.3 The Data & Privacy settings have a place where you can find the ad personalization settings.

Then you can hopefully see a really long list of who Google thinks you are and what Google thinks you might be interested in, like this:

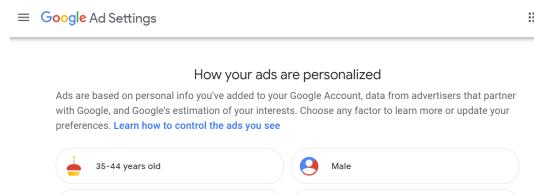


Fig. 8.4 The start of Kyle's Google ad profile

Try this yourself and see what Google thinks of you!

You can try social media sites as well. [Twitter's ad profile is located here](#) and [Facebook's Ad information is here](#).

8.5.1. Reflection

After looking at your ad profile, ask yourself the following:

- What was accurate, inaccurate, or surprising about your ad profile?
- How comfortable are you with Google knowing (whether correctly or not) those things about you?

8.6. Sentiment Analysis on Twitter

To see more how data mining works, we are going to look at how positive or negative tweets are (using a library that performs "sentiment analysis" on text).

8.6.1. Demo: Sentiment Analysis and Loop Variables

Sentiment Analysis

In order to test out data mining on Twitter, we are going to use a Natural Language Processing library, which gives us functions to work with language data such as sentences, words, etc.

You don't need to know the details of how these work internally, but we will be using the "[Natural Language Toolkit](#)" along with the "Valence Aware Dictionary and sEntiment Reasoner" (or VADER) lexicon.

So let's get the library and lexicon now.

```
import nltk  
nltk.download(["vader_lexicon"])
```

```
[nltk_data] Downloading package vader_lexicon to  
[nltk_data]     C:\Users\kmthayer\AppData\Roaming\nltk_data...  
[nltk_data]   Package vader_lexicon is already up-to-date!
```

```
True
```

We will now have the library make a "Sentiment Intensity Analyzer" for us, which we save in a variable called `sia`

```
from nltk.sentiment import SentimentIntensityAnalyzer  
sia = SentimentIntensityAnalyzer()
```

Now that we have the "Sentiment Intensity Analyzer" we can try it out on different sentences to have the computer guess how positive or negative they are. Let's start with a really positive sentence:

```
sentence = "I love love love pizza!!!!!!!"  
sia.polarity_scores(sentence)["compound"]
```

```
0.941
```

In the above code, we ran a `polarity_scores` function on the sentence and pulled out the `compound` result. In this case it came back as `0.941`, which is close to 1 and indicates a positive statement.

Now let's try a really negative one:

```
sentence = "I hate hate hate pizza!!!!!!!"  
sia.polarity_scores(sentence)["compound"]
```

```
-0.9227
```

You can see that this sentence came out as **-0.9227**, which is close to -1 and indicates a negative statement.

Let's try once more with a more neutral sentence

```
sentence = "I guess I'll eat pizza if you really want me to."  
sia.polarity_scores(sentence)[ "compound" ]
```

```
0.1513
```

The sentiment analyzer showed this sentence as **0.1513**, which is positive but close to 0, so indicates a slightly positive statement.

The Sentiment Intensity Analyzer is far from perfect, but we can use it some to try and find trends in social media posts.

looping with sentiments

If we want to look at trends over a series of sentences (or social media posts), we can use for loops.

So let's make an array of sentences and then do a loop to look at the sentiment of each sentence.

```
# Make an array of movie reviews (each one a string)  
movie_reviews = [  
    "That movie was pretty good.",  
    "I like the movie a lot!",  
    "I thought the movie was boring",  
    "I'd watch the movie again",  
    "That sure was an exciting movie!"  
]  
  
# Loop through each review  
for review in movie_reviews:  
    # find the sentiment (compound polarity score) of the review  
    review_sentiment = sia.polarity_scores(review)[ "compound" ]  
  
    # print out the sentiment and the original review  
    print("Sentiment: " + str(review_sentiment))  
    print("  Review: " + review)  
    print() # print a blank line to space out each review sentiment printout
```

```
Sentiment: 0.7269  
Review: That movie was pretty good.  
  
Sentiment: 0.4199  
Review: I like the movie a lot!  
  
Sentiment: -0.3182  
Review: I thought the movie was boring  
  
Sentiment: 0.0  
Review: I'd watch the movie again  
  
Sentiment: 0.6996  
Review: That sure was an exciting movie!
```

We can now see at a glance the sentiments for each of our movie review sentences (and we can consider how accurate we think the sentiment scores are).

But what might be even more useful would be to do something like the average sentiment of all reviews, or what percentage were positive.

In order to figure this out, we are going to make use of variables to track information while we are looping.

Loop Variables

First let's consider how to count the number of movie reviews in our list.

Python provides us an easy way of counting the how many movie reviews there were, by using the `len` function like this:

```
len(movie_reviews)
```

```
5
```

But we can also use a variable to keep track of how many reviews we've seen so far as we go through our loop.

Note: while this strategy requires more code than just doing `len(movie_reviews)`, it will build us to doing more complicate tracking as we loop

loop count

We start by making a variable, which we will call `num_reviews` to track the number of reviews we've seen so far, and we'll set it to 0 since we haven't gone through any reviews yet.

Then as part of our loop, each time we go through a review we will add 1 to our `num_reviews` variable

```
num_reviews = 0 # we haven't seen any reviews yet

for review in movie_reviews:
    # we're looking at a review, so add one to num_reviews
    num_reviews = num_reviews + 1
    print("we've now looked at " + str(num_reviews) + " reviews")

print("After the for, we see there were " + str(num_reviews) + " total reviews")
```

```
we've now looked at 1 reviews
we've now looked at 2 reviews
we've now looked at 3 reviews
we've now looked at 4 reviews
we've now looked at 5 reviews
After the for, we see there were 5 total reviews
```

We can rewrite the above code using a Python shorthand of `+=`, which means:

- `num_reviews = num_reviews + 1`

can be rewritten as

- `num_reviews += 1`

```
num_reviews = 0 # we haven't seen any reviews yet

for review in movie_reviews:
    # we're looking at a review, so add one to num_reviews
    num_reviews += 1
    print("we've now looked at " + str(num_reviews) + " reviews")

print("After the for, we see there were " + str(num_reviews) + " total reviews")
```

```
we've now looked at 1 reviews
we've now looked at 2 reviews
we've now looked at 3 reviews
we've now looked at 4 reviews
we've now looked at 5 reviews
After the for, we see there were 5 total reviews
```

loop average

Now let's loop through the list of reviews again, but this time try to find the average sentiment of all reviews.

To find the average of all the sentiments, we need to add all the sentiments together and then divide by the number of reviews.

So what we will do is make another variable at the start of our loop called `total_sentiment` and each time we loop through a new review, we will add that review's sentiment to the `total_sentiment`. Then at the end, the average will be the `total_sentiment` divided by the `num_reviews`.

```
num_reviews = 0 # we haven't seen any reviews yet
total_sentiment = 0 # we haven't seen any review sentiment yet

for review in movie_reviews:
    # we're looking at a review, so add one to num_reviews
    num_reviews += 1

    # find the sentiment (compound polarity score) of the review
    review_sentiment = sia.polarity_scores(review)["compound"]

    #add the current review sentiment to the total sentiment
    total_sentiment += review_sentiment

# now that the loop is done, the average_sentiment is
#     the total_sentiment divided by the num_reviews
average_sentiment = total_sentiment / num_reviews

print("The average sentiment of the reviews was: " + str(average_sentiment))
```

```
The average sentiment of the reviews was: 0.30564
```

So that let us find the average sentiment of our reviews, which were generally positive.

We could also find out what percentage of reviews were positive by finding the number of reviews that had a sentiment bigger than 0, and then dividing by the total number of reviews and multiplying the answer by 100.

In this case we make a variable before the loop called `num_positive_reviews`, and add 1 to it whenever we find a review that is positive (using an `if` statement), like this:

```
num_reviews = 0 # we haven't seen any reviews yet
num_positive_reviews = 0 # we haven't seen any positive reviews yet

for review in movie_reviews:
    # we're looking at a review, so add one to num_reviews
    num_reviews += 1

    # find the sentiment (compound polarity score) of the review
    review_sentiment = sia.polarity_scores(review)["compound"]

    # if the sentiment was positive (bigger than 0), add one to the
    num_positive_reviews
    if review_sentiment > 0:
        num_positive_reviews += 1

# now that the loop is done, the percentage of positive reviews is
#     the num_positive_reviews divided by the num_reviews, and then multiplied by
#     100
percent_positive = num_positive_reviews / num_reviews * 100

print("The percentage of positive reviews was: " + str(percent_positive))
```

```
The percentage of positive reviews was: 60.0
```

8.6.2. Practice: Sentiment Analysis and Loop Variables

Now it's your turn to practice sentiment analysis and loop variables

Sentiment Analysis

First run the code to load up the Sentiment Intensity Analyzer

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to  
[nltk_data]     C:\Users\kmthayer\AppData\Roaming\nltk_data...  
[nltk_data]   Package vader_lexicon is already up-to-date!
```

Also, look at this example from the demo of running sentiment analysis:

```
sentence = "I love love love pizza!!!!!!!"  
sia.polarity_scores(sentence)[ "compound" ]
```

```
0.941
```

Now, copy that two lines of code above, and try out your own sentences, and run the sentiment analysis on them

```
# TODO: enter your code here
```

Try several sentences and see how the Sentiment Intensity Analyzer handles them

```
# TODO: enter your code here
```

Loop variables

Now let's practice with loop variables.

Below is a for loop which goes through each letter in the word "Mississipi".

```
for letter in "Mississipi":  
    print(letter)
```

```
M  
i  
s  
s  
i  
s  
s  
i  
p  
i
```

Make another copy of that loop, but add a variable before the loop called `num_letters` and use it count how many letters were in the word "Mississipi". At the end display the number of letters.

```
# TODO: enter your code here
```

Make another copy of what you just did, but this time also count the number of "i"s. Make a variable called `num_i` to count how many "i"s.

Hint: To see if a letter is an "i", check if `letter == "i"`

At the end print out how many of the letters were "i"s and what percentage of the word was "i"s.

```
# TODO: enter your code here
```

8.6.3. Demo: Sentiment Analysis on Reddit

Now let's try using sentiment analysis (and loop variables) on Reddit:

We'll start by doing our normal steps to load Reddit PRAW (or fake praw)

Reddit PRAW Setup

```
import praw
```

(optional) make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it won't actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Sentiment Analysis

load sentiment analysis library and make analyzer

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\kmtthayer\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

loop through submissions, finding average sentiment

We can now combine our previous examples of looping through reddit submissions with what we just learned of sentiment analysis and looping variables to find the average sentiment of a set of submission titles.

```

num_submissions = 0
total_sentiment = 0

# Look up the subreddit "cuteanimals", then find the "hot" List, getting up to 10
# submission
submissions = reddit.subreddit("cuteanimals").hot(limit=10)

# Turn the submission results into a Python List
submissions_list = list(submissions)

for submission in submissions_list:
    #calculate sentiment
    submission_sentiment = sia.polarity_scores(submission.title)["compound"]
    num_submissions += 1
    total_sentiment += submission_sentiment

    print("Sentiment: " + str(submission_sentiment))
    print("Submission Title: " + submission.title)
    print()

average_sentiment = total_sentiment / num_submissions
print("Average sentiment was " + str(average_sentiment))

```

Fake praw is pretending to select the subreddit: cuteanimals

```

Sentiment: 0.5093
Submission Title: Look at my cute dog!

Sentiment: 0.0
Submission Title: A baby lizard!

Sentiment: 0.6239
Submission Title: The cutest bird ever!

Average sentiment was 0.3777333333333333

```

We can now see the average sentiment of a set of reddit post titles based on our search of a subreddit!

If you use your reddit bot keys, you can change the `subreddit` to be whatever one you want and see whether people are posting positively or negatively in it.

note: You can change `limit=10` to go up higher to get more submissions at a time to find the average of

8.7. Data Poisoning

People working with data sets always have to deal with problems in their data, stemming from things like mistyped data entries, missing data, and the general problem of all data being a simplification of reality.

Sometimes a dataset has so many problems that it is effectively **poisoned** or not feasible to work with.

8.7.1. Unintentional Data Poisoning

Datasets can be poisoned unintentionally. For example, many scientists posted online surveys that people can get paid to take. Getting useful results depended on a wide range of people taking them. But when one TikToker's video about taking them went viral, the surveys got filled out with mostly one narrow demographic, preventing many of the datasets from being used as intended.

See more in

- [A teenager on TikTok disrupted thousands of scientific studies with a single video – The Verge](#)

8.7.2. Intentional Data Poisoning

Data can be poisoned intentionally as well. For example, in 2021, workers at Kellogg's were upset at their working conditions, so they agreed to go on strike, and not work until Kellogg's agreed to improve their work conditions. Kellogg's announced that they would hire new workers to replace the striking workers:

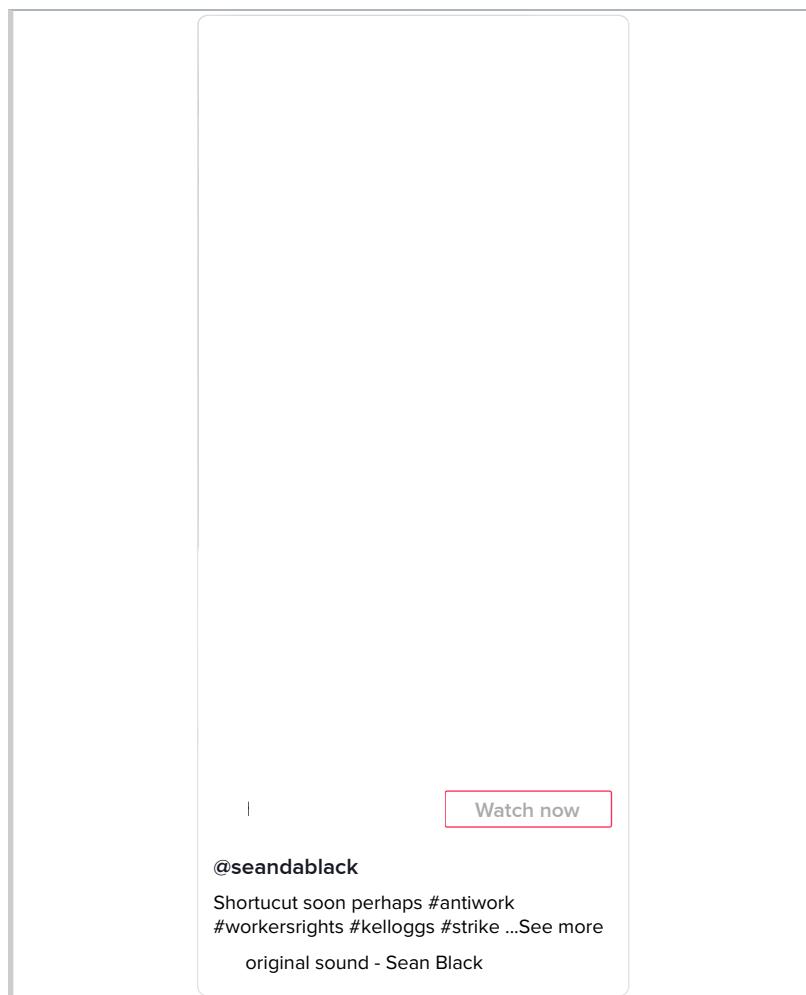
Kellogg's proposed pay and benefits cuts while forcing workers to work severe overtime as long as 16-hour-days for seven days a week. Some workers stayed on the job for months without a single day off. The company refuses to meet the union's proposals for better pay, hours, and benefits, so they went on strike.

Earlier this week, the company announced it would permanently replace 1,400 striking workers.

- [People Are Spamming Kellogg's Job Applications in Solidarity with Striking Workers – Vice MotherBoard](#)

People in the [anitwork subreddit](#) found the website where Kellogg's posted their job listing to replace the workers. So those redditors suggested they spam the site with fake applications, poisoning the job application data, so Kellogg's wouldn't be able to figure out which applications were legitimate or not (we could consider this a form of trolling). Then Kellogg's wouldn't be able to replace the striking workers, and they would have to agree to better working conditions.

Then Sean Black, a programmer on TikTok saw this and decided to contribute by creating a bot that would automatically log in and fill out applications with random user info, increasing the rate at which he (and others who used his code) could spam the Kellogg's job applications:



See also:

- [How to poison the data that Big Tech uses to surveil you – MIT Technology Review](#)

8.8. Reflections on Data Mining

- Are you surprised by any of the things the can be done with data mining?
- Do you think there is information that could be discovered through data mining that social media companies **shouldn't** seek out (e.g., social media companies could use it for bad purposes, or they might get hacked and others could find it)?
- Do you think there is information that could be discovered through data mining that social media companies **should** seek out (e.g., they can't make their platform treat people fairly without knowing this)?

8.9. Learn More

- [Your Friends' Online Connections Can Reveal Your Sexual Orientation](#)
- [Housing companies used Facebook's ad system to discriminate against older people, according to new human rights complaints](#)

9. Privacy and Security

With all the data social media sites collect on you including with data mining, let's look at privacy and security

9.1. Privacy

There are many reasons, both good and bad, that we might want to keep information private.

- There might be some things that we just feel like aren't for public sharing (like how most people wear clothes in public, hiding portions of their bodies)
- We might want to discuss something privately, avoiding embarrassment that might happen if it were shared publicly
- We might want a conversation or action that happens in one context not to be shared in another (context collapse)
- We might want to avoid the consequences of something we've done (whether ethically good or bad), so we keep the action or our identity private
- We might have done or said something we want to be forgotten or make at least made less prominent
- We might want to prevent people from stealing our identities or accounts, so we keep information (like passwords) private
- We might want to avoid physical danger from a stalker, so we might keep our location private
- We might not want to be surveilled by a company or government that could use our actions or words against us (whether what we did was ethically good or bad)

When we use social media platforms though, we at least partially give up some of our privacy.

For example, a social media application might offer us a way of "[Private Messaging](#)" (also called Direct Messaging) with another user. But in most cases those "private" messages are stored in the computers at those companies, and the company might have computer programs that automatically search through the messages, and people with the right permissions might be able to view them directly.

In some cases we might want a social media company to be able to see our "private" messages, such as if someone was sending us death threats. We might want to report that user to the social media company for a ban, or to law enforcement (though many people have found law enforcement to be not helpful), and we want to open access to those "private" messages to prove that they were sent.

9.1.1. Privacy Rights

Some governments and laws protect the privacy of individuals (using a Natural Rights ethical framing). These include the European Union's [General Data Protection Regulation](#) (GDPR), which includes a "right to be forgotten", and the United States Supreme Court has at times [inferred a constitutional right to privacy](#).

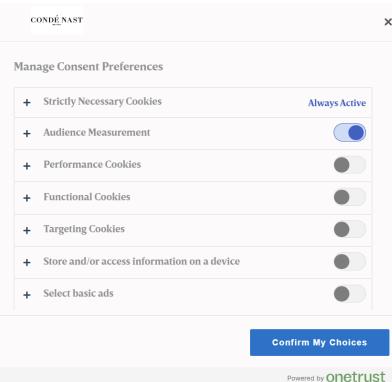


Fig. 9.1 Privacy tracking settings prompt on [wired.com](#). These prompts were added as part of following the EU's new GDPR regulations.

9.2. Security

While we have our concerns about the privacy of our information, we often share it with social media platforms under the understanding that they will hold that information securely. But social media companies often fail at keeping our information securely.

For example, the proper security practice for storing user passwords is to use a [special individual encryption](#) for each password. This way the database can only confirm that a password was the right one, but it can't independently figure out what the password is. Therefore if someone had access to the database, the only way to figure out the right password is to use "brute force," that is, keep guessing passwords until they guess the right one (and [each guess takes a lot of time](#)).

But while that is the proper security for storing passwords. So for example, [Facebook stored millions of Instagram passwords in plain text](#), meaning the passwords weren't encrypted and anyone with access to the database could simply read everyone's passwords. And Adobe encrypted their passwords improperly and then [hackers leaked their password database of 153 million users](#).

From a security perspective there are many risks that a company faces, such as:

- Employees at the company misusing their access, like [Facebook employees using their database permissions to stalk women](#)
- Hackers finding a vulnerability and inserting, modifying, or downloading information.

For example:

- hackers stealing the [names, Social Security numbers, and birthdates of 143 million Americans from Equifax](#)
- hackers posting publicly the [phone numbers, names, locations, and some email addresses of 530 million Facebook users](#), or about 7% of all people on Earth

Hacking attempts can be made on individuals, whether because the individual is the goal target, or because the individual works at a company which is the target. Hackers can target individuals with attacks like:

- Password reuse attacks, where if they find out your password from one site, they try that password on many other sites
- Hackers tricking a computer into thinking they are another site, for example:
 - the [US NSA impersonated Google](#)

- [Social engineering](#), where they try to gain access to information or locations by tricking people. For example:
 - Phishing attacks, where they make a fake version of a website or app and try to get you to enter your information or password into it. Some people have made [malicious QR codes to take you to a phishing site](#).
 - Many of the actions done by the con-man [Frank Abagnale](#), which were portrayed in the movie [Catch Me If You Can](#)

One of the things you can do as an individual to better protect yourself against hacking is enable [2-factor authentication](#) on your accounts.

9.3. Additional Privacy Violations

Besides hacking, there are other forms of privacy violations, such as:

- **Unclear Privacy Rules:** Sometimes privacy rules aren't made clear to the people using a system. For example:
 - If you send "private" messages on a work system, your [boss might be able to read them](#).
 - When Elon Musk purchased Twitter, he also was purchasing [access to all Twitter Direct Messages](#)
- **Others Posting Without Permission:** Someone may post something about another person without their permission. See in particular: [The perils of 'sharenting': The parents who share too much](#)
- **Metadata:** Sometimes the metadata that comes with content might violate someone's privacy.
 - For example, in 2012, former tech CEO John McAfee was a [suspect in a murder in Belize](#). John McAfee hid out in secret. But when Vice magazine wrote an article about him, the [photos in the story contained metadata with the exact location in Guatemala](#).
- **Deanonymizing Data:** Sometimes companies or researchers release datasets that have been "anonymized," meaning that things like names have been removed, so you can't tell who the data is about. But sometimes people can still deduce who the anonymized data is about. This happened when Netflix released anonymized movie ratings data sets, but [at least some users' data could be traced back to them](#).
- **Inferred Data:** Sometimes information that doesn't directly exist can be inferred through data mining (as we saw last chapter), and the creation of that new information could be a privacy violation.
 - This includes creation of [Shadow Profiles](#), which are information about the user that the user didn't provide or consent to
- **Non-User Information:** Social Media sites might collect information about people who don't have accounts, like how [Facebook does](#)

9.4. Tracking Use

Let's now look at how we might track use of something. We will first make our previous code to get average sentiment, which will make writing code easier! But then we will also start tracking how people are using the function we made (and potentially send that information elsewhere).

In order to do that, we need to learn how to use functions.

9.4.1. Demo: Writing Functions

Before we can do our demo of tracking function use, we need to learn how to create functions in Python.

Functions allow us to run another computer program. In our recipe analogy earlier, we said it was like:

- Make the dumpling dough (see recipe on page 42).

Or

- to make dumplings vegan, make the dumpling dough (see recipe on page 42), but instead of using the egg, substitute 2 teaspoons olive oil and 2 tablespoons hot water.

Benefits of Functions

There are several advantages to creating and using functions in computer programs, such as:

Reusing code instead of repeating code: When we find ourselves repeating a set of actions in our program, we end up writing (or copying) the same code multiple times. If we put that repeated code in a function, then we only have to write it once and then use that function in all the places we were repeating the code.

Single, standardized definitions: Let's say we made code that takes a name and tries to split it into a first name and last name, and we have that code copied in several places in our program. Then we realize that our code isn't handling some last names correctly, like "O'Reilly" and "Del Toro." If we fix this bug in one of the places the code is copied in our program it still will be broken elsewhere, so we have to find all the places and fix it there. If, on the other hand we had the code to split names in a function, and used that function everywhere else, then we only have to fix the bug inside that one function and our code everywhere is fixed.

Code organization: Making functions also can help us organize our code. It lets us give a name to a block of code, and when we use it, those function names can help make the code more understandable. Making code as functions also helps in letting us put those pieces of code in other files or in code libraries, so the file we are working on is smaller and easier to manage.

Using Functions

We have been using many functions so far in this book, such as:

- `display(2 + 2)`
- `sleep(3)`
- `client.create_tweet(text="This is a tweet")`
- `sentence.upper()`

Now we will be defining our own functions, which we can then use later in our code.

Defining Functions

In Python a function is defined using the 'def' keyword.

Creating a Function:

```
def function_name(argument1, argument2):
    STATEMENT
    STATEMENT
    STATEMENT
```

Using a Function that you previously made:

```
function_name(argument1, argument2)
```

Let's start with an example function that doesn't use any arguments:

```
def say_hi():
    print("Hi!")
```

In the code above, `def` tells Python we want to define a function, `say_hi` is the name we chose for our function, and the empty parentheses `()` mean that it doesn't take any parameters. There is then a colon `:` to say what follows is a code block that will be what happens when the function is called.

When we run the code above that defines our function, we don't see any output, but now the function `say_hi` exists and is ready for us to try using it:

```
say_hi()
```

```
Hi!
```

We can now call this function many times, for example in a `for` loop

```
for i in range(5):
    say_hi()
```

```
Hi!
Hi!
Hi!
Hi!
Hi!
```

We can also re-define our functions by doing a new `def` statement. It will just replace the old functions definition with the new one:

```
def say_hi():
    print("Hi there!")
```

```
for i in range(5):
    say_hi()
```

```
Hi there!
Hi there!
Hi there!
Hi there!
Hi there!
```

Parameters

Parameters (also called "arguments") are like variables for a function.

In the definition of the function, you can list inside the parentheses the parameters you want to be given for you to use in your function code.

Let's redefine our `say_hi` function so it takes a parameter for the name of a person to say hi to:

```
def say_hi(name):
    print("Hi " + name + "!")
```

Now when we call the function `say_hi` we need to give it a value in the parentheses (or it gives us an error: `missing required positional argument`)

```
say_hi("Kyle")
```

```
Hi Kyle!
```

We can again use a loop to call our function multiple times, but this time we will loop over a list of names and send a different name each time the function runs:

```
names = ["Kyle", "Susan", "Another Person"]
for name in names:
    say_hi(name)
```

```
Hi Kyle!
Hi Susan!
Hi Another Person!
```

We can make a function that takes multiple parameters. Let's redefine our function again to take first and last names:

```
def say_hi(first_name, last_name):
    print("Hi " + first_name + " " + last_name + "!")
```

```
say_hi("Kyle", "Thayer")
```

```
Hi Kyle Thayer!
```

Returns

In the above examples, our `say_hi` performs an action of displaying text (we used the `print` function).

But if we try to save what comes back from running the function:

```
say_hi_result = say_hi("Kyle", "Thayer")
```

```
Hi Kyle Thayer!
```

```
display(say_hi_result)
```

```
None
```

It says that nothing (`None`) came back out of the function.

There are other functions that we've run that have had things come back that we can save in a variable, like counting the number of characters in a string with `len`.

```
num_letters = len("Ethics")
```

```
display(num_letters)
```

```
6
```

In Python, when we want to send something back that can be saved in a variable, we use a `return` in our function definition, like this function which creates the hi message and doesn't display it:

```
def create_hi_message(first_name, last_name):
    hi_message = "Hi " + first_name + " " + last_name + "!"
    return hi_message
```

The return says what value to send back to wherever the function was called. In this case we are sending back what got saved in the `hi_message` variable.

When we use this function, we can save the result in a variable:

```
tweet_to_make = create_hi_message("Kyle", "Thayer")
```

This time the variable had the message saved, but nothing was displayed. We can now display the variable to see what was saved:

```
display(tweet_to_make)
```

```
'Hi Kyle Thayer!'
```

If we want, we can simplify the code by telling return to just send back whatever "Hi " + first_name + " " + last_name + "!" is instead of saving it in an `hi_message` variable first.

```
def create_hi_message(first_name, last_name):
    return "Hi " + first_name + " " + last_name + "!"
```

```
tweet_to_make = create_hi_message("Susan", "Notess")
```

```
display(tweet_to_make)
```

```
'Hi Susan Notess!'
```

9.4.2. Practice: Functions

Create a function called `say_goodbye` which displays the text "Goodbye!"

```
# TODO: enter your code here
```

Write code that calls the function `say_goodbye`

```
# TODO: enter your code here
```

Redefine the function `say_goodbye` to take a parameter called `name`, and have it display "Goodbye name!" where "name" is replaced by whatever was in the `name` variable

```
# TODO: enter your code here
```

Write code that calls the function `say_goodbye` but with your name as a parameter

```
# TODO: enter your code here
```

Try out the code below which counts from 0 to 4 slowly:

```
import time # We need the time library for the following examples
```

```
for i in range(5):
    print(i)
    time.sleep(1)
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

We can put that for loop in a function like this:

```
def counter():
    for i in range(5):
        print(i)
        time.sleep(1)
```

And then we can call it:

```
counter()
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

Now redefine `counter` by

1. copying the code above which defines `counter`
2. make the counter take a parameter called `max`
3. Have the `range` call use the parameter `max`

```
# TODO: enter your code here
```

Now try calling the new version of `counter` but passing it the argument 7

```
# TODO: enter your code here
```

Create a function called `multiply` which takes two arguments, multiplies them together (*), and then returns the multiplied value

```
# TODO: enter your code here
```

Call the `multiply` function with two numbers and save the result in a variable. Then print out the variable to see that the multiplied number was saved.

```
# TODO: enter your code here
```

9.4.3. Demo: Track Use of Sentiment Analysis Code

In this code demo, we will take the sentiment analysis code we used in the last chapter (Data Mining), and we will turn it into a function which will make it easier to use.

After turning it into a function though, we will add code to that function to track how it is used. We could theoretically take this information we are tracking and send to results to some other account.

This sort of tracking can be part of tracking program [telemetry](#), which can be useful in figure out where software is broken or where it is most or least useful. But it can also be violating the privacy of anyone using our function who doesn't know we are tracking its use, or used maliciously to steal user information.

Reddit PRAW Setup

```
import praw
```

(optional) use the fake version of Reddit praw, so you don't have to use real Reddit developer access passwords

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

load sentiment analysis library and make analyzer

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\kmthayer\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

original code to loop through submissions, finding average sentiment

This is the code from chapter 8 that loops through submissions in the "cuteanimals" subreddit and calculates the average sentiment

```
num_submissions = 0
total_sentiment = 0

# Look up the subreddit "cuteanimals", then find the "hot" list, getting up to 10
# submissions
submissions = reddit.subreddit("cuteanimals").hot(limit=10)

# Turn the submission results into a Python List
submissions_list = list(submissions)

for submission in submissions_list:
    #calculate sentiment
    submission_sentiment = sia.polarity_scores(submission.title)["compound"]
    num_submissions += 1
    total_sentiment += submission_sentiment

    print("Sentiment: " + str(submission_sentiment))
    print("  Submission Title: " + submission.title)
    print()

average_sentiment = total_sentiment / num_submissions
print("Average sentiment was " + str(average_sentiment))
```

Fake praw is pretending to select the subreddit: cuteanimals

```
Sentiment: 0.5093
Submission Title: Look at my cute dog!

Sentiment: 0.0
Submission Title: A baby lizard!

Sentiment: 0.6239
Submission Title: The cutest bird ever!

Average sentiment was 0.3777333333333333
```

Make a function using the code above for finding the average sentiment

We now make a function of that code above by doing the following:

- Add a `def` line at the start to make a function called `find_average_sentiment`
- Indent all the old code so that it becomes the contents of the function `find_average_sentiment`
- Make the function take two arguments:
 - `subreddit_name`, which takes place of "cuteanimals", so the person calling the function can choose which subreddit to search
 - `display_progress` which defaults to False. This decides whether or not the print statements are run when the function is run, so we can see the progress if we want, or just get the answer by default
- At the end of the function, return the average_sentiment as the result

```
def find_average_sentiment(subreddit_name, display_progress = False):
    num_submissions = 0
    total_sentiment = 0

    # Look up the subreddit given as a parameter, then find the "hot" list, getting
    up to 10 submission
    submissions = reddit.subreddit(subreddit_name).hot(limit=10)

    # Turn the submission results into a Python List
    submissions_list = list(submissions)

    for submission in submissions_list:
        #calculate sentiment
        submission_sentiment = sia.polarity_scores(submission.title)[ "compound"]
        num_submissions += 1
        total_sentiment += submission_sentiment

        if(display_progress):
            print("Sentiment: " + str(submission_sentiment))
            print("  Submission Title: " + submission.title)
            print()

    average_sentiment = total_sentiment / num_submissions
    if(display_progress):
        print("Average sentiment was " + str(average_sentiment))

    return average_sentiment
```

Now let's try using the function

```
find_average_sentiment("cuteanimals")
```

Fake praw is pretending to select the subreddit: cuteanimals

```
0.3777333333333333
```

```
find_average_sentiment("science", display_progress=True)
```

Fake praw is pretending to select the subreddit: science

```
Sentiment: -0.5255
Submission Title: Scientists have cloned dangerous dinosaurs!

Sentiment: 0.7574
Submission Title: Scientists have created the best tasting food ever!

Sentiment: 0.0
Submission Title: F*** magnets, how do they work? And I don't wanna talk to a
scientist

Average sentiment was 0.0773
```

```
0.0773
```

Modify the function so it tracks use

Now we make another version of the same function, but with a small difference:

- We make a list variable called `sentiment_searches` which exists outside the function.
- At the start of the function we add the subreddit being searched to that list. This way, as the function gets used, we'll keep a history of its use in the `sentiment_searches` list

```
# Make a list to save what subreddit was used for each time
`find_average_sentiment` is run
sentiment_searches = []

def find_average_sentiment(subreddit_name, display_progress = False):

    # Add the current subreddit being searched to the sentiment_searches list
    sentiment_searches.append(subreddit_name)

    num_submissions = 0
    total_sentiment = 0

    # Look up the subreddit name given as a parameter, then find the "hot" list,
    # getting up to 10 submission
    submissions = reddit.subreddit(subreddit_name).hot(limit=10)

    # Turn the submission results into a Python List
    submissions_list = list(submissions)

    for submission in submissions_list:
        #calculate sentiment
        submission_sentiment = sia.polarity_scores(submission.title)["compound"]
        num_submissions += 1
        total_sentiment += submission_sentiment

        if(display_progress):
            print("Sentiment: " + str(submission_sentiment))
            print("  Submission Title: " + submission.title)
            print()

    average_sentiment = total_sentiment / num_submissions
    if(display_progress):
        print("Average sentiment was " + str(average_sentiment))

    return average_sentiment
```

Now let's run this version of the function

```
find_average_sentiment("cuteanimals")
```

Fake praw is pretending to select the subreddit: cuteanimals

```
0.3777333333333333
```

```
find_average_sentiment("science")
```

Fake praw is pretending to select the subreddit: science

```
0.0773
```

It looks like it works like normal, but our calls to the function have been tracked!

```
display(sentiment_searches)
```

```
['cuteanimals', 'science']
```

Now, if we were being malicious, we would hide this code in some other code library we would try to convince you to use, that way you wouldn't notice the code. And instead of just saving those tweets to a variable, we would send it to ourselves, perhaps by putting code into our new_create_tweet to log into a different twitter account and private messaged that info to ourselves.

How can we trust code libraries?

If people can make code libraries track us and violate our privacy, how can we trust them? We could try looking at the [source code for the PRAW library](#) to try and make sure the library we are using isn't doing anything bad, but no programmer can be expected to read through all the libraries they use. There is unfortunately no simple answer to this.

In fact, there are cases where people have messed with code libraries:

- The United States National Security Agency "paid massive computer security firm RSA \$10 million to promote a flawed encryption system so that the surveillance organization could wiggle its way around security."
 - Does US national security outweigh global computer security?
- Shortly after the Russian invasion of Ukraine in 2022, someone modified a popular NodeJS code library so that it would [automatically destroy files if it was run on a computer in Russia or Belarus](#).
 - Does opposing a military invasion justify sabotaging a code library?

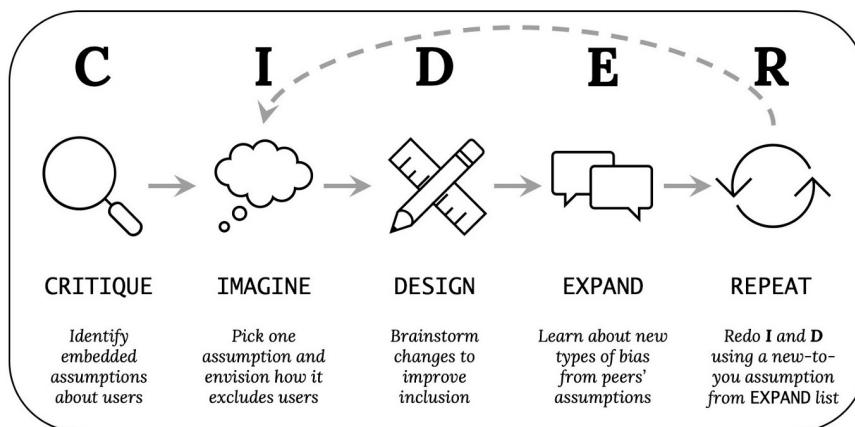
And those are just the intentional problems with code libraries. All sorts of code libraries and computer programs are full of security flaws, which are regularly discovered and fixed (though who knows how much the flaws were exploited first).

9.5. Design Analysis: GDPR

We want to provide you, the reader, a chance to explore online privacy more.

In this activity you will be looking at an [official brochure on the EU's GDPR privacy law](#)^[1].

We will again follow the five step [CIDER method](#) (Critique, Imagine, Design, Expand, Repeat).



So read through the [official brochure on the EU's GDPR privacy law](#) (for this activity ignore any additional details or clarifications made elsewhere in the GDPR, since those weren't deemed important enough to put on this brochure). Then do the following (preferably on paper or in a blank computer document):

9.5.1. Critique (3-5 minutes, by yourself):

What assumptions does GDPR make about individuals or groups using social media, which might not be true or might cause problems? List as many as you can think of (bullet points encouraged).

9.5.2. Imagine (2-3 minutes, by yourself):

Select one of the above assumptions that you think is important to address. Then write a 1-2 sentence scenario where a user face difficulties because of the assumption you selected. This represents one way the design could exclude certain users.

9.5.3. Design (3-5 minutes, by yourself):

Brainstorm ways to change the GDPR policy to avoid the scenario you wrote above. List as many different kinds of potential solutions you can think of – aim for ten or more (bullet points encouraged).

9.5.4. Expand (5-10 minutes, with others):

Combine your list of critiques with someone else's (or if possible, have a whole class combine theirs).

You can also consider reading criticism of the GDPR:

- [What's wrong with the GDPR? – Politico](#)
- [How GDPR Is Failing – Wired \(archive.org copy\)](#)

9.5.5. Repeat the Imagine and Design Tasks:

Select another assumption from the list above that you think is important to address. Make sure to choose a different assumption than you used before. Choose one that you didn't come up with yourself, if possible. Repeat the Imagine and Design steps.

[1] You could also try this with a [brochure for businesses](#), or look at a privacy and security settings page on a social media site.

9.6. Reflection Questions

- What are your biggest concerns around privacy on social media?
- What incentives do social media companies have to protect privacy?
- What incentives to social media companies have to violate privacy?
- What incentives do social media companies have to be careless with privacy?

9.7. Learn More

- [533 million Facebook users' phone numbers and personal data have been leaked online](#)
- [Scientists Like Me Are Studying Your Tweets—Are You OK With That?](#)
- [What's 'Context Collapse'? Understanding it Can Mean a More Fulfilling Online Life](#)

10. Accessibility

Now let's look at who social media sites work for, who they don't, and what it takes to make a social media site work for more people.

10.1. Disability

A **disability** is an ability which a person doesn't have, but their society expects them to have.

[1] For example:

- If a building only has stair cases to get up to the second floor (it was built assuming everyone could walk up stairs), then someone who cannot get up stairs has a disability in that situation.
- If a physical picture book was made with the assumption that people would be able to see the pictures, then someone who cannot see has a disability in that situation.
- If tall grocery store shelves that were made with the assumption that people would be able to reach them, then people who are short, or who can't lift their arms up, or who can't stand up, all would have a disability in that situation.
- If an airplane seat that was designed with little leg room assuming people's legs wouldn't be too long, then someone who is very tall, or who has difficulty bending their legs would have a disability in that situation.

Which abilities are expected of people, and therefore what things are considered disabilities, are [socially defined](#). Different societies and groups of people make different assumptions about what people can do, and so what is considered a disability in one group, might just be "normal" in another.

There are many things we might not be able to do that won't be considered disabilities because our social groups don't expect us to be able to do them. For example, none of us have wings that we can fly with, but that is not considered a disability, because our social groups didn't assume we would be able to. Or, for a more practical example, let's look at color vision:

Most humans are trichromats, meaning they can see three base colors (red, green, and blue), along with all combinations of those colors. Human societies often assume that people will be trichromats. So people who can't see as many colors are considered to be [color blind](#), a disability. But there are also a [small number of people who are tetrachromats](#), and can see four base colors (trying to name these base colors in trichromat terms is not straightforward) and all combinations of those colors. In comparison to tetrachromats, trichromats (the majority of people), lack an ability to see some colors. But our society doesn't build things for tetrachromats, so their extra ability to see color doesn't help them much, and trichromats' relative reduction in seeing color doesn't cause them difficulty, so being a trichromat isn't considered to be a disability.

Some disabilities are **visible disabilities** that other people can notice by observing the disabled person (e.g., wearing glasses is an indication of a visual disability, a missing limb might be noticeable). Other disabilities are **invisible disabilities** that other people cannot notice by observing the disabled person (e.g., [chronic fatigue syndrome](#), contact lenses for a visual disability, or prosthetics for a missing limb covered by clothing). Sometimes people with invisible disabilities get unfairly accused of "faking" or "making up" their disability.

Disabilities can be accepted as socially normal, like is sometimes the case for wearing glasses or contacts, or it can be [stigmatized](#) as socially unacceptable, inconvenient, or blamed on the disabled person.

Some people (like many with chronic pain) would welcome a cure that got rid of their disability. Others (like [many autistic people](#)), are insulted by the suggestion that there is something wrong with them that needs to be "cured," and think the only reason autism is considered a "disability" at all is because society doesn't make reasonable accommodations for them the way it does for neurotypical people.

Many of the disabilities we mentioned above were **permanent disabilities**, that is, disabilities that won't go away. But disabilities can also be **temporary disabilities**, like a broken leg in a cast, which will eventually get better. Disabilities can also vary over time (e.g., "today is a bad

day for my back pain"). Disabilities can even be **situational disabilities**, like the loss of fine motor skills when wearing thick gloves in the cold, or trying to watch a video on your phone in class with the sound off, or trying to type on a computer while holding a baby.

As you look through all these types of disabilities, you might discover ways you have experienced disability in your life. Though please keep in mind that different disabilities can be very different, and everyone's experience with their own disability can vary. So having some experience with disability does not make someone an expert in any other experience of disability.

As for our experience with disability, Kyle has been diagnosed with [generalized anxiety disorder](#) and Susan has been diagnosed with [depression](#). Kyle and Susan also both have:

- [near sightedness](#): our eyes cannot focus on things far away (unless we use corrective lenses, like glasses or contacts)
- [ADHD](#): we have difficulty controlling our focus, sometimes being hyperfocused and sometimes being highly distracted, and also have difficulties with [executive dysfunction](#).

[1] There are a number of ways to think about disability, such as legal (what legally counts as a disability?), medical (what is a problem to be cured?), identity (who views themselves as "disabled"), etc. We are focused here more on disability as it relates to design and who things in our world are designed for.

10.2. Accessible Design

There are a number of ways of managing disabilities. All of these ways of managing disabilities might be appropriate at different times for different situations.

10.2.1. Coping Strategies

Those with disabilities often find ways to cope with their disability, that is, find ways to work around difficulties they encounter and seek out places and strategies that work for them (whether realizing they have a disability or not). Additionally, people with disabilities might change their behavior (whether intentionally or not) to hide the fact that they have a disability, which is called **masking**, and may take a mental or physical toll on the person masking, which others around them won't realize.

For example, kids who are near-sighted and don't realize their ability to see is different from others will often seek out seats at the front of classrooms where they can see better. As for us two authors, we both have ADHD and were drawn to PhD programs where our tendency to hyperfocus on following our curiosity was rewarded (though executive dysfunction with finishing projects created challenges).

This way of managing disabilities puts the burden fully on disabled people to manage their disability in a world that was not designed for them, trying to fit in with "normal" people.

10.2.2. Modifying the Person

Another way for managing disabilities is [assistive technology](#), which is something that helps a disabled person act as though they were not disabled. In other words, it is something that helps a disabled person become more "normal" (according to whatever a society's assumptions are). For example:

- Glasses help people with near-sightedness see in the same way that people with "normal" vision do
- Walkers and wheelchairs can help some disabled people move around closer to the way "normal" people can (though stairs can still be a problem)
- A [spoon might automatically balance itself](#) when held by someone whose hands shake
- Stimulants (e.g., caffeine, Adderall) can increase executive function in people with ADHD, so they can plan and complete tasks more like how neurotypical people do.

This way of managing disability gives tools to disabled people to help them become more "normal." So the disabled person is able to move through a world that was not designed for them. But there is still an expectation that disabled people must become more "normal," and they often these tools are very expensive.

10.2.3. Making an environment work for all

Another strategy for managing disability is to use [**Universal Design**](#), which originated in architecture. In universal design, the goal is to make environments and buildings have options so that there is a way for everyone to use it^[1]. For example, a building with stairs might also have ramps and elevators, so people with different mobility needs (e.g., people with wheelchairs, baby strollers, or luggage) can access each area. In the elevators the buttons might be at a height that both short and tall people can reach. The elevator buttons might have labels both drawn (for people who can see them) and in braille (for people who cannot), and the ground floor button may be marked with a star, so that even those who cannot read can at least choose the ground floor.

In this way of managing disabilities, the burden is put on the designers to make sure the environment works for everyone, though disabled people might need to go out of their way to access features of the environment.

10.2.4. Making a tool adapt to users

When creating computer programs, programmers can do things that aren't possible with architecture (where Universal Design came out of), that is: programs can change how they work for each individual user. All people (including disabled people) have different abilities, and making a system that can modify how it runs to match the abilities a user has is called [**Ability based design**](#). For example, a phone might detect that the user has gone from a dark to a light environment, and might automatically change the phone brightness or color scheme to be easier to read. Or a computer program might detect that a user's hands tremble when they are trying to select something on the screen, and the computer might change the text size, or try to guess the intended selection.

In this way of managing disabilities, the burden is put on the computer programmers and designers to detect and adapt to the disabled person.

^[1] Universal Design has taken some criticism. Some have updated it, such as in acknowledging that different people's needs may be contradictory, and others have replaced it with frameworks like [Inclusive Design](#).

10.3. Why It Matters Who Designs

10.3.1. Who gets designed for

When designers and programmers don't think to take into account different groups of people, then they might make designs that don't work for everyone. This problem often shows up for how designs do or do not work for people with disabilities. But it also shows up in other areas as well.

The following tweet has a video of a soap dispenser that apparently was only designed to work for people with light-colored skin.^[1]

Chukwuemeka Afigbo
@nke_ise · [Follow](#)



If you have ever had a problem grasping the importance of diversity in tech and its impact on society, watch this video

The media could not be played.

Reload

2:48 AM · Aug 16, 2017



200K

[Read 2.6K replies](#)

Similarly, [Twitter looked into bias in how their automatic image cropping algorithm worked.](#)

10.3.2. Who gets to be designers

In how we've been talking about accessible design, the way we've been phrasing things has implied a separation between designers who make things, and the disabled people who things are made for. And unfortunately, as researcher [Dr. Cynthia Bennett](#) points out, disabled people are often excluded from designing for themselves, or even when they do participate in the design, they aren't considered to be the "real designers." You can see Dr. Bennett's research talk on this in the following Youtube Video:

[The Promise of Empathy: Design, Disability, and Knowing t...](#)



10.3.3. Design Justice

We mentioned [Design Justice](#) earlier, but it is worth reiterating again here that design justice includes considering which groups get to be part of the design process itself.

- [1] If you can't see the video, it shows someone with light skin putting their hand under a soap dispenser, and soap comes out. Then a person with dark skin puts their hand under a soap dispenser, and nothing happens. The person with dark skin then puts a white paper towel on their

hand and then when they put their hand under the soap dispenser, soap comes out. When the person with dark skin takes off the white paper towel, the soap dispenser won't work for them anymore.

10.4. Alt-text on Social Media

Let's look more at a particular example of an accessibility design: alt-text on images (which we mentioned previously in chapter 2).

10.4.1. Alt-text

Some users might not be able to see images on websites for a variety of reasons. The user might be blind or low-vision. Their device or internet connection might not support images. Or perhaps all the images got deleted (like [what happened to The Onion](#)).

In order for these users to still get the information intended from the images, the image can come with alt-text. You can read more about alt-text in [this New York Times feature](#)

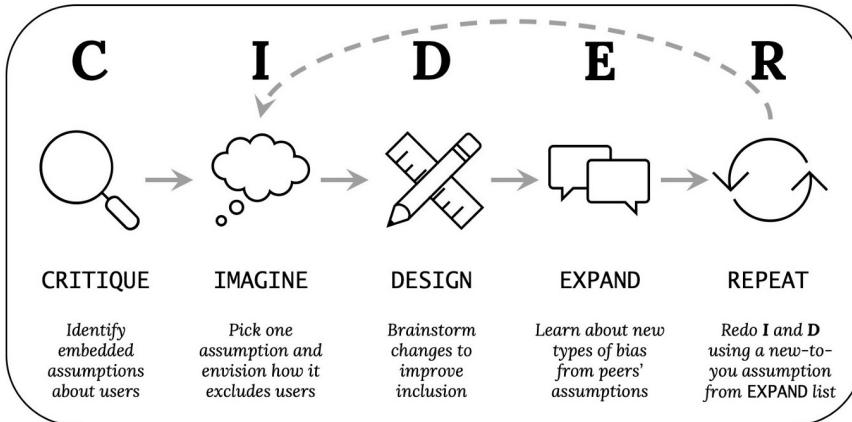
Reddit unfortunately doesn't allow alt-text for their images. So while we were going to have a programming demo here to look up the alt-text, there is no alt-text on images uploaded to reddit to look up, meaning this site is unfriendly to blind or low-vision users.

10.5. Design Analysis: Accessibility

We want to provide you, the reader, a chance to explore accessibility more.

In this activity you will be looking at a social media site on your device (e.g., your phone or computer).

We will again follow the five step [CIDER method](#) (Critique, Imagine, Design, Expand, Repeat).



So open a social media site on your device (the website or app may have additional accessibility settings, but don't use those for now, just consider how it works as it is currently). Then do the following (preferably on paper or in a blank computer document):

10.5.1. Critique (3-5 minutes, by yourself):

What assumptions does the site and your device make about individuals or groups using social media, which might not be true or might cause problems? List as many as you can think of (bullet points encouraged).

10.5.2. Imagine (2-3 minutes, by yourself):

Select one of the above assumptions that you think is important to address. Then write a 1-2 sentence scenario where a user face difficulties because of the assumption you selected. This represents one way the design could exclude certain users.

10.5.3. Design (3-5 minutes, by yourself):

Brainstorm ways to change the site or your device to avoid the scenario you wrote above. List as many different kinds of potential solutions you can think of – aim for ten or more (bullet points encouraged).

10.5.4. Expand (5-10 minutes, with others):

Combine your list of critiques with someone else's (or if possible, have a whole class combine theirs).

10.5.5. Repeat the Imagine and Design Tasks:

Select another assumption from the list above that you think is important to address. Make sure to choose a different assumption than you used before. Choose one that you didn't come up with yourself, if possible. Repeat the Imagine and Design steps.

10.5.6. Explore accessibility settings

Now, try to find the accessibility settings on the social media site and on your device.

For each setting you see, try to come up with what disabilities that setting would be beneficial for (there may be multiple).

11. Recommendation Algorithms

Now let's look at how social media platforms decide what content to show you or recommend for you: recommendation algorithms.

11.1. What Recommendation Algorithms Do

When social media platforms show users a series of posts, updates, friend suggestions, ads, or anything really, they have to use some method of determining which things to show users. The method of determining what is shown to users is called a **recommendation algorithm**, that is an algorithm (a series of steps or rules, such as in a computer program) that recommends posts for users to see, people for users to follow, ads for users to view, or reminders for users.

Some recommendation algorithms can be simple such as reverse chronological order, meaning show users the latest posts (like how blogs work, or Twitter's "See latest tweets" option). They can also be very complicated taking into account many factors, such as:

- Time since posting (e.g., show newer posts, or remind me of posts that were made 5 years ago today)
- Whether the post was made or liked by my friends or people I'm following
- How much this post has been liked, interacted with, or hovered over
- Which other posts I've been liking, interacting with, or hovering over
- What people connected to me or similar to me have been liking, interacting with, or hovering over
- What people near you have been liking, interacting with, or hovering over (they can find your approximate location, like your city, from your internet IP address, and they may know even more precisely)
 - This perhaps explains why sometimes when you talk about something out loud it gets recommended to you (because someone around you then searched for it). Or maybe they are actually recording what you are saying and recommending based on that.
- Phone numbers, email addresses ([sometimes collected deceptively](#)) can be used to suggest friends or contacts.
- And probably many more factors as well!

Now, how these algorithms precisely work is hard to know, because social media sites keep these algorithms secret, probably for multiple reasons:

- They don't want another social media site copying their hard work in coming up with an algorithm
- They don't want users to see the algorithm and then be able to complain about specific details
- They don't want malicious users to see the algorithm and figure out how to best make their content go viral

11.1.1. Reflections

- What experiences do you have of social media sites making particularly good recommendations for you?
- What experiences do you have of social media sites making particularly bad recommendations for you?

11.2. Ethical Analysis of Recommendation Algorithms

When we look at ethics and responsibility in regards to recommendation algorithms, it can be helpful to consider the difference between individual analysis and systemic analysis.

11.2.1. Individual vs. Systemic Analysis

Individual analysis focuses on the behavior, bias, and responsibility an individual has, while **systemic analysis** focuses on the how organizations and rules may have their own behaviors, biases, and responsibility that aren't necessarily connected to what any individual inside intends.

For example, there were differences in US criminal sentencing guidelines between crack cocaine vs. powder cocaine in the 90s. The guidelines suggested harsher sentences on the version of cocaine more commonly used by Black people, and lighter sentences on the version of cocaine more commonly used by white people. Therefore, when these guidelines were followed, they had have racially biased (that is, racist) outcomes regardless of intent or bias of the individual judges. (See: https://en.wikipedia.org/wiki/Fair_Sentencing_Act).

11.2.2. Recommendation Algorithms as Systems

Similarly, recommendation algorithms are rules set in place that might produce biased, unfair, or unethical outcomes. This can happen whether or not the creators of the algorithm intended these outcomes. Once these algorithms are in place though, the have an influence on what happens on a social media site. Individuals still have responsibility with how they behave, but the system itself may be set up so that individual efforts cannot not be overcome the problems in the system.



Kelsey D. Atherton
@AthertonKD

...

Oh, you're experiencing a structural problem? Have you ever considered trying different personal choices instead?

10:20 AM · Apr 22, 2019

11.3K Retweets 569 Quote Tweets 37.4K Likes

Fig. 11.1 A tweet highlighting the difference between structural problems (systemic analysis) and personal choices (individual analysis).

Sometimes though, individuals are still blamed for systemic problems. For example, Elon Musk, who has the power to change Twitters recommendation algorithm, blames the users for the results:



Elon Musk

Trashing accounts that you hate will cause our algorithm to show you more of those accounts, as it is keying off of your interactions.

Basically saying if you love trashing *that* account, then you will probably also love trashing *this* account. Not actually wrong lol.

7:47 PM · Jan 16, 2023 · 22.9M Views

18.9K Retweets 5,514 Quote Tweets 201.3K Likes

Fig. 11.2 [A tweet](#) from current Twitter owner Elon Musk blaming users for how the recommendation algorithm interprets their behavior.

11.3. Individual Concerns with Recommendation Algorithms

Let's look at some of the concerns that an individual user might have with recommendation algorithms.

11.3.1. How recommendations can go well or poorly

Friends or Follows:

Recommendations for friends or people to follow can go well when the algorithm finds you people you want to connect with.

Recommendations can go poorly when they do something like recommend an ex or an abuser because they share many connections with you.

Reminders:

Automated reminders can go well in a situation such as when a user enjoys the nostalgia of seeing something from their past.

Automated reminders can go poorly when they give users unwanted or painful reminders, such as for [miscarriages](#), funerals, or [break-ups](#)

Ads:

Advertisements shown to users can go well for users when the users find products they are genuinely interested in, and for making the social media site free to use (since the site makes its money from ads).

Advertisements can go poorly if they become part of discrimination ([like only showing housing ads to certain demographics of people](#)), or reveal private information ([revealing to a family that someone is pregnant](#))

Content (posts, photos, articles, etc.)

Content recommendations can go well when users find content they are interested in. Sometimes algorithms do a good job of it and users are appreciative. TikTok has been mentioned in particular as providing surprisingly accurate recommendations, though [Professor Arvind Narayanan argues](#) that TikTok's success with its recommendations relies less on advanced recommendation algorithms, and more on the design of the site making it very easy to skip the bad recommendations and get to the good ones.

Content recommendations can go poorly when it sends people down problematic chains of content, like by [grouping videos of children in a convenient way for pedophiles](#), or Amazon [recommending groups of materials for suicide](#).

11.3.2. Gaming the recommendation algorithm

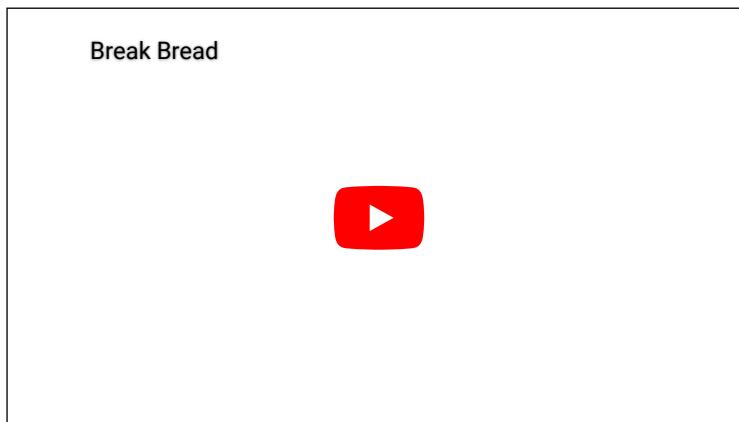
Knowing that there is a recommendation algorithm, users of the platform will try to do things to make the recommendation algorithm amplify their content. This is particularly important for people who make their money from social media content.

For example, in the case of the simple “show latest posts” algorithm, the best way to get your content seen is to constantly post and repost your content (though if you annoy users too much, it might backfire).

Other strategies include things like:

- Clickbait: trying to give you a mystery you have to click to find the answer to (e.g., “you won’t believe what happened when this person tried to eat a stapler!”). They do this to boost clicks on their link, which they hope boosts them in the recommendation algorithm, and gets their ads more views
- Trolling: by provoking reactions, they hope to boost their content more
- Coordinated actions: have many accounts (possibly including bots) like a post, or many people use a hashtag, or have people trade positive reviews

Youtuber F.D. Signifier explores the YouTube recommendation algorithm and interviews various people about their experiences (particularly Black Youtubers like himself) in this video (it’s very long, so we’ll put some key quotes below):



A recommendation algorithm like YouTube’s tries to discover categories of content, so the algorithm can recommend more of the same type of content. F.D. Signifier explains:

[A social media platforms] collects data on the viewing habits of each viewer and it uses that data to organize both viewers and channels into rabbit holes. All of this is automated by AI bots and machine learning. And all shade aside, it’s pretty impressive what they’re able to do. But these bots have no soul no conscience and most problematically no concept of social justice or responsibility.

[...]

Without this social responsibility effectively engineered, YouTube will and has funnel creators and viewers around in ways that reflect the biases and prejudices of the population it serves.

[...]

[As I follow YouTube recommendations] It’s far more likely that my biases will be confirmed and possibly even enhanced than they are to be challenged and re-evaluated. And it’s likely for a lot of consumers of YouTube that they will be segregated by political cultural and ethnic lines.

Since recommendation algorithm bases its decisions on how users engage with content, the biases of users plays into what gets boosted by the algorithm. For example, one common piece of advice on YouTube is for creators to put their faces on their preview thumbnail, but

given that many users have a bias against Black people (whether intentional or not), this advice might not work:

In preparation for this video, and in just wanting to test out how to improve my channel's reach, I took my Black face off of pretty much every thumbnail of any video that I've made up until this point. And the result was a clear uptick in views on each video that I did this for.

Additionally, because of how YouTube categorizes content, if someone tries to make content that doesn't fit well in the existing categories, the recommendation algorithm might not boost it, or it might boost it in ill-fitting locations.

[Two problems happen with Black people trying to make educational content for Black audiences:]

1. Black viewers of educational channels are funneled into white content spaces and
2. Black content creators of educational content are funneled into really non-educational and in many cases toxic anti-Black content spaces.

11.3.3. Reflections

- What responsibilities do you think social media platforms should have in what their recommendation algorithms recommend?
- What strategies do you think might work to improve how social media platforms use recommendations?

11.4. Societal Concerns with Recommendation Algorithms

Now let's look at some larger societal concerns with the effects of recommendation algorithms.

11.4.1. Epistemic Bubbles / Echo Chambers

One concern with how recommendation algorithms is that they can create echo chambers (or "epistemic bubbles"), where people get filtered into groups and the recommendation algorithm only gives people content that reinforces and doesn't challenge their beliefs. These echo chambers allow people in the groups to freely have conversations among themselves without external challenge.

These echo chambers can include:

- Hate groups, where people's hate and fear of others gets reinforced and never challenged
- Fan communities, where people's appreciation of an artist, work of art, or something is assumed, and then reinforced and never challenged
- Marginalized communities can find safe spaces where they aren't constantly challenged or harassed (e.g., a [safe space](#))

11.4.2. Amplifying Polarization and Negativity

There are concerns that echo chambers increase polarization, where groups lose common ground and ability to communicate with each other. In some ways echo chambers are the opposite of context collapse, where contexts are created and prevented from collapsing. Though [others have argued](#) that people do interact across these echo chambers, but the contentious nature of their interactions increases polarization.

Along those lines, if social media sites simply amplify content that gets strong reactions, they will often amplify the most negative and polarizing content. Recommendation algorithms can make this even worse. For example: [At one point, Facebook counted the default "like" reaction less than the "anger" reaction, which amplified negative content.](#)

On Twitter, [one study found \(full article on archive.org\)](#):

"Whereas Google gave higher rankings to more reliable sites, we found that Twitter boosted the least reliable sources, regardless of their politics."

According to [another study](#) on Twitter:

"An analysis [...] suggested that when users swarm tweets to denounce them with quote tweets and replies, they might be cueing Twitter's algorithm to see them as particularly engaging, which in turn might be prompting Twitter to amplify those tweets. The upshot is that when people enthusiastically gather to denounce the latest Bad Tweet of the Day, they may actually be ensuring more people see it than had they never decided to pile on in the first place.

That possibility raises serious questions of what constitutes responsible civic behavior on Twitter and whether the platform is in yet another way incentivizing combative behavior."

Though this is a big concern about Internet-based social media, traditional media sources also play into this: For example, this study: [Cable news has a much bigger effect on America's polarization than social media, study finds](#)

11.4.3. Radicalization

Building off of the amplification polarization and negativity, there are concerns (and real examples) of social media (and their recommendation algorithms) radicalizing people into conspiracy theories and into violence.

Rohingya Genocide in Myanmar

A [genocide of the Rohingya people in Myanmar](#) started in 2016, and in 2018 [Facebook admitted it was used to 'incite offline violence' in Myanmar](#). In 2021, the [Rohingya sued Facebook for £150bn](#) over how Facebook amplified hate speech and didn't take down inflammatory posts.

The Flat Earth Movement

The flat earth movement (an absurd conspiracy theory that the earth is actually flat, and not a globe) gained popularity in the 2010s. As YouTuber Dan Olson explains it in his (rather long) video [In Search of a Flat Earth](#):

Modern Flat Earth [movement] was essentially created by content algorithms trying to maximize retention and engagement by serving users suggestions for things that are, effectively, incrementally more concentrated versions of the thing they were already looking at. Bizarre cranks peddling random theories are an aspect of civilization that has always been with us, so it was inevitable that they would end up on YouTube, but the algorithm made sure they found an audience. These systems were accidentally identifying people susceptible to conspiratorial and reactionary thinking and sending them increasingly deeper into Flat Earth evangelism.

Dan Oleson then explained that by 2020, the flat earth content was getting less views:

The bottom line is that Flat Earth has been slowly bleeding support for the last several years.

Because they're all going to [QAnon](#).

See also: [YouTube aids flat earth conspiracy theorists, research suggests](#)

11.4.4. Discussion Questions

- What responsibilities do you think social media platforms should have in regards to larger social trends?
- Consider impact vs. intent. For example, consequentialism only cares about the impact of an action. How do you feel about the importance of impact and intent in the design of recommendation algorithms?
- What strategies do you think might work to improve how social media platforms use recommendations?

11.5. Recommendation Bot

Let's now make a bot to try out our own recommendation algorithm. Before we can do that though, we'll need to look at how to use dictionaries for counting.

11.5.1. Demo: Dictionary Counters

We've already seen in Chapter 8 how to make loop variables in order to keep track of something we are looping over. We are now going to learn a way of using dictionaries to do that which will help us solve more problems.

But first, let's remember how we did loop variables

Loop Variables (review)

To use loop variables, we create a variable before our loop, and give it an initial value (often 0). Then within the loop over each item in our list, we can optionally add something to our loop variable. After the loop, our variable will have our final result.

For example, here is code to count the number of "i"s in "Mississippi":

```
# create a Loop variable to track the total number of i's
# start it with 0, since we've seen 0 i's so far
num_i = 0

# go through each letter in the word
for letter in "Mississippi":
    # if the letter was an i, then add one to our Loop variable
    if letter == "i":
        num_i += 1

# we now have the total number of i's
display("total number of i's was: " + str(num_i))
```

```
"total number of i's was: 4"
```

In the code above we made a variable to count the number of "i"s. But what if we wanted to count the other letters? Then we'd need one variable for each letter. For the code above we could do this:

```

# create a loop variable to track the total number of each possible letter
# start it with 0, since we've seen 0 letters so far
num_M = 0
num_i = 0
num_s = 0
num_p = 0

# go through each letter in the word
for letter in "Mississippi":
    # check each letter, then add one to the correct loop variable
    if letter == "M":
        num_M += 1
    elif letter == "i":
        num_i += 1
    elif letter == "s":
        num_s += 1
    elif letter == "p":
        num_p += 1

# we now have the total number of i's
display("total number of M's was: " + str(num_M))
display("total number of i's was: " + str(num_i))
display("total number of s's was: " + str(num_s))
display("total number of p's was: " + str(num_p))

```

"total number of M's was: 1"

"total number of i's was: 4"

"total number of s's was: 4"

"total number of p's was: 2"

Now what if we didn't know what letters were possibly in the word we wanted to check? We'd need to make 26 variables, or if we had capital and lowercase letters separate, then we'd need 52 variables. But what about numbers? Punctuation? Other symbols?

Making separate loop variables is going to become a real pain. But there is another strategy we can use:

Dictionary Counters

We can make use of dictionaries, which are good for looking up values, to store information about each letter we come across.

So instead of having the variables: `num_M`, `num_i`, `num_s`, and `num_p`, we could have a dictionary called `letter_counts` that we want in the end to look like this:

```
{
    "M": 1,
    "i": 4,
    "s": 4,
    "p": 2
}
```

The way we can build up this dictionary in code is that we can create our `letter_counts` dictionary before the loop, and initialize it empty (`{}`), with no letters or count values.

Then, in our loop, when we see a letter, we can look it up in our dictionary. If we don't find it in our dictionary, we add that letter and set its count to 1 (since we just saw one). If we did find a count already in our dictionary, then we add one to the count.

At the end, we will have entries in our dictionary for all the letters we found, showing their count. All the letters that don't have entries in are dictionary are ones we didn't find (implying their count is 0).

Here is the code re-written with a dictionary counter:

```

# create a dictionary counter before the loop
# it has no entries, since we have seen no letters yet
letter_counts = {}

# go through each letter in the word
for letter in "Mississippi":
    if letter not in letter_counts: # If there is no entry for this letter yet
        letter_counts[letter] = 1 # then make an entry set to 1
    else: # otherwise, there was an entry
        letter_counts[letter] += 1 # so add one to that entry

# we now have the total number of letters
display("total letter counts are: ")
display(letter_counts)

```

'total letter counts are: '

{'M': 1, 'i': 4, 's': 4, 'p': 2}

Now we don't have to figure out what letters we are expecting, and we will just add as many entries to our dictionary as letters we come across. We can change our string we are looking through and our code still works:

```

# create a dictionary counter before the loop
# it has no entries, since we have seen no letters yet
letter_counts = {}

# go through each letter in the string
for letter in "unexpected letters: &$$*&":
    if letter not in letter_counts: # If there is no entry for this letter yet
        letter_counts[letter] = 1 # then make an entry set to 1
    else: # otherwise, there was an entry
        letter_counts[letter] += 1 # so add one to that entry

# we now have the total number of letters
display("total letter counts are:")
display(letter_counts)

```

'total letter counts are: '

{'u': 1,
'n': 1,
'e': 5,
'x': 1,
'p': 1,
'c': 1,
't': 3,
'd': 1,
' ': 2,
'l': 1,
'r': 1,
's': 1,
'(': 1,
'&': 2,
'\$': 2,
'*': 1}

One final trick we'll do with our count dictionary, is order it by the most common letters (with the most common ones first).

This code has a few different Python features, so don't worry about it too much, but we'll explain it a little below

```

# Sort the letter counts (and save in a new variable: sorted_letter_counts)
sorted_letter_counts = sorted(letter_counts.items(), key=lambda x: -x[1])

display("total letter counts (sorted) are:")
display(sorted_letter_counts)

```

```
'total letter counts (sorted) are:'
```

```
[('e', 5),
 ('t', 3),
 (' ', 2),
 ('&', 2),
 ('$', 2),
 ('u', 1),
 ('n', 1),
 ('x', 1),
 ('p', 1),
 ('c', 1),
 ('d', 1),
 ('l', 1),
 ('r', 1),
 ('s', 1),
 (':', 1),
 ('*', 1)]
```

The code above had a few new features. Again don't worry about understanding it too much, but the pieces of this code are:

- `sorted()` - a function that takes a list, and a function that gets the value to use for sorting
- `letter_counts.items()` - this takes a dictionary and gets all the key-value pairs (together in a list-like datatype called a "tuple"). So it has, for example ('e', 5) to mean the dictionary said the count for e was 5.
- `key=lambda x: -x[1]` - this part is for getting the key (that is, the thing to be sorted)
 - it takes a function (in this case a function that we don't give a name, which we call a `lambda` function)
 - the function for each of the key-value pairs (saved into a variable called `x`), gets the value out (the second thing in the key-value pair, so `x[1]`) and makes it negative (`-x[1]`) so it puts the highest count first

11.5.2. Practice: Dictionary Counters

Now it's your turn to practice dictionary counters

1. Copy the code from the demo that counts letters in a string. Modify the string to be something else and find the letter_counts (no need to sort)

```
# TODO: enter your code here
```

Now let's try this with words.

The code below makes a string, and then splits it into words by dividing it apart at each space.

```
# Save a poem into a string (we can use """ to make a multiline string)
# Fire and Ice BY ROBERT FROST (now public domain)
poem = """Some say the world will end in fire,
Some say in ice.
From what I've tasted of desire
I hold with those who favor fire.
But if it had to perish twice,
I think I know enough of hate
To say that for destruction ice
Is also great
And would suffice."""

# split the string (all Lowercase) into words
import re # import the Regular Expressions library, to help us split words

#make the poem all Lowercase
lower_case_poem = poem.lower()

# split the poem into pieces at all spaces and newlines (\s), and , 's and . 's
poem_split_by_spaces_and_punctuation = re.split("[\s,.]", lower_case_poem)

# get rid of some empty strings "" that ended up in our list
split_poem = list(filter(None, poem_split_by_spaces_and_punctuation))

print(split_poem)
```

```
['some', 'say', 'the', 'world', 'will', 'end', 'in', 'fire', 'some', 'say', 'in',
'ice', 'from', 'what', 'i\'ve', 'tasted', 'of', 'desire', 'i', 'hold', 'with',

```

1. Make code that counts how often each word appears in the poem (it should be very similar to the code from problem 1 above)

```
# TODO: enter your code here
```

11.5.3. Demo: Recommend a Subreddit

Now let's look at a recommendation algorithm for a new subreddit to follow. Our algorithm will be

For a given subreddit:

1. Make a list of the accounts who made the most recent posts to the subreddit
2. For each of those accounts, look up what subreddits they also follow
3. While doing this, keep track of what subreddits showed up most
4. Recommend the subreddits that showed up the most (the subreddits followed by people posting in a given subreddit)

Normal Reddit PRAW Setup

```
import praw
```

(optional) use the fake version of Reddit praw, so you don't have to use real Reddit developer access passwords

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_#$DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Make a function to get subreddit suggestions

Now we make a function that will generate subreddit suggestions.

The function takes a subreddit name to start with, and also two optional arguments: `num_subreddit_posts` for how many posts it should look through in the starting subreddit, and `num_author_posts` for how many other posts by the post authors it should look through.

We first get a list of submissions to the given starting subreddit. Then we create a dictionary counter (`possible_suggestion_counts`).

For each of the submissions to the starting subreddit, we find the author. Then for the author we look at their recent submissions and see what subreddit that submission was on. We make sure it isn't an over18 (NSFW) subreddit, and then call it a `possible_suggestion`

We then check and see if our `possible_suggestion` subreddit is already in the `possible_suggestion_counts` dictionary. If it wasn't already in the dictionary we add it (starting with a count of 1), otherwise add 1 to the count if it was already there.

After the for loop we have counts for our possible suggestion subreddits. So we sort the list to put the most commonly appearing ones at the top, and we return the results.

```
def get_followSuggestions(subreddit_name, num_subreddit_posts=10,
num_author_posts=10):

    # Look up the given subreddit, then find the "hot" list, getting up to 10
    # submission
    submissions = reddit.subreddit(subreddit_name).hot(limit=num_subreddit_posts)

    # Turn the submission results into a Python List
    submissions_list = list(submissions)

    # dictionary to track subreddits posted to by the authors of those submissions
    # which will be possible suggestions
    # The keys will be the username, and the values will be how often they
    # appeared as post subreddits for authors of the subreddit we are starting with
    possible_suggestion_counts = {}

    # Go through each of the posts on the subreddit we are starting with
    for submission in submissions_list:

        # display some information about the post we are looking at
        print("Getting info for submission: " + str(submission.title))
        print(" author: " + str(submission.author))

        # Get the latest submissions from the author of that post
        latest_author_submissions =
        submission.author.submissions.new(limit=num_author_posts)

        # For each of those posts by that author, we'll look at what subreddit it
        # was on
        for author_submission in latest_author_submissions:

            # A lot of subreddits are not safe for work, so we'll skip those...
            if(not author_submission.subreddit.over18):

                # Get the name of the subreddit that post was made in
                possible_suggestion = author_submission.subreddit.display_name

                # If this possible suggestion is not yet in the dictionary,
                # add it with a count of one
                if possible_suggestion not in possible_suggestion_counts:
                    possible_suggestion_counts[possible_suggestion] = 1
                else: #otherwise, update the count in the dictionary
                    possible_suggestion_counts[possible_suggestion] += 1

    # sort the suggestions by who appeared the most
    orderedSuggestions = sorted(possible_suggestion_counts.items(), key=lambda x:
    -x[1])

    # return our recommendations for subreddits to follow
    return orderedSuggestions
```

Test our function (suggest follows)

Now that our function is ready, we can test it out and see who we suggest our "fake_user" should follow (if you skip fake_tweepy and log into real twitter, you can do this for real users)

```
suggestions = get_followSuggestions("cuteanimals")

display("suggested subreddits:")
display(suggestions)
```

Fake praw is pretending to select the subreddit: cuteanimals

```
Getting info for submission: Look at my cute dog!
author: fake_user
Getting info for submission: A baby lizard!
author: pretend_user
Getting info for submission: The cutest bird ever!
author: imaginary_user
```

```
'suggested subreddits:'
```

```
[('science', 3), ('politics', 2), ('cats', 1), ('birds', 1)]
```

Try it yourself!

If you skip the fake_praw step and run this on real Reddit, you might notice:

- The top suggestion is often the subreddit you are already looking at
- If the same author posted multiple times in our starting subreddit, we count all the places they posted again (double counting)
- There might still be some offensive subreddits even after we tried to filter out specifically labeled NSFW ones
- the suggestion lists can be very long, even if you are only looking at the default num_subreddit_posts=10 and num_author_posts=10

We could of course add more code to deal with those issues, but hopefully you can at least get the idea of how this recommendation algorithm works :)

11.6. Design Activity

Come up with at least two different theoretical sets of rules (recommendation algorithms) for what would make a "good" social media post to recommend.

- Consider all the information you could get about a post, both from the social media API, but also information social media company has internally. For example
 - post engagement
 - Information about the user
 - Information about the topic (that we can try to guess)
 - Other data mining strategies (like Sentiment Analysis)
- Compare your two different strategies, and think about how users might try to behave in order to game the algorithm

11.7. Learn More

- [I Called Off My Wedding. The Internet Will Never Forget](#)
- [Five points for anger, one for a 'like': How Facebook's formula fostered rage and misinformation](#)

12. Virality

We've now covered many of the aspects of how content spreads on social media platforms, (that is, content going "viral"), so now let's turn specifically to the concept of virality in more depth.

12.1. Evolution and Memes

In order to understand what we are talking about when we say something goes "viral", we need to first understand evolution and memes.

12.1.1. Evolution

Biological evolution is how living things change, generation after generation, and how all the different forms of life, from humans to bacteria, came to be.

Evolution occurs when three conditions are present:

- **Replication (with Inheritance)**
 - An organism can make a new copy of itself, which inherits its characteristics
- **Variations / Mutations**
 - The characteristics of an organism are sometimes changed, in a way that can be inherited by future copies
- **Natural Selection**
 - Some characteristics make it more or less likely for an organism to compete for resources, survive, and make copies of itself

When those three conditions are present, then over time successive generations of organisms will:

- be more adapted to their environment
- divide into different groups and diversify
- stumble upon strategies for competing with or cooperating with other organisms.

12.1.2. Memes

In the 1976 book [The Selfish Gene](#), evolutionary biologist Richard Dawkins^[1] said rather than looking at evolution of organism, it made even more sense to look at the evolution of the genes of those organism (sections of DNA that perform some functions and are inherited). For example, if a bee protects its nest by stinging an attacking animal and dying, then it can't reproduce and it might look like a failure of evolution. But if the gene that told the bee to die protecting the nest was shared by the other bees in the nest, then that one bee dying allows the gene to keep being replicated, so the gene is successful evolutionarily.

Since genes contained information for how organisms would grow and live, then biological evolution could be considered to be evolving information. Dawkins then took this idea of evolution of information and applied it to culture, coining the term "meme" (intended to [sound like "gene"](#)).

A **meme** is a piece of culture that might reproduce in an evolutionary fashion, like a hummable tune that someone hears and starts humming to themselves, perhaps changing it, and then others overhearing next. In this view, any piece of human culture can be considered a meme that is spreading (or failing to spread) according to evolutionary forces. So we can use an evolutionary perspective to consider the spread of:

- Technology (languages, weapons, medicine, writing, math, computers, etc.),
- religions
- philosophies
- political ideas (democracy, authoritarianism, etc.)
- art
- organizations
- etc.

We can even consider the evolutionary forces that play in the spread of true and false information (like an old saying: "[A lie is halfway around the world before the truth has got its boots on.](#)")

^[1] While we value Dawkin's contribution to evolutionary theory, we don't want to make this an endorsement of any of his later statements or views.

12.2. Pre-internet Virality Examples

Since we can look at any part of culture through an evolutionary perspective (memes), we can see how things "went viral" before the invention of the internet.

12.2.1. Books

The book [Writing on the Wall: Social Media - The First 2,000 Years](#) describes how, before the printing press, when someone wanted a book, they had to find someone who had a copy and have a scribe make a copy. So books that were popular spread through people having scribes copy each others books. And with all this copying, there might be different versions of the book spreading around, because of scribal copying errors, added notes, or even the original author making an updated copy. So we can look at the evolution of these books: which got copied, and how they changed over time.

12.2.2. Chain letters

When physical mail was dominant in the 1900s, one type of mail that spread around the US was a [chain letter](#). Chain letter were letters that instructed the recipient to make their own copies of the letter and send them to people they knew. Some letters gave the reason for people to make copies might be as part of a [pyramid scheme](#) where you were supposed to send money to the people you got the letter from, but then the people you send the letter to would give you money. Other letters gave the reason for people to make copies that if they made copies, good things would happen to them, and if not bad things would, like this:

You will receive good luck within four days of receiving this letter, providing, you in turn send it on. [...] An RAF officer received \$70,000 [...] Gene Walsh lost his wife six days after receiving the letter. He failed to circulate the letter.

WITH LOVE ALL THINGS ARE POSSIBLE

This paper has been sent to you for good luck. The original copy is in New England. It has been around the world nine times. The luck has now been sent to you. You will receive good luck within four days of receiving this letter, providing, you in turn send it on. This is no joke. You will receive it in the mail. Send copies to people you think need good luck. Don't send money as fate has no price. Do not keep this letter. It must leave your hands within 96 hours. An RAF officer received \$70,000. Joe Elliot received \$40,000 and lost it because he broke the chain. While in the Philippines, Gene Walsh lost his wife six days after receiving the letter. He failed to circulate the letter. However, before her death he received \$7,755,000. Please send 20 copies of the letter and see what happens in four days. The chain comes from Venezuela and was written by Saul Anthony Decroup, a missionary from South America. Since the copy must make a tour around the world, you must make 20 copies and send them to friends and associates. After few days you will get a surprise. This is true even if you aren't superstitious. Do note the following: Constantine Dias received the chain in 1953. He asked his secretary to make 20 copies and send them out. A few days later he won the lottery of two million dollars. Carlie Dadditt, an office employee, received the letter and forgot it had to leave his hands within 96 hours. He lost his job. Later, after finding the letter again, he mailed out the 20 copies. A few days later he got a better job. Dalan Fairchild received the letter and not believing, threw the letter away. Nine days later he died. Remember, send no money, and please don't ignore this.

IT WORKS

Fig. 12.2 An example chain letter from <https://cs.uwaterloo.ca/~mli/chain.html>.

The spread of these letters meant that people were putting in effort to spread them (presumably believing making copies would make them rich or help them avoid bad luck). To make copies, people had to manually write or type up their own copy of the letters (or later with photocopies, find a machine and pay to make copies). Then they had to pay for envelopes and stamps to send it in the mail. As these letters spread we could consider what factors made some chain letters (and modified versions) spread more than others, and how the letters got modified as they spread.

12.2.3. Sourdough starters

Sourdough bread is made by baking something called a "starter," which is a mix of flour, water, and a colony of microorganisms (like yeast).



Fig. 12.3 Sourdough starter. [Photo by Janus Sandsgaard](#)



Fig. 12.4 Sourdough bread. [Photo source](#)

The microorganisms in the starter will continue multiplying if you let them, and you can add flour and water to make it larger, then split it into multiple starters. You can repeat this process again and again, occasionally using some starters to bake bread, but you can share the starters with others.

In this way, as people split and share their starters, sourdough starters are spread, multiply and evolve (including the microorganisms evolving biologically). One sourdough starter even [dates back to at least 1847](#).

12.3. Evolution in social media

Let's now turn to social media and look at how evolution happens there.

As we said before, evolution occurs when there is: replication (with inheritance), variations or mutations, and natural selection, so let's look at each of those.

12.3.1. Replication (With Inheritance)

For social media content, replications means that the content (or a copy or modified version) get seen by more people. Additionally, when a modified version gets distributed, future replications of that version will include the modification (a.k.a., inheritance).

There are ways of duplicating that are built into social media platforms:

- Actions such as: liking, reposting, replying, and paid promotion get the original posting to show up for users more
- Actions like quote tweeting, or the TikTok Duet feature let people see the original content, but modified with new context.
- Social media sites also provide ways of embedding posts in other places, like in news articles

There are also ways of replicating social media content that aren't directly built in to the social media platform, such as:

- copying images or text and reposting them yourself
- taking screenshots, and cross-posting to different sites

12.3.2. Variations / Mutations

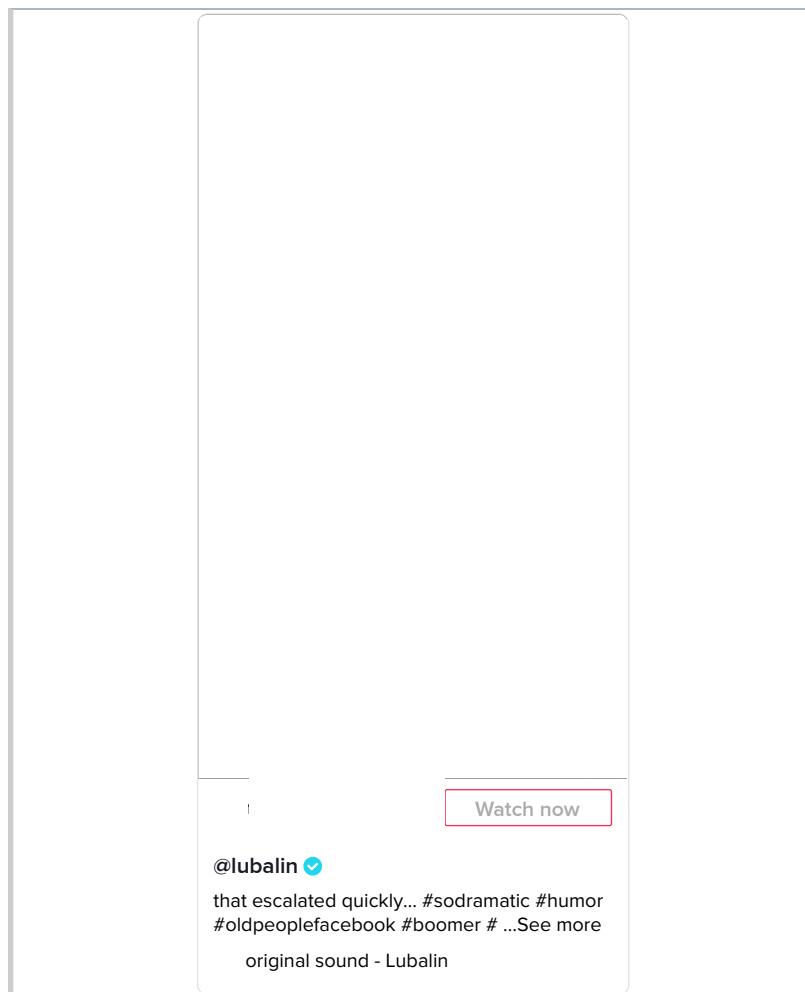
When content is replicated on social media, it may be modified. The Social media system might have built in ways to do this, like a quote tweet or reply adds some sort of comment to the original post, effectively making a new version of the post that can spread around.



Fig. 12.5 [Monica Lewinsky](#) posted [this quote tweet](#) that answers a question with a side-eye emoji, which her audiences will understand as referring to her [affair](#) with then-US-president Bill Clinton.

Through quote tweeting, a modified version of the original tweet (now with Lewinsky's emoji response) spread as people liked, retweeted, replied, and put it in [Buzzfeed lists](#).

Additionally, content can be copied by being screenshots, or photoshopped. Text and images can be copied and reposted with modifications (like [a poem about plums](#)). And content in one form can be used to make new content in completely new forms, like this "Internet Drama" song whose lyrics are from messages sent back and forth between two people in a Facebook Marketplace:



12.3.3. "Natural" Selection

It isn't clear what should be considered as "nature" in a social media environment (human nature? the nature of the design of the social media platform? are bots unnatural?), so we'll just instead talk about **selection**.

When content (and modified copies of content) is in a position to be replicated, there are factors that determine whether it gets **selected** for replication or not. As humans look at the content they see on social media they decide whether they want to replicate it for some reason, such as:

- "that's funny, so I'll retweet it"
- "that's horrible, so I'll respond with an angry face emoji"
- "reposting this will make me look smart"
- "I am inspired to use part of this to make a different thing"

Groups and organizations make their own decisions on what social media content to replicate as well (e.g., a news organization might find a social media post newsworthy, so they write articles about it).

Additionally content may be replicated because of:

- Paid promotion and ads, where someone pays money to have their content replicated
- Astroturfing: where crowds, often of bots, are paid to replicate social media content (e.g., like, retweet)

Finally, the social media platforms use algorithms and design layouts which determine what posts people see. There are various rules and designs social media sites can use, and they can amplify the natural selection and unnatural selection in various ways. They can do this through recommendation algorithms as we saw last chapter, as well as choosing what actions are allowed, and what amount of friction is given to those actions, as well as what data is collected and displayed.

Different designs of social media platforms will have different consequences in what content has viral, just like how different physical environments determine which forms of life thrive and how they adapt and fill ecological niches.

12.4. Virality and Intention

When someone creates content that goes viral, they didn't necessarily intend it to go viral, or viral in the way that it does.

If a user posts a joke, and people share it because they think it is funny, then their intention and the way the content goes viral is at least somewhat aligned. If a user tries to say something serious, but it goes viral for being funny, then their intention and the virality are not aligned.

Let's look at some examples of the relationship between virality and intent.

12.4.1. Building on the original intention

Content is sometimes shared without modification fitting the original intention, but let's look at ones where there is some sort of modification that aligns with the original intention.

We'll include several examples on this page from the TikTok Duet feature, which allows people to build off the original video by recording a video of themselves to play at the same time next to the original. So for example, This tweet thread of TikTok videos (cross-posted to Twitter) starts with one Tiktok user singing a short parody musical of an argument in a grocery store. The subsequent tweets in the thread build on the prior versions, first where someone

adds themselves singing the other half of the argument, then where someone adds themselves singing the part of their child, then where someone adds themselves singing the part of an employee working at the store^[1]:

Emma Lynn 
@emmaspacelynn · [Follow](#)

This thread is evidence of the way TikTok's duet feature can result in the most hilarious and creative collaborations.

Pretty much a guy wrote a musical number about a grocery store and everyone is adding onto it and I am deceased.

Part 1

The media could not be played.

[Reload](#)

8:07 PM · Oct 4, 2020 

[Read the full conversation on Twitter](#)

 65K  Reply  Copy link

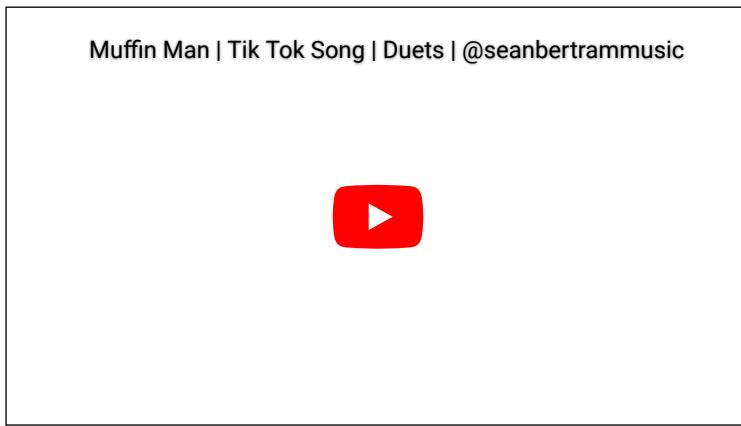
[Read 711 replies](#)

As another example, this tweet is instructions for how to interact with it (add a picture), and people keep copying the instructions with their reply.



Fig. 12.6 A [quote-tweet thread](#) with instructions to interact with it.

Content might even have direct indication for how to modify it. For example, the original TikTok video in this compilation (cross-posted to YouTube) has a song, but during a section with no singing text appears on the video to say "You do something here?????" and then "Wow great job" and "Nice." Other users then used the TikTok Duet feature to sing/play along and add their own verses to that section:



12.4.2. Antagonistic to original intention

Sometimes content goes viral in a way that is against the intended purpose of the original content. For example, in this video started as of a TikToker introducing his girlfriend. Other TikTokers then used the duet feature to add an out of frame gun pointed at the girlfriend's head, and her out of frame hands tied together, being held hostage. TikTokers continued to build on this with hostage negotiators, press conferences and news sources. All of this is almost certainly not the impression the original TikToker was trying to convey.



12.4.3. Viral for being “embarrassing”

Similar to the previous example, social media content can go viral for being perceived as “embarrassing.” For example, in 2002, a 15 year old kid made a video of himself swinging a pretend lightsaber, that went viral and was mocked:



Fig. 12.7 “On November 2nd, 2002, Raza recorded an 8mm movie of himself pretend-fighting with a club in his high school studio, but forgot to take the cassette tape home with him. Unbeknownst to Raza, the footage was eventually discovered by three of his classmates and posted online via Kazaa, a popular P2P file-sharing network, on April 14th, 2003.” - From the Know Your Meme entry on [Star Wars Kid](#)

Similarly, in 2011, a 13-year old Rebecca Black made a music video called “Friday,” which spread virally for being cheesy and bad.



Fig. 12.8 “As of March 30th, 2011, Rebecca Black’s “Friday” YouTube video officially surpassed Justin Bieber’s “Baby” in total number of user downvotes with over 1.1 million downvotes.” - From the Know Your Meme entry on [Rebecca Black - Friday](#).

For another example, in 2021, John Roderick (who became known as “bean dad”) posted on twitter a story about how his 9-year-old daughter was hungry and had asked him to open a can of beans. He told her to figure out how to use the can-opener herself and refused to help her:



Fig. 12.9 Part of John Roderick telling his story of refusing to help his daughter use a can opener.

Roderick said that six hours later his daughter finally figured out how to open the can. This story went viral as many shared their criticisms. As [Know Your Meme puts it](#), "While Roderick tweeted the story as though it were a proud parenting moment, many criticized the story for teaching poor lessons to the daughter with some going so far as to call it abuse and others made jokes about the story."

In response to this story going viral a Twitter user related this to larger social trends on Twitter, which quickly became common wisdom on the platform:



Fig. 12.10 The origin of the concept of the Twitter [main character of the day](#), who the whole Twitter community piles on to criticize.

12.4.4. Intentionally bad or offensive content

Users can also create intentionally bad or offensive content in an attempt to make it go viral (which is a form of trolling). So when criticism of this content goes viral, that is in fact aligned with the original purpose.

For example, this cooking video contains an unusual recipe (SpaghettiOs as a pie filling) and unusual cooking methods (like using forearms to spread butter).



EASIEST DINNER...
Janelle & Kate • Follow

Facebook Watch

EASIEST DINNER HACK EVER!!

1.6K 7.6K 5.1K

In the comments, people post their horrified reactions, and the original poster responds naively (e.g., viewer reaction: "When she started mashing her forearms into the butter and garlic my soul left my body.", video creator replied "in a good way, right? haha"). The video continued to spread as people tried the recipes themselves ([link 1](#), [link 2](#)).

It turns out that this video and other similar cooking videos are intentionally made to be bad videos and intended to produce a reaction (see article: [Your Least Favorite Gross Viral Food Videos Are All Connected to This Guy](#)).

Saying and doing provocative, shocking, and offensive things can also be an effective political strategy, and getting viral attention through other's negative reactions has been seen as a [key component of Donald Trump's political successes](#).

12.4.5. Content made about others

Sometimes people make content about other people that then goes viral.

Sometimes the original source of the content doesn't have intentions or awareness of social media, such as this cat, whose drinking sounds are used to build a musical piece (using TikTok Duet), eventually becoming the song [Nature Boy by Nat King Cole](#) and then with added [original lyrics](#):

Num Num Cat TikTok Chain but its actually good lol



Other times, the subject has no limited or no awareness of social media because they are a child (see the article: [Their children went viral. Now they wish they could wipe them from the internet.](#))

Content or recordings of others can also be shared in a way that may embarrass or harm the other person, such as is mocked in this parody headline from The Onion:



MORE FROM THE ONION

Fig. 12.11 [Parody headline from The Onion.](#)

Posting content about others (that they don't want go viral) can also be a way of trying to get justice, such as two videos recorded on May 25, 2020 that went viral:

- [A Black bird watcher named Christian Cooper talked to a white woman named Amy Cooper \[coincidentally same last name\] in Central Park in New York City.](#) Amy's dog was not on a leash (which was against the rules of the park), and when Christian confronted her she got angry. Christian then recorded Amy saying she was going to call the police and say "There's an African American man threatening my life," and then she followed through and called 911 (this could have easily resulted in police violence against Christian Cooper).
- On the same day in Minneapolis, Minnesota, a white police officer named [Derek Chauvin murdered a Black man named George Floyd](#) by kneeling on his neck until he died, while a crowd around him filmed the incident and begged Derek Chauvin to stop.

While neither Amy in New York, nor Derek Chauvin in Minneapolis likely wanted those videos to go viral, the posting of those videos brought consequences to both Amy Cooper and Derek Chauvin for their racist actions which they probably wouldn't have faced if not for the viral videos.

[1] The videos in this tiktok thread do not have captions (for those who cannot hear), and we could find no properly subtitled version of the videos, nor any separate copy of the lyrics. In future versions of the book, we may at least copy the lyrics somewhere for future viewers.

12.5. Ethics of copying

Elon Musk, who purchased Twitter in 2022 has long been known to copy others' images and jokes and post them as his own without attribution (often specifically cropping images to hide any attribution) ([source](#), [source](#), [source](#)). So let's consider ethical issues and complications around how content is copied on the internet.

12.5.1. Remixing

Much of the internet has developed a culture of copying without necessarily giving attribution to where it came from. Often, unlike with Elon Musk, this copying also involves modifying the content, recontextualizing the content to give it new meaning, or combining it with other content.

For example, let's look at this meme about stealing memes:



Fig. 12.12 A meme about stealing memes. (It is unclear how we should or even could cite this).

The meme above is composed of many pieces copied from elsewhere, and modified and put together. Here are the pieces we could identify:

- A painting: [SACRED HEART OF JESUS by Dona Gelsinger](#) (which itself is copying its form from centuries of paintings of the [sacred heart](#))
- The background was switched out to make a yellow disk [halo](#) behind the head of Jesus
- Jesus face is replaced with Keanu Reeves' bearded face (perhaps from the [spongebob movie](#))
- A laughing [emoticon](#) is placed in Jesus' hand.
- A watermark from @AllMemes appears on Jesus' shoulder.
- The text about stealing memes added at the top

Communities based on this type of remixing have existed outside the Internet before showing up in internet-based social media platforms, such as [sampling in hip hop music](#) in the 1980s.

In an anthropological introduction to YouTube (from 2008), [Michael Wesch observes this phenomenon](#):

And this is something really quite profound that's happening. Where we can remix this culture that's being thrown at us, where we can take it, re-appropriate it and throw it back. [...] Most of what we do is actually illegal, any remixing is basically illegal. And I could talk more about the- the parameters of that, we have fair use laws that should protect it but the simple fact of ripping a DVD is actually illegal which makes virtually everything we do illegal.

12.5.2. Cultural appropriation

The online community activity of copying and remixing can be a means of [cultural appropriation](#), which is when one cultural group adopts something from another culture in an unfair or disrespectful way (as opposed to a fair, respectful [cultural exchange](#)). For

example, [many phrases from Black American culture have been appropriated by white Americans](#) and had their meanings changed or altered (like "woke", "cancel", "shade", "sip/spill the tea", etc.).

Additionally, white Americans' use of images and gifs of Black people reacting and expressing emotions [has been compared](#) to earlier (and racist) art forms of [blackface](#), where white actors would paint their faces black and then act in exaggerated unintelligent ways.

12.5.3. Citation and giving credit

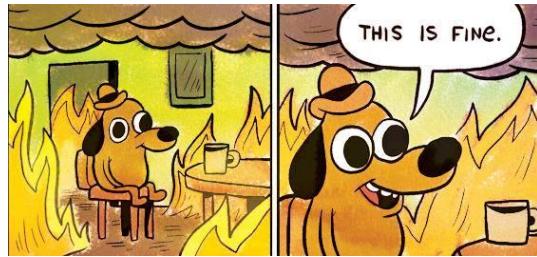


Fig. 12.13 The ["This is fine" meme](#) image by K.C. Green

On the 10th anniversary of the [webcomic](#) by K.C. Green where the "This is fine" meme came from, [he reflected on his feelings](#) about how those frames from his comic became a viral meme:

When a work gets as big as this has, is it still yours? Not talking about copyright and legal stuff. It says something larger that everyone can feel and relate to.

[...]

I've been forced time and time again with these 6 panels, to be the party pooper, gate-keeper, girlboss, etc and just to get people to recognize there are artists behind these drawings online. These memes we share.

[...]

So I do what I can and try to keep in good humor and be thankful that I can still do what I do for a living.

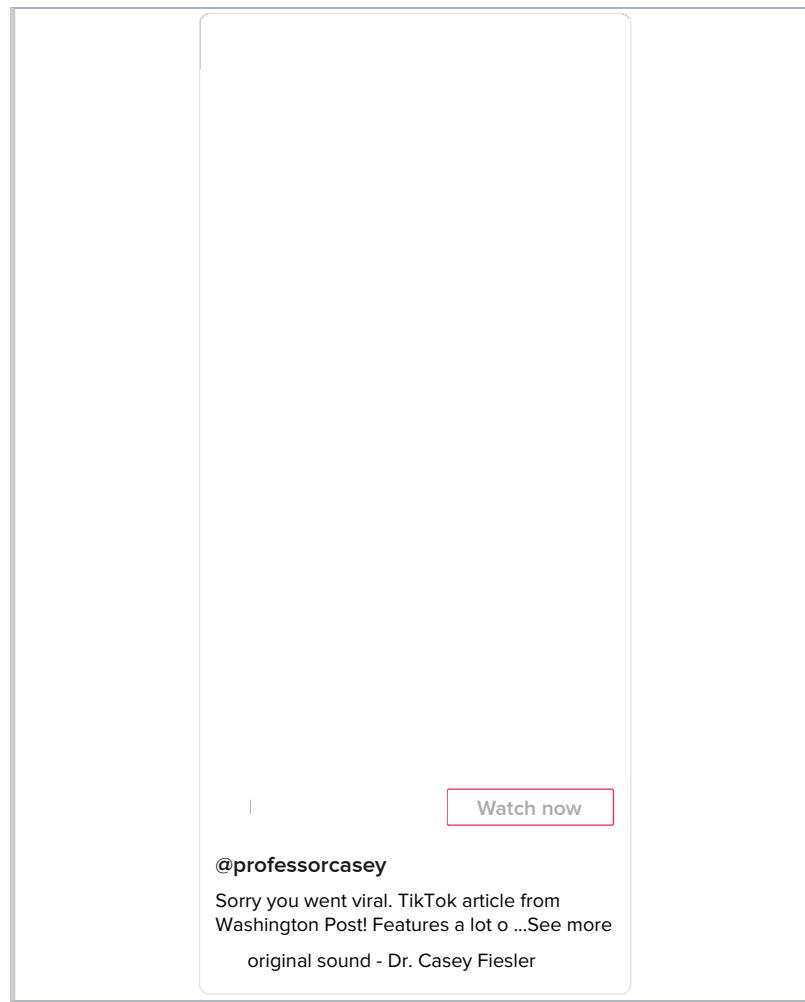
Given the community activities on social media of copying, remixing, cultural appropriate, and cultural exchange:

- How do you think attribution should work when copying and reusing content on social media (like if you post a meme or gif on social media)?
 - When is it ok to not cite sources for content?
 - When should sources be cited, and how should they be cited?
- How can you participate in cultural exchange without harmful cultural appropriation?

12.6. The Experience of Going Viral

While many people on social media post in hopes of getting attention and even going viral, those who have actually had their content go viral often have mixed feelings about it. For example, author Roxane Gay has said, "[Content going viral is overwhelming, intimidating, exciting, and downright scary.](#)"

The Washington Post wrote a series of articles on the experience of going viral, first [On TikTok, instant fame often comes with a price: Sleepless nights, shadowbans and viral cruelty](#), and then [Sorry, you went viral. TikTok's explosive stardom has created a new kind of celebrity. But nothing goes viral like rage.](#) Researcher Dr. Casey Fiesler was interviewed for these articles and talks more about it in this TikTok video:



<https://twitter.com/pixelatedboat/status/741904787361300481>

12.7. Activity: Value statements in what goes viral

12.7.1. Choose three scenarios

When content goes viral there may be many people with a stake in it's going viral, such as:

- The person (or people) whose content or actions are going viral, who might want attention, or get financial gain, or might be embarrassed or might get criticism or harassment, etc. Different people involved might have different interests. Some may not have awareness of it happening at all (like a video of an infant).
- Different audiences might have interests such as curiosity, or desire to bring justice to a situation, or desire to get attention for themselves or their ideas based on engaging the viral content, or desire to troll or harass others.
- Social networking platforms might have interests such as increases attention to their platform, or increased advertising, or increased or decreased reputation (in views of different audiences).

List at least three different scenarios of content going viral and list out the interests of different groups and people in the content going viral.

12.7.2. Create value statements

Social media platforms have some ability to influence what goes viral and how (e.g., recommendation algorithms, what actions are available, what data is displayed, etc.), though they only have partial control, since human interaction and organization also plays a large role. Still, regardless of whether we can force any particular outcome, we can still think of what you think would be best for what content should go viral, how much, and in what ways.

Create a set of values statements for when and how you ideally you would want content to go viral. Try to come up with at least 10 values statements. We encourage you to consider different ethics frameworks as you try to come up with ideas.

12.8. Reflections

- In what ways have you participated in helping content go viral?
- In what ways have you tried to make content go viral (or seen others do so)?
- In what ways have you experienced going viral?
- Would you like something you do or say to go viral?

12.9. Learn More

- [Your Least Favorite Gross Viral Food Videos Are All Connected to This Guy.](#)
- [An anthropological introduction to youtube](#)
- [On TikTok, instant fame often comes with a price: Sleepless nights, shadowbans and viral cruelty](#)
- [Sorry you went viral. TikTok's explosive stardom has created a new kind of celebrity. But nothing goes viral like rage.](#)

13. Mental Health

Now that we've looked at how information spreads through social media platforms, we'll start looking at the consequences of this and how to deal with those consequences. We'll start with mental health.

Note

This chapter is about mental health, so discusses many mental health problems, including self-harm.

13.1. Social Media Influence on Mental Health

In 2019 the company Facebook (now called Meta) presented an internal study that found that [Instagram was bad for the mental health of teenage girls](#), and yet they still allowed teenage girls to use Instagram.

So, what does social media do to the mental health of teenage girls, and to all its other users?

The answer is of course complicated and varies. Some have argued that [Facebook's own data is not as conclusive as you think about teens and mental health](#).

Many have anecdotal experience with their own mental health and those they talk to. For example cosmetic surgeons have seen how photo manipulation on social media has influenced people's views of their appearance:

People historically came to cosmetic surgeons with photos of celebrities whose features they hoped to emulate. Now, they're coming with edited selfies. They want to bring to life the version of themselves that they curate through apps like FaceTune and Snapchat.

- [Selfies, Filters, and Snapchat Dysmorphia: How Photo-Editing Harms Body Image](#)

Comedian and director Bo Burnham has his own observations about how social media is influencing mental health:

"If [social media] was just bad, I'd just tell all the kids to throw their phone in the ocean, and it'd be really easy. The problem is it - we are hyper-connected, and we're lonely. We're overstimulated, and we're numb. We're expressing our self, and we're objectifying ourselves. So I think it just sort of widens and deepens the experiences of what kids are going through.

But in regards to social anxiety, social anxiety - there's a part of social anxiety I think that feels like you're a little bit disassociated from yourself. And it's sort of like you're in a situation, but you're also floating above yourself, watching yourself in that situation, judging it. And social media literally is that. You know, it forces kids to not just live their experience but be nostalgic for their experience while they're living it, watch people watch them, watch people watch them watch them.

My sort of impulse is like when the 13 year olds of today grow up to be social scientists, I'll be very curious to hear what they have to say about it. But until then, it just feels like we just need to gather the data."

- [Director Bo Burnham On Growing Up With Anxiety—And An Audience](#) -

NPR Fresh Air (10:15-11:20)

It can be difficult to measure the effects of social media on mental health since there are so many types of social media, and it permeates our cultures even of people who don't use it directly.

Some researchers have found that [people using social media may enter a dissociation state](#), where they lose track of time (like what happens when someone is reading a good book).

Researchers at Facebook decided to try to measure how their recommendation algorithm was influencing people's mental health. So they changed their recommendation algorithm to show some people more negative posts and some people more positive posts. They found that people who were given more negative posts tended to post more negatively themselves. Now, this while experiment was done without informing users that they were part of an experiment, and [when people found out that they might be part of a secret mood manipulation experiment, they were upset](#).

13.1.1. Digital Detox?

Some people view internet-based social media (and other online activities) as inherently toxic, and thus encourage a [digital detox](#), where people take some form of a break from social media platforms and digital devices.

While taking a break from parts or all of social media can be good for someone's mental health (e.g., doomscrolling is making them feel more anxious, or they are currently getting harassed online), viewing internet-based social media as inherently toxic and trying to return to an idyllic time from before the Internet is not realistic or honest view of the matter.

In her essay "[The Great Offline](#)," Lauren Collee argues that this is just a repeat of earlier views of city-living and the "wilderness." As white Americans were colonizing the American continent, they began idealized "wilderness" as being uninhabited land (either ignoring the Indigenous people who already lived there, or kicking them out).

In the 19th century, as wilderness tourism was taking off as an industry, natural landscapes were figured as an antidote to the social pressures of urban living, offering truth in place of artifice, interiority in place of exteriority, solitude in place of small talk.

Similarly, advocates for digital detox build an idealized "offline" separate from the complications of modern life:

Sherry Turkle, author of *Alone Together*, characterizes the offline world as a physical place, a kind of Edenic paradise. "Not too long ago," she writes, "people walked with their heads up, looking at the water, the sky, the sand" — now, "they often walk with their heads down, typing."

[...]

Gone are the happy days when families would gather around a weekly televised program like our ancestors around the campfire!

But Lauren Collee argues that by placing the blame on the use of technology itself, and making not using technology (a digital detox) the solution, we lose our ability to deal with the nuances of how we use technology and how it is designed:

I'm no stranger to apps that help me curb my screen time, and I'll admit I've often felt better for using them. But on a more communal level, I suspect that cultures of digital detox — in suggesting that the online world is inherently corrupting and cannot be improved — discourage us from seeking alternative models for what the internet could look like. I don't want to be trapped in cycles of connection and disconnection, deleting my social media profiles for weeks at a time, feeling calmer but isolated, re-downloading them, feeling worse but connected again. For as long as we keep dumping our hopes into the conceptual pit of "the offline world," those hopes will cease to exist as forces that might generate change in the worlds we *actually* live in together.

So in this chapter, we will not consider internet-based social media as inherently toxic or beneficial for mental health. We will be looking for more nuance and where things go well, where they do not, and why.

13.2. Unhealthy Activities on Social Media

Given the complex relationship between internet-based social media and mental health, let's first look at some social media activities that people may find harmful to their mental health. Here are a few examples:

13.2.1. Doomscrolling

Doomscrolling is:

"Tendency to continue to surf or scroll through bad news, even though that news is saddening, disheartening, or depressing. Many people are finding themselves reading continuously bad news about COVID-19 without the ability to stop or step back."

- [Merriam-Webster Dictionary](#)



Ethan Jacobs 
@ethanjacobs_law

...

OK doomscrolling is bad but have you SEEN the quality of the doom this week?

10:47 PM · Jan 7, 2021 · Twitter Web App

28.2K Retweets 1,022 Quote Tweets 264.3K Likes

Fig. 13.1 [Tweet on doomscrolling](#) the day after insurrectionists stormed the US Capital (while still in the middle of the COVID pandemic).

The seeking out of bad news, or trying to get news even though it might be bad, has existed as long as people have kept watch to see if a family member will return home safely. But of course new mediums can provide more information to sift through and more quickly, such as

with the advent of the [24-hour news cycle](#) in the 1990s, or, now social media.

13.2.2. Trauma Dumping

While there are healthy ways of sharing difficult emotions and experiences (see the next section), when these difficult emotions and experiences are thrown at unsuspecting and unwilling audiences, that is called [trauma dumping](#). Social media can make trauma dumping easier. For example, with parasocial relationships, you might feel like the celebrity is your friend who wants to hear your trauma. And with context collapse, where audiences are combined, how would you share your trauma with an appropriate audience and not an inappropriate one (e.g., if you re-post something and talk about how it reminds you of your trauma, are you dumping it on the original poster?).

Trauma dumping can be bad for the mental health of those who have this trauma unexpectedly thrown at them, and it also often isn't helpful for the person doing the trauma dumping either:

Venting, by contrast, is a healthy form of expressing negative emotion, such as anger and frustration, in order to move past it and find solutions. Venting is done with the permission of the listener and is a one-shot deal, not a recurring retelling or rumination of negativity. A good vent allows the venter to get a new perspective and relieve pent-up stress and emotion.

While there are benefits to venting, there are no benefits to trauma dumping. In trauma dumping, the person oversharing doesn't take responsibility or show self-reflection. Trauma dumping is delivered on the unsuspecting. The purpose is to generate sympathy and attention not to process negative emotion. The dumper doesn't want to overcome their trauma; if they did, they would be deprived of the ability to trauma dump.

- [How to Overcome Social Media Trauma Dumping](#)

13.2.3. Munchausen by Internet

Munchausen Syndrome (or [Factitious disorder imposed on self](#)) is when someone pretends to have a disease, like cancer, to get sympathy or attention. People with various illnesses often find support online, and even form online communities. It is often easier to fake an illness for an online community than in an in-person community, so [many have done so](#) (like the fake professor @Sciencing_Bi in the authenticity chapter). People who fake these illnesses often do so as a result of their own mental illness, so, in fact, "[they are sick, albeit it in a very different way than claimed](#)."

13.2.4. Digital Self-Harm

Sometimes people will harm their bodies (called "[self-harm](#)") as a way of expressing or trying to deal with negative emotions or situations.

Self-harm doesn't always have to be physical though, and some people find ways of causing emotional self-harm through the internet.

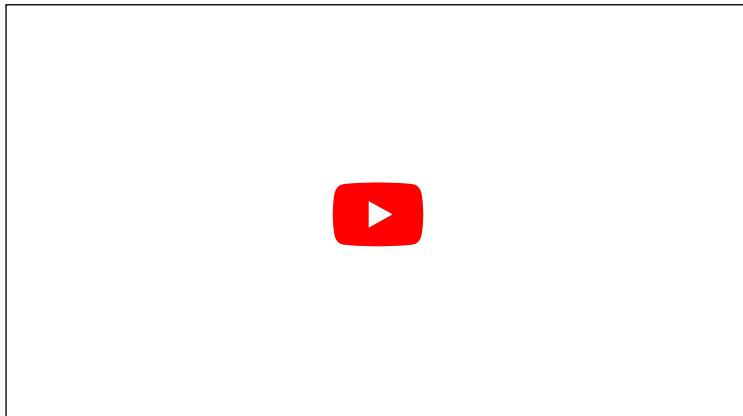
Self-Bullying

One form of digital self-harm is through [self-bullying](#), where people set up fake alternate accounts which they then use to post bullying messages at themselves.

Negative Communities

Another form of digital self-harm is through joining toxic negative communities built around tearing each other down and reinforcing a hopeless worldview. (Content warning: sex and self-harm)

In 2018, Youtuber [ContraPoints](#) (Natalie Wynn) made a video exploring the extremely toxic online Incel community, and related it to her own experience with a toxic 4chan community.
(Content warning: Sex, self-hatred, and self-harm)



Note: The video might not embed right, and if you want to watch it, you might have to click to open it in youtube.

Since you might not want to watch a 35 minute video, here are a few key points and quotes:

“[Incel](#)” is short for “involuntarily celibate,” meaning they are men who have centered their identity on wanting to have sex with women, but with no women “giving” them sex. Incels objectify women and sex, claiming they have a right to have women want to have sex with them. Incels believe they are being unfairly denied this sex because of the few sexually attractive men (“[Chads](#)”), and because feminism told women they could refuse to have sex. Some incels believe their biology (e.g., skull shape) means no women will “give” them sex. They will be forever alone, without sex, and unhappy. The incel community has produced [multiple mass murderers / terrorists attacks](#).

In the video, ContraPoints says that in some forums, incels will post pictures of themselves, knowing and expecting that the community will proceed to criticize everything about their appearance and reinforce hopelessness:

The truth about incels is that almost all of them are completely normal looking guys. But of course that's not the feedback they get from other incels. The feedback they get is that their chins are weak, their hair is thin, their skin is garbage and there's no hope whatsoever, no woman will ever love them, they are truecels with no option but to lie down and rot.

ContraPoints then relates this to her experience with a 4chan message board that, unlike other in other online trans communities, consisted of trans women tearing down each others appearances, saying that no one would ever see them as a woman (they would never “pass” as a woman), and saying that no trans woman could ever pass. As a somewhat public trans woman, the community often posted about her:

For a while I had some stans on the board who basically viewed me as inspiration [...] of course that kind of post is frowned upon.

If I'm not looked at as a big-skulled manly freak, if my transition is going well, that means that some of their transitions might go well too, and that is an unacceptable conclusion for a community founded on self-loathing and hopelessness.

So it was necessary for the rest of the board to explain why I didn't pass, why I would never pass, and why anyone who looked less good than me shouldn't even fucking think about it. They shouldn't transition at all, they should just repress, they should lie down and rot.

ContraPoints says she regularly searched these forums to see what terrible things people said about her:

And there would be this thrill of going to TTTT and reading other people saying what my deepest anxieties told me was really true. And that was always painful but there was a kind of pleasure too. There was a rush.

It's exciting to burst out of the politically correct bubble and say what you're really thinking: that personality doesn't matter because big-skulled Chads get all the girls, that ContraPoints is a big-skulled hon with a voice like nails on a chalkboard.

And at first I justified the habit by telling myself I was just doing research. I have to keep tabs on what the bigots are saying, that's simply my job. But soon I realized it wasn't just research, and it was infecting me away from the computer.

She then describes this as a form of digital self-harm, calling it "**masochistic epistemology**: whatever hurts is true" (note: "masochistic" means seeking pain, and "epistemology" means how you determine what is true):

ContraPoints then gives her advice to these incels who have turned inward with self-hatred and digital self-harm:

So, incels. I'm not going to respond to your worldview like it's an intellectual position worthy of rational debate. Because these ideas and arguments, you're not using them the way rational people use arguments. You're using them as razor blades to abuse yourselves.

And I know because I've done the exact same thing.

The incel worldview is catastrophizing. It's an anxious death spiral. And the solution to that has to be therapeutic, not logical.

Note

If you are suffering from mental health problems (as both authors of this book have), please seek help, whether from friends, counselors, or [mental health crisis hotlines](#) such as the [new 988 hotline](#).

13.3. Healthy Activities on Social Media

Now let's look at some of the more healthy sides of social media use.

First let's consider that, while social media use is often talked as "addiction" or "junk food," there might be [better ways to think about social media use](#), as a place that you might enjoy, connect with others, learn new things, and express yourself.

One of the ways social media can be beneficial to mental health is in finding community (at least if it is a healthy one, and not toxic like in the last section). For example, if you are bullied at school (and by classmates on some social media platform), you might find a different online community online that supports you.

So you might find a safe space online to explore part of yourself that isn't safe in public (e.g., [Trans Twitter and the beauty of online anonymity](#)). Or you might find [places to share or learn about mental health](#) (in fact, from seeing social media posts, Kyle realized that ADHD was causing many more problems his life than just having trouble sitting still, and he sought diagnosis and treatment). There are also support groups for various issues people might be struggling with, like [ADHD](#) or having been [raised by narcissistic parents](#).

13.4. Mental Health Detection

Since social media platforms are able to gather so much data on their users, they can try to use data mining to figure out information about their users' moods, mental health problems, or neurotypes (e.g., ADHD, Autism).

For example, Facebook has a suicide detection algorithm, where they try to intervene if they think a user is suicidal ([Inside Facebook's suicide algorithm: Here's how the company uses artificial intelligence to predict your mental state from your posts](#)). As social media companies have tried to detect talk of suicide and sometimes remove content that mentions it, users have found ways of getting around this by inventing new word uses, like "[unalive](#)".

Larger efforts at trying to determine emotions or mental health through things like social media use, or [iPhone or iWatch use](#), have had very questionable results, and [any claims of being able to detect emotions reliably are probably false](#).

Additionally, these detection of mental health can be part of violating privacy, or used for unethical surveillance, such as:

- your [employer might detect that you are unhappy](#), and considering firing you since they think you might not be fully committed to the job
- someone might build a system which tries to detect who is Autistic, and then force them into an [abusive therapy system to try and "cure" them of their Autism](#) (see also [this more scientific explanation of that linked article](#))

13.5. Demo: Only positive news

Let's look at something we could try to do to improve the mental health for our users: Only show positive news!

We'll use sentiment analysis again, but this time we'll get posts from the news subreddit, but only display the tweets with a positive sentiment.

Would this actually improve someone's mental health? It's hard to say! But we can see something that we might try out if we wanted to improve mental health of our users.

13.5.1. Normal Reddit PRAW Setup

```
import praw
```

(optional) make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it won't actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa#@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script")
```

Fake praw is pretending to collect account info to use on reddit

13.5.2. Load sentiment analysis code

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\kmthayer\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

13.5.3. Code to search and display news

Now let's make code that will get submissions from the news subreddit (or from a fake_news_site), and display all of them. We will then make a modified version below to compare the results.

```
# Look up the subreddit "news", then find the "hot" list, getting up to 10
# submission
submissions = reddit.subreddit("news").hot(limit=10)

# Turn the submission results into a Python List
submissions_list = list(submissions)

# go through each reddit submission
for submission in submissions_list:
    print(submission.title)
    print()
```

Fake praw is pretending to select the subreddit: news

```
-----  
AttributeError                                Traceback (most recent call last)  
Input In [6], in <cell line: 2>()  
      1 # Look up the subreddit "news", then find the "hot" list, getting up to 10  
      2 submission  
----> 3 submissions = reddit.subreddit("news").hot(limit=10)  
      4 # Turn the submission results into a Python List  
      5 submissions_list = list(submissions)  
  
AttributeError: 'NoneType' object has no attribute 'hot'
```

13.5.4. Search through news submissions and only display good news

Now we will make a different version of the code that computes the sentiment of each submission title and only displays the ones with positive sentiment.

```
# Look up the subreddit "news", then find the "hot" list, getting up to 10
# submission
submissions = reddit.subreddit("news").hot(limit=10)

# Turn the submission results into a Python List
submissions_list = list(submissions)

# go through each reddit submission
for submission in submissions_list:

    #calculate sentiment
    title_sentiment = sia.polarity_scores(submission.title)["compound"]

    if(title_sentiment > 0):
        print(submission.title)
        print()
```

Fake praw is pretending to select the subreddit: news

```
Breaking news: A lovely cat took a nice long nap today!
```

```
Breaking news: Some grandparents made some yummy cookies for all the kids to share!
```

13.5.5. Try it out on real Reddit

If you want, you can skip the fake_praw step and try it out on real Reddit, from whatever subreddit you want

Did it work like you expected?

You can also only show negative sentiment submissions ($\text{sentiment} < 0$) if you want to see only bad news.

13.6. Design Analysis: Mental Health

We want to provide you, the reader, a chance to explore mental health more. We want you to be considering potential benefits and harms to the mental health of different people (benefits like reducing stress, feeling part of a community, finding purpose, etc. and harms like unnecessary anxiety or depression, opportunities and encouragement of self-bullying, etc.).

As you do this you might consider personality differences (such as introverts and extroverts), and [neurodiversity](#), the ways people's brains work and process information differently (e.g., ADHD, Autism, Dyslexia, Face blindness, depression, anxiety). But be careful generalizing about different neurotypes (such as [Autism](#)), especially if you don't know them well. Instead try to focus on specific traits (that may or may not be part of a specific group) and the impacts on them (e.g., someone easily distracted by motion might..., or someone sensitive to loud sounds might..., or someone already feeling anxious might...).

We will be doing a modified version of the five step [CIDER method](#) (Critique, Imagine, Design, Expand, Repeat).

While the CIDER method normally assumes that making a tool accessible to more people is morally good, if that tool is potentially harmful to people (e.g., give people unnecessary anxiety), then making the tool accessible to more people might be morally bad. So instead of just looking at the assumptions made about people and groups using a social media site, we will be also looking at potential harms to different people and groups using a social media site.

So open a social media site on your device. Then do the following (preferably on paper or in a blank computer document):

13.6.1. Harms

Critique (3-5 minutes, by yourself):

How might the mental health of different people or groups be harmed by this social media site? List as many as you can think of (bullet points encouraged).

Imagine (2-3 minutes, by yourself):

Select one of the above harms that you think is important to address. Then write a 1-2 sentence scenario where a user faces difficulties because of the harm you selected. This represents one way the design could harm certain users.

Design (3-5 minutes, by yourself):

Brainstorm ways to change the site or your device to avoid the scenario you wrote above. List as many different kinds of potential solutions you can think of – aim for ten or more (bullet points encouraged).

Expand (5-10 minutes, with others):

Combine your list of critiques with someone else's (or if possible, have a whole class combine theirs).

Repeat the Imagine and Design Tasks:

Select another harm from the list above that you think is important to address. Make sure to choose a different harm than you used before. Choose one that you didn't come up with yourself, if possible. Repeat the Imagine and Design steps.

13.6.2. Benefits

Critique (3-5 minutes, by yourself):

How might the mental health of different people or groups be benefited by this social media site? List as many as you can think of (bullet points encouraged).

Imagine (2-3 minutes, by yourself):

Select one of the above benefits that you think is important to consider. Then write a 1-2 sentence scenario where a user gets these benefits.

Design (3-5 minutes, by yourself):

Brainstorm ways to change the site or your device to make the scenario more beneficial to that person or group, or beneficial to even more people. List as many different kinds of potential changes you can think of – aim for ten or more (bullet points encouraged).

Expand (5-10 minutes, with others):

Combine your list of benefits with someone else's (or if possible, have a whole class combine theirs).

Repeat the Imagine and Design Tasks:

Select another benefit from the list above that you think is important to address. Make sure to choose a different benefit than you used before. Choose one that you didn't come up with yourself, if possible. Repeat the Imagine and Design steps.

13.7. Reflection questions on mental health

- In what ways have you found social media bad for your mental health and good for your mental health?
- What responsibility do you think social media platforms have for the mental health of their users?
- Are there ways social media sites can be designed to be better for the mental health of its users?
- What are the ways social media companies monitoring of mental health could be beneficial or harmful?

13.8. Learn more

- [Social Media Has Become A Place To Talk About Mental Illness. But Is That Helpful?](#)
- [When Teens Cyberbully Themselves](#)
- [Everything We Know About Facebook's Secret Mood-Manipulation Experiment](#)

14. Content Moderation

Let's now look at content moderation, which is in some ways the opposite of recommendation algorithms. While recommendation algorithms push content to the view of users, in content moderation, content is banned, deleted, or hidden.

14.1. What Content Gets Moderated

Social media platforms moderate (that is ban, delete, or hide) different kinds of content. There are a number of categories that they might ban things:

14.1.1. Quality Control

In order to make social media sites usable and interesting to users, they may ban different types of content such as advertisements, disinformation, or off topic posts. Almost all social media sites (even the ones that claim "free speech") block [spam](#), mass produced unsolicited messages, generally advertisement, scams, or trolling.

Without quality control moderation, the social media site will likely fill up with content that the target users of the site don't want, and those users will leave. What content is considered "quality" content will vary by site, with 4chan considering a lot of offensive and trolling content to be "quality" but still banning spam (because it would make the site repetitive in a boring way), while most sites would ban some offensive content.

14.1.2. Legal Concerns

Social media sites also might run into legal concerns with allowing some content to be left up on their sites, such as copyrighted material (like movie clips) or child pornography.

So most social media sites will often have rules about content moderation, and at least put on the appearance of trying to stop illegal content (though a few will try to move to countries that won't get them in trouble, like 8kun is now hosted in Russia).

With copyrighted content, the platform YouTube is very aggressive in allowing movie studios to get videos taken down, so [many content creators on YouTube have had their videos taken down erroneously](#).

14.1.3. Safety

Another concern is for the safety of the users on the social media platform (or at least the users that the platform cares about). Users who don't feel safe will leave the platform, so social media companies are incentivized to help their users feel safe. So this often means moderation to stop trolling and harassment.

14.1.4. Potentially Offensive

Another category is content that users or advertisers might find offensive. If users see things that offend them too often, they might leave the site, and if advertisers see their ads next to too much offensive content, they might stop paying for ads on the site. So platforms might put limits on language (e.g., racial slurs), violence, sex, and nudity. Sometimes different users or advertisers have different opinions on what should be allowed or not. For example, "[The porn ban of 2018 was a defining event for Tumblr that led to a 30 percent drop in traffic and a mass exodus of users that blindsided the company](#)."

14.2. Moderation Tools

We've looked at what type of content is moderated, now let's look at how it is moderated. Sometimes individuals are given very little control over content moderation or defense from the platform, and then the only advice that is useful is: "don't read the comments." But some have argued that this shifts responsibility onto the individual users getting negative comments, when [the responsibility should be on the people in charge of creating the platform](#).

So let's look at the type of content moderation controls that might be given to individuals, and might be used by platforms.

14.2.1. Individual User Controls

Individual users are often given a set of moderation tools they can use themselves, such as:

- **Block an account:** a user can block an account from interacting with them or seeing their content
- **Mute an account:** a user can allow an account to try interacting with them, but the user will never see what that account did.

- **Mute a phrase or topic:** some platforms let users block content by phrases or topics (e.g., they are tired of hearing about cryptocurrencies, or they don't want spoilers for the latest TV show).
- **Delete:** Some social media platforms let users delete content that was directed at them (e.g., replies to their post, posts on their wall, etc.)
- **Report:** Most social media sites allow users to report or flag content as needing moderation.

And there are other options and nuances as well, depending on the platform.

Jonathan McIntosh (@radicalbytes)

Better yet you can hold all comments for review before being made public unless a user is pre-approved.

Hank Green (@hankgreen) · Dec 31, 2021
It is so so so nice that you can just delete comments on YouTube videos. A video's comment section feels like it is owned by a creator in a way that the replies to a tweet do not. Weird how everything kinda operates on vibe.

3:50 PM · Dec 31, 2021 · TweetDeck

31 Likes

Fig. 14.1 Two YouTubers Tweeting about YouTube's comment moderation options vs. Twitter.

14.2.2. Platform Controls

Social media platforms themselves have their own options for how they can moderate comments, such as:

- **Delete:** Platforms can delete posts or comments.
- **Suspend:** Platforms can temporarily lock a user out until, for a set amount of time, or until they agree to delete some content and behave differently
- **Ban:** Platforms can permanently ban users, and also try to ban users coming from certain internet connections
- **Auto-detect:** Platforms can also use computer programs to automatically detect potential violations of content to automatically block, or flag for follow-up.

14.3. Comparing Different Platforms

Let's now look at how some different platforms have handled content moderation:

14.3.1. 4chan/8chan (minimal moderation)

Sites like 4chan and 8chan bill themselves as sites that support free-speech, in the sense that they don't ban trolling and hateful speech, though they may remove some illegal content, like child pornography.

One thing these sites do ban though, is spam. While much of spam is certainly legal, and a form of speech, this speech is restricted on these sites. If the chat boards filled up with spam, the users would find it boring and leave, so for practical reasons, these sites still moderate for spam (though they may allow some uses of ironic spam, [copy/pasta](#)).

14.3.2. Reddit (subreddits with volunteer moderators)

Reddit is composed of many smaller discussion boards, called subreddits. These subreddits range from friendly to very toxic, with different moderators in charge of each subreddit.

Reddit as a larger platform decided to ban and remove some of its most toxic and hateful subreddits, including r/c***town (note: I censored out a racial slur for Black people), and r/fatpeoplehate. In [a study of what happened after this ban](#):

Post-ban, hate speech by the same users was reduced by as much as 80-90 percent.

[...]

"Members of banned communities left Reddit at significantly higher rates than control groups.

[...]

Migration was common, both to similar subreddits (i.e. overtly racist ones) and tangentially related ones (r/The_Donald).

[...]

However, within those communities, hate speech did not reliably increase, although there were slight bumps as the invaders encountered and tested new rules and moderators.

14.3.3. Facebook (hired moderators)

Facebook uses hired moderators to handle content moderation on the platform at large (though Facebook groups are moderated by users). When users (or computer programs) flag content, the hired moderators will look at it and decide what to do.

Facebook also discovered in internal research that, "[the more likely a post is to violate Facebook's community standards, the more user engagement it receives, because the algorithms that maximize engagement reward inflammatory content.](#)"

14.3.4. Removing the option of feedback

For a period of time, most news organizations allowed comments on their articles, but around 2013 many of these sites [simply removed the possibility of leaving comments](#), as they felt allowing comments did more harm than good.

14.3.5. Public Figure Exception

Twitter, Facebook, and other platforms had an [exception to their normal moderation policies for political leaders](#), where they wouldn't ban them even if they violated site policies (most notably applied to Donald Trump). After the January 6th insurrection at the US Capitol, Donald Trump was banned first from Twitter, then from Facebook, and [Facebook announced an end special treatment for politicians](#).

14.4. Government Censorship

Governments might also have rules about content moderation and censorship, such as laws in the US against Child Sexual Abuse Material (CSAM). China additionally censors various news stories in their country, like stories about protests. In addition to banning news on their platforms, in late 2022 China took advantage of Elon Musk having fired almost all Twitter content moderators to hide news of protests by [flooding Twitter with spam and porn](#).

14.5. Moderation and Ethics

In the contexts of social media and public debate, moderation has a meaning that is about creating limits and boundaries about what is posted to keep things working well. But this meaning of "moderation" grew out of a wider, more generic concept of moderation. You might remember seeing moderation coming up in lists of virtues in virtue ethics, back in Chapter 2. So what does moderation (the social practice of limiting what is posted) have to do with moderation (the abstract ethical quality)?

14.5.1. Origin Story for Moderation

One concept that comes up in a lot of different ethical frameworks is *moderation*. Famously, Confucian thinkers prized moderation as a sound principle for living, or as a virtue, and taught the value of the ‘golden mean’, or finding a balanced, moderate state between extremes. This golden mean idea got picked up by Aristotle—we might even say ripped off by Aristotle—as he framed each virtue as a medial state between two extremes. You could be cowardly at one extreme, or brash and reckless at the other; in the golden middle is courage. You could be miserly and penny-pinching, or you could be a reckless spender, but the aim is to find a healthy balance between those two. Moderation, or being moderate, is something that is valued in many ethical frameworks, not because it comes naturally to us, *per se*, but because it is an important part of how we form groups and come to trust each other for our shared survival and flourishing.

Moderation also comes up in deontological theories, including the political philosophy tradition that grew out of Kantian rationalism: the tradition that is often identified with John Rawls, although there are many other variations out there too. In brief, here is the journey of the idea:

- Kant was influenced by ideas that were trending in his time—the European era we call the “Enlightenment”, which became very interested in the idea of rationality. We could write books about what they meant by the idea of “rationality”, and Kant certainly did so, but you probably already have a decent idea of what rationality is about. Rationalism tries to use reasoning, logical argument, and scientific evidence to figure out what to make of the world. Kant took this idea and ran with it, exploring the question of what if *everything*, even morality, could be derived from looking at rationality in the abstract.
- Many philosophers and, let’s face it, many sensible people since Kant have questioned whether his project could succeed, or whether his question was even a good question to be asking. Can one person really get that kind of “god’s-eye view” of ultimate rationality? People disagree a lot about what would be the most rational way to live.
- Some philosophers even suggested that it is hard to think about what is rational or reasonable without our take being skewed by our own aims and egos. We instinctively take whatever suits our own goals and frame it in the shape of reasons. Those who do not want their wealth taxed have reasons in the shape of rational arguments for why they should not be taxed. Those who do believe wealth should be taxed have reasons in the shape of rational arguments for why taxes should be imposed. Our motivations can massively effect which of those *rationales* we find to be most rational. This is what John Rawls wanted to address.

14.5.2. Rawls and Contractualism

Rawls proposed a famous thought experiment. Imagine we were going to redesign America. A huge lottery was done to gather people from all walks of life into a committee to decide how the society should be structured and how it should function. Naturally, they will all have their own interests in mind, so Rawls proposed that they all be hidden behind a “veil of ignorance”, making it so that while they are on the committee, the people have no idea who they are, or what sort of life they will have once the new design is implemented. (The veil of ignorance is not a real thing, and it is extremely unclear how such an obscuring could be accomplished, although science fiction writers have had fun trying to imagine it.)

Rawls’s thought was that if you don’t know whether you will be in one of society’s more powerful roles or more disadvantaged roles, then you will have a motivation to make sure you will be okay, *whatever role you get in the end*. Therefore, the committee members would design a just and fair society, so that they would be okay no matter where they end up. The design the committee agrees to forms the basis of a new “social contract”, or agreement about how society works.

Theoretically, a social contract would guide us in how to live safely and fairly with each other, although injustice in the social contract means that these benefits are not always achieved. By "agreeing" to a social contract, we agree to let that contract moderate our natural rights as individual moral and rational agents. Natural Rights theory says no one should restrict my freedoms. Social Contract theory says that we use our freedom to accept certain restrictions, in order to make life better for all of us.

Rawlsian thought is usually classified as a form of Contractualism: although Rawls imagined the contractual agreement process as happening formally and explicitly, we can describe any society in a state of functioning equilibrium as operating on an implicit "social contract". The social contract that guides a society can show up in informal guidelines (like customs, manners, and habits) and formal guidelines (like laws and regulations, such as we have for things like driving on roads, or for taxes). Those guidelines tell us how to function within the society.

Of course, a social contract involves more than just the formal, explicit parts. There are tacit and informal parts too, and that is where we find a lot of nuance. [The United States' Congress is not allowed to pass laws inhibiting your freedom of speech](#), but if you come over to my house and use your freedom in ways that I don't care for, I can ask you to stop, or kick you out of my house. The existence of private property and private domains within that broader social contract means that we have the right to moderate spaces which belong to us. Like we saw with trolling, in Chapter 7, there are many ways that people can enforce patterns, habits, and norms, even without resorting to legal means.

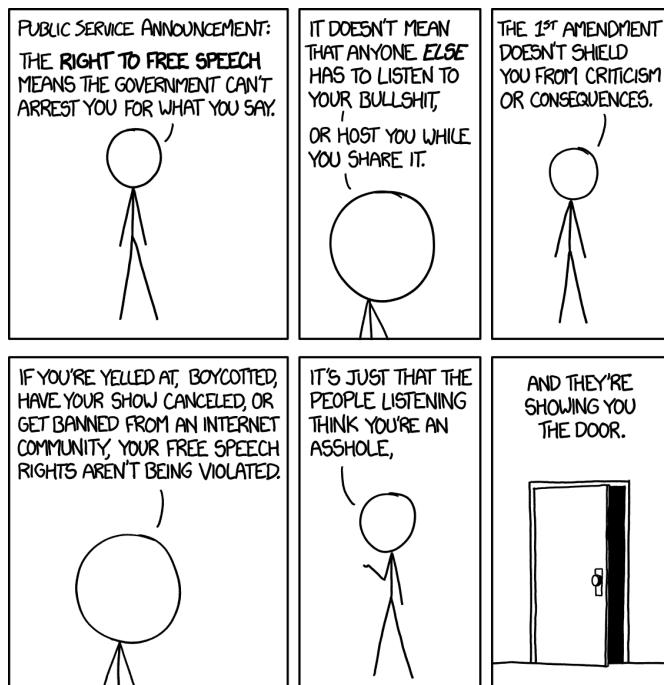


Fig. 14.2 An [xkcd webcomic](#) expressing an a view of free speech as related to the [US Constitutions' 1st amendment](#)

Because social media spaces involve a complicated interplay of privacy and publicity, they raise really complicated questions about what kinds of moderation are or should be legitimated by social contracts (either explicitly, by being spelled out in the Terms of Service, or implicitly, via downvoting, muting, or blocking), and what kinds of moderation are illegitimate obstructions to the rights of the individual to exercise free speech.

14.5.3. Charles W. Mills and The Racialized Contract

Some philosophers, like Charles W. Mills, have pointed out that social contracts tend to be shaped by those in power, and agreed to by those in power, but they only work when a less powerful group is taken advantage of to support the power base of the contract deciders.

This is a rough way of describing the idea behind Mills's famous book, *The Racial Contract*. Mills said that the "we" of American society was actually a subgroup, a "we" within the broader community, and that the "we" of American society which agrees to the implicit social contract is a racialized "we". That is, the contract is devised by and for, and agreed to by, white people, and it is rational—that is, it makes sense and it works—only because it assumes the subjugation and the exploitation of people of color. Mills argued that a truly just society would need to include ALL subgroups in devising and agreeing to the imagined social contract, instead of some subgroups using their rights and freedoms as a way to impose extra moderation on the rights and freedoms of other groups.

Reflection questions:

- What people are in charge of different social media sites and the content moderation rules? How does this affect the rules that are made?
- How might content moderation rules be different if all racial groups had power to set the rules?

14.5.4. Relational Ethics Frameworks

You might be thinking here, what about all those other frameworks that didn't focus so much on the individual, because they see the individual as inherently tied to and constituted by the social community? How do we determine what forms of moderation are legitimate or illegitimate if we begin from a place less obsessed with individual freedoms, and more attentive to the underlying elements of interconnectedness and care that we see forming the baseline for moral frameworks, like we see in the Ubuntu principle of some African Philosophies or in the care-based ecological ethics of many American Indigenous Philosophies?

- Look at the Relational Ethics frameworks in chapter 2, and using those different frameworks:
 - What would be considered bad actions that need to be moderated?
 - What would be the goals of doing content moderation?
 - How might this look different than current content moderation systems?

14.6. Activity and Reflections on Moderation

14.6.1. Activity: Try reporting a comment

Go to a social media site and try to find spam or some other disallowed comment and report it.

YouTube comments can be a place to find these, particularly replies to comments. It's hard to know where the spammers are currently getting away with spam, but you might try the latest honest trailer from [ScreenJunkies](#), sort comments by "newest first" and then look for replies and see if any are spam. If you find one, try reporting it.

- What did you think of the options you were given for reporting spam?

14.6.2. Reflection Questions

- Have you ever reported a post/comment for violating social media platform rules?
- Have you ever faced consequences for breaking social media rules (or for being accused of it)?
- In unmoderated online spaces who has the most power and ability to speak and be heard? Who has the least power and ability to speak and be heard?

14.7. Viewing Tweets and Replies

In order to explore automated content moderation, we are going to now look at how we can view a tweet and its replies (and replies to those replies, etc.). Once we have a way of displaying these tweets, then we can add a rules to show or hide specific tweets.

As a first step, we need to look at how tweets and replies are saved in a data structures called a "trees."

14.7.1. Tree Structures

Let's look at an example of a comment with replies, and replies to those replies, etc. (this could be on twitter or any other social media system):

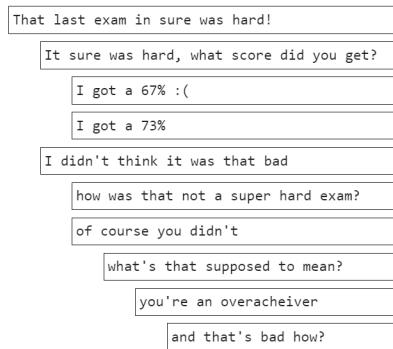


Fig. 14.3 A comment with replies.

Seeing comments and replies like this is hopefully familiar to you.

Let's look at this organized in a different organization, which is called a "tree" structure in programming and in math:

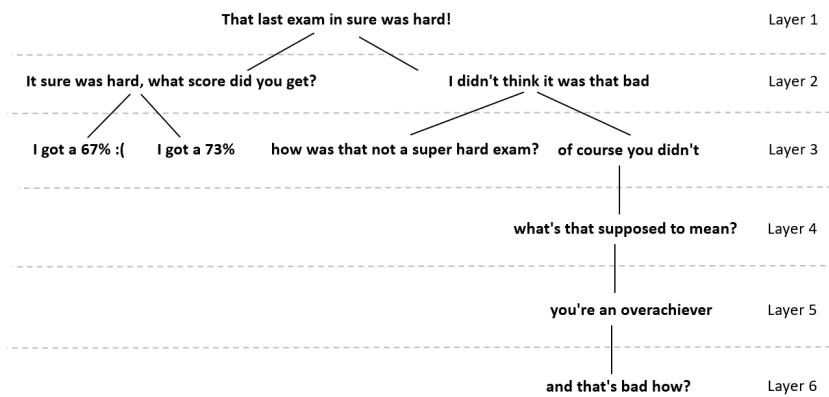


Fig. 14.4 A "tree" of tweets and replies and replies to those.

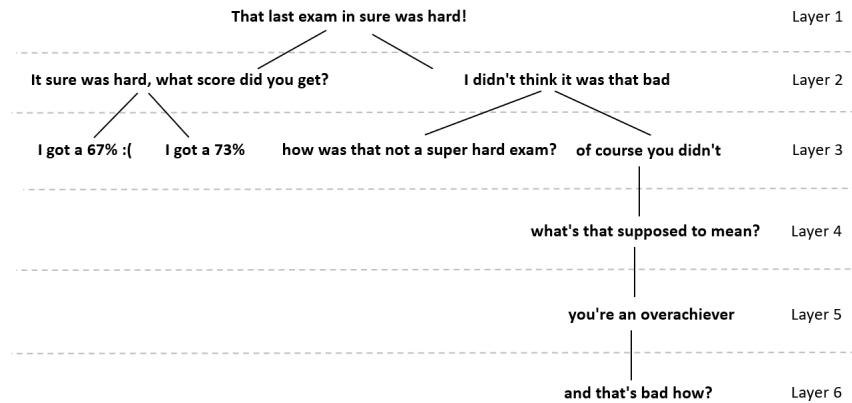
In the "tree" structure, each comment or reply is called a "node," with the initial comment being the "root node." Each of these nodes has lines showing which nodes are replies (in math terminology the replies are "children").

So given this tree structure, how do we represent it in code, and how do we navigate it?

14.7.2. Demo: Navigating Trees (recursion)

Structure of Comments & Replies

Let's look at our example from before of comments and replies:



When we want to represent Trees (like comments and replies) in code, one way of doing so is by using dictionaries.

Our initial tweet will be a dictionary with `text` (the comment text), and `replies` (a list of dictionaries).

Each of those replies will in turn be a dictioary with `text` (the reply text), and `replies` to that reply (a list of dictionaries).

And so on.

Below is code to store that in a variable (though it looks kind of messy):

```
comment_about_exam = {  
    'text': 'That last exam in sure was hard!',  
    'replies':[  
        {'text': 'It sure was hard, what score did you get? ',  
         'replies': [{  
             'text': 'I got a 67% :(',  
             'replies': []  
         }, {  
             'text': 'I got a 73%',  
             'replies': []  
         }]  
        }, {  
            'text': 'I didn\'t think it was that bad',  
            'replies': [  
                'text': 'how was that not a super hard exam?',  
                'replies': []  
            ], {  
                'text': 'of course you didn\'t',  
                'replies': [  
                    'text': 'what\'s that supposed to mean?',  
                    'replies': [{  
                        'text': 'you\'re an overacheiver',  
                        'replies': [  
                            'text': 'and that\'s bad how?',  
                            'replies': []  
                        ]  
                    }]  
                ]  
            }]  
        }]
```

We'll also make a function that will help us display a message in a box that is indented over. Don't worry about the details, but this uses HTML display styling, which is how websites do styling.

```

from IPython.display import HTML, Image, display
import html
def displayIndented(text, left_margin=0):
    display(
        HTML(
            f"<pre style='border:solid 1px;padding:3px;margin-left:{left_margin}px'>" +
            html.escape(text) +
            "</pre>"
        )
    )

```

The function above takes the `text` to be displayed, and optionally the `left_margin` for how much to indent the text box.

Below are some examples of how it works:

```
displayIndented("Here is an example")
```

Here is an example

```
displayIndented("Here is an example with an left_margin of 20", left_margin=20)
```

Here is an example with an left_margin of 20

Navigating tree

Now let's consider how we can navigate this tree of comments and replies.

First, we can just print out the initial tweet (the root):

```
displayIndented(comment_about_exam['text'])
```

That last exam in sure was hard!

Navigate with for loops

If we want to print the initial tweet, and just the replies to that tweet, we can use a for loop, like this:

```

displayIndented(comment_about_exam['text'])

for reply in comment_about_exam['replies']:
    displayIndented(reply['text'], left_margin=20)

```

That last exam in sure was hard!

It sure was hard, what score did you get?

I didn't think it was that bad

If we also want to include the replies to those initial replies, we can put another for loop inside of there:

```

displayIndented(comment_about_exam['text'])

for reply in comment_about_exam['replies']:
    displayIndented(reply['text'], left_margin=20)

    for reply_reply in reply['replies']:
        displayIndented(reply_reply['text'], left_margin=40)

```

That last exam in sure was hard!

It sure was hard, what score did you get?

I got a 67% :(

I got a 73%

I didn't think it was that bad

how was that not a super hard exam?

of course you didn't

If we want to get all of the replies in our example though, we'll need to have a for loop for each level, but the code is going to be getting messy:

```
displayIndented(comment_about_exam['text'])

for reply in comment_about_exam['replies']:
    displayIndented(reply['text'], leftMargin=20)

    for reply_reply in reply['replies']:
        displayIndented(reply_reply['text'], leftMargin=40)

        for reply_reply_reply in reply_reply['replies']:
            displayIndented(reply_reply_reply['text'], leftMargin=60)

            for reply_reply_reply_reply in reply_reply_reply['replies']:
                displayIndented(reply_reply_reply_reply['text'], leftMargin=80)

                for reply_reply_reply_reply_reply in
reply_reply_reply_reply['replies']:
                    displayIndented(reply_reply_reply_reply_reply['text'],
leftMargin=100)
```

That last exam in sure was hard!

It sure was hard, what score did you get?

I got a 67% :(

I got a 73%

I didn't think it was that bad

how was that not a super hard exam?

of course you didn't

what's that supposed to mean?

you're an overacheiver

and that's bad how?

for loops didn't work great

Our code was messy, and if there were even more levels, we'd need even more for loops. This could go on endlessly.

Navigate with recursion: a function that calls itself

We can use a clever programming trick that will work better.

We make a function that prints a comment and all the replies (`print_comment_and_replies`). So our function will first print the text of the comment, and then it will go through each reply, but instead of printing the reply directly, there is a function that will print that comment and all replies to it: `print_comment_and_replies` (which is the function we are writing).

This trick can be confusing to understand (and it's ok if you don't), but let's look at it again in pseudocode:

The function `print_comment_and_replies` does the following

1. Print the text of the comment
2. For each of the replies to that comment, use the `print_comment_and_replies` function to print it out

So, we will call `print_comment_and_replies` with our initial comment, and that function will then call `print_comment_and_replies` for each of the replies to that comment, and then those new calls to `print_comment_and_replies` will call `print_comment_and_replies` for all the replies to those comments, and so on, until all the comments are printed out.

Note: In computer science terms, this is called a "depth-first search" algorithm

The actual code for `print_comment_and_replies` is here:

```

def print_comment_and_replies(comment):
    # print comment
    displayIndented(comment['text'])

    #print replies (and the replies of those, etc.)
    for reply in comment['replies']:
        print_comment_and_replies(reply)

```

And we can test it out on our tweet and see it work

```
print_comment_and_replies(comment_about_exam)
```

```

That last exam in sure was hard!
It sure was hard, what score did you get?
I got a 67% :(
I got a 73%
I didn't think it was that bad
how was that not a super hard exam?
of course you didn't
what's that supposed to mean?
you're an overacheiver
and that's bad how?

```

In the above result, there were no indents, but we can use another trick (getting more confusing) where we track how many indents to make when the function is called (by default, it starts at 0). When the function calls itself to print the replies, we add:

```

def print_comment_and_replies(comment, num_indent=0):
    # print indented comment
    displayIndented(comment['text'], left_margin=num_indent*20)

    #print replies (and the replies of those, etc.)
    for reply in comment['replies']:
        print_comment_and_replies(reply, num_indent + 1)

```

And when we test this out, we can see the result

```
print_comment_and_replies(comment_about_exam)
```

```

That last exam in sure was hard!
    It sure was hard, what score did you get?
        I got a 67% :(
        I got a 73%
    I didn't think it was that bad
        how was that not a super hard exam?
        of course you didn't
            what's that supposed to mean?
                you're an overacheiver
                    and that's bad how?

```

14.7.3. Demo: Hide Some Comments

Now we will use our code from before, but we will skip displaying some comments, and we can make up whatever rule we want to do this.

First let's make our fake conversation data:

```

comment_about_exam = {
    'text': 'That last exam in sure was hard!',
    'replies':[{
        'text': 'It sure was hard, what score did you get? ',
        'replies': [{{
            'text': 'I got a 67% :(',
            'replies': []
        }},{{
            'text': 'I got a 73%',
            'replies': []
        }}]
    }, {
        'text': 'I didn\'t think it was that bad',
        'replies': [{{
            'text': 'how was that not a super hard exam?',
            'replies': []
        }}, {
            'text': 'of course you didn\'t',
            'replies': [{{
                'text': 'what\'s that supposed to mean?',
                'replies': [{{
                    'text': 'you\'re an overacheiver',
                    'replies': [{{
                        'text': 'and that\'s bad how?',
                        'replies': []
                    }}]
                }}]
            }}]
        }]
    }]
}

```

We'll copy that function to help us display the tweets nicely again too

```

from IPython.display import HTML, Image, display
import html
def displayIndented(text, left_margin=0):
    display(
        HTML(
            "<pre style='border:solid 1px;padding:3px;margin-left:" +
            str(left_margin) + "px'>" +
            html.escape(text) +
            "</pre>"
        )
    )

```

Display everything

If we want to display everything, we can use the recursive function from the last section:

```

def printCommentAndReplies(comment, num_indent=0):
    # print indented tweet
    displayIndented(comment['text'], left_margin=num_indent*20)

    #print replies (and the replies of those, etc.)
    for reply in comment['replies']:
        printCommentAndReplies(reply, num_indent = num_indent + 1)

```

And when we test this out, we can see the result

```
printCommentAndReplies(comment_about_exam)
```

```

That last exam in sure was hard!
It sure was hard, what score did you get?
I got a 67% :(
I got a 73%
I didn't think it was that bad
how was that not a super hard exam?
of course you didn't
what's that supposed to mean?
you're an overacheiver
and that's bad how?

```

Display only some

If we want to make a rule for what to display, we will first make a new function called `should_display` which will look at a comment/reply and return `True` if it should be displayed, or `False` if it should be hidden.

For our first rule, let's say we will display all messages that are more than 16 characters long. If a comment/reply is shorter than that, we won't display it or any of the replies to it.

```
def should_display(comment):
    # only display if the length of the comment text is more than 20 characters
    Long
    if(len(comment["text"]) > 20):
        return True
    else:
        return False
```

Now we will make a new version of our recursive `print_tweet_and_replies` with an added `if` statement that checks whether the `should_display` function says if we should display that comment and its replies:

```
def print_comment_and_replies(comment, num_indent=0):
    if(should_display(comment)):
        # print indented tweet
        displayIndented(comment['text'], left_margin=num_indent*20)

        # print replies (and the replies of those, etc.)
        for reply in comment['replies']:
            print_comment_and_replies(reply, num_indent = num_indent + 1)
```

Now let's test it out and see that fewer of the messages were printed out (only the long ones)

```
print_comment_and_replies(comment_about_exam)
```

```
That last exam in sure was hard!
It sure was hard, what score did you get?
I didn't think it was that bad
how was that not a super hard exam?
```

Making up new rules

We can make up whatever rules we want for what to display. For example, we might search for offensive words and hide those, or we could hide ones with negative sentiment.

As one more simple example here, we will make a new rule that only displays a message if it got replies (we will assume that if no one bothered to reply, than it isn't worth displaying).

To make this change we will redefine our `should_display` function with the new rule, and then re-run `print_tweet_and_replies`

```
def should_display(comment):
    # only display if there are more than 0 replies
    if(len(comment["replies"]) > 0):
        return True
    else:
        return False
```

```
print_comment_and_replies(comment_about_exam)
```

```
That last exam in sure was hard!
It sure was hard, what score did you get?
I didn't think it was that bad
of course you didn't
what's that supposed to mean?
you're an overacheiver
```

14.8. Learn More

- [Against "Don't read the comments"](#)
- [Facebook's race-blind practices around hate speech came at the expense of Black users, new documents show](#)

15. Content Moderators

We've just looked at how social media sites do content moderation, but now let's look at the people who do that content moderation: the **content moderators**.

15.1. Types of Content Moderator Set-Ups

There are a number of different types of content moderators and ways of organizing them, such as:

15.1.1. No Moderators

Some systems have no moderators. For example, a personal website that can only be edited by the owner of the website doesn't need any moderator set up (besides the person who makes their website).

If a website does let others contribute in some way, and is small, no one may be checking and moderating it. But as soon as the wrong people (or spam bots) discover it, it can get flooded with spam, or have illegal content put up (which could put the owner of the site in legal jeopardy).

15.1.2. Untrained Staff

If you are running your own site and suddenly realize you have a moderation problem you might have some of your current staff (possibly just yourself) start handling moderation. As moderation is a very complicated and tricky thing to do effectively, untrained moderators are likely to make decisions they (or other users) regret.

15.1.3. Dedicated Moderation Teams

After a company starts working on moderation, they might decide to invest in teams specifically dedicated to content moderation.

These teams of content moderators could be considered human computers hired to evaluate examples against the content moderation policy of the platform they are working for.

15.1.4. Individuals moderating their own spaces

You can also having people moderate their own spaces. For example:

- when you text on the phone, you are in charge of blocking numbers if you want to (though the phone company might warn you of potential spam or scams)
- When you make posts on Facebook, or upload videos to YouTube, you can delete comments and replies
- Also in some of these systems you can allow friends access to your spaces to let them help you moderate them.

15.1.5. Volunteer Moderation

Letting individuals moderate their own spaces is expecting individuals to put in their own time and labor. You can do the same thing with larger groups, and have volunteers moderate them. Reddit does something similar where subreddits are moderated by volunteers, and Wikipedia moderators (and editors) are also volunteers.

15.1.6. Automated Moderators (bots)

Another strategy for content moderation is using bots, that is computer programs that look through posts or other content and try to automatically detect problems. These bots might remove content, or they might flag things for human moderators to review.

15.2. Example Moderator Set-ups

Let's look in more detail at some specific examples of moderator set-ups:

15.2.1. Reddit

[Reddit](#) is divided into subreddits which are often about a specific topic. Each subreddit is moderated by volunteers who have special permissions, who reddit forbids from making any money:

Reddit is valued at more than ten billion dollars, yet it is extremely dependent on mods who work for absolutely nothing. Should they be paid, and does this lead to power-tripping mods?

- [A post starting a discussion thread on reddit about reddit](#)

In addition to the subreddit moderators, all reddit users can upvote or downvote comments and posts. The reddit recommendation algorithm promotes posts based on the upvotes and downvotes, and comments that get too many downvotes get automatically hidden.

Finally, reddit itself does some moderation as a platform in determining which subreddits can exist, and has on occasion shut down some.

Reflection Question:

- What is your take on the ethical trade-offs of unpaid reddit moderators? What do you think Reddit should do?

15.2.2. Wikipedia

[Wikipedia](#) is an online encyclopedia that is crowdsourced by volunteer editors. You can go right now and change a Wikipedia page's content if you want (as long as the page isn't locked)! You can edit anonymously, or you can create an account. The Wikipedia community gives some editors [administrator access](#), so they can perform more moderation tasks like blocking users or locking pages. Editors and administrators are generally not, paid, though they can be paid by other groups if they [disclose and fill out forms](#)

Wikipedia exists in multiple languages (each governed somewhat independently). When looking at the demographics of who writes the English Wikipedia articles, editors of wikipedia [skew heavily male](#) (around 80% or 90%), and presumably administrators skew heavily male as well. This can produce bias in how things are moderated. For example, [Donna Strickland had no Wikipedia page before her Nobel. Her male collaborator did](#):

"Articles on Strickland had been drafted on the online encyclopedia before in May 2018 — but the draft was rejected by moderators. 'This submission's references do not show that the subject qualifies for a Wikipedia article,' the moderators wrote, despite the fact that the original author linked to a page that showed Strickland was once president of the Optical Society, a major physics professional organization and publisher of some of the field's top journals."

Reflection Question:

- How should Wikipedia handle their editor/administrator demographics?

15.2.3. Facebook

While Facebook groups and individual pages can be moderated by users, for the platform as a whole, Facebook has paid moderation teams to make moderation decisions (whether on content flagged by bots, or content flagged by users).

As Facebook has grown, it has sought users from all over the globe, [but as of 2019](#):

- Facebook had menus and prompts in 111 different languages, which were deemed to be "officially supported"
- Facebook's "Community standards" rules were only translated into 41 of those languages
- Facebook's content moderators know about 50 languages (though they say they hire professional translators when needed)
- Automated tools for identifying hate speech only work in about 30 languages

Reflection Questions:

- What dangers are posed with languages that have limited or no content moderation?
- What do you think Facebook should do about this?

15.3. The Toll on Moderators

When social media companies like Facebook hire moderators, they often hire teams in countries where they can pay workers less. The moderators then are given sets of content to moderate and have to make quick decisions about each item before looking at the next one. They have to get through many posts during their time, and given the nature of the content (e.g., hateful content, child porn, videos of murder, etc.), this can be traumatizing for the moderators:

- [Facebook Is Ignoring Moderators' Trauma: 'They Suggest Karaoke and Painting'](#)

In addition to the trauma, by finding places where they can pay workers less and get them to do undesirable work, they are exploiting current inequalities to increase their profits. So, for example, "[Colombia's Ministry of Labor has launched an investigation into TikTok subcontractor Teleperformance [for content moderators], relating to alleged union-busting, traumatic working conditions and low pay]"(<https://time.com/6231625/tiktok-teleperformance-colombia-investigation/>)

15.3.1. Reflection Questions

- What support should content moderators have from social media companies and from governments?
- Do you think there are ways to moderate well that involve less traumatizing of moderators or taking advantage of poor people?

15.4. Learn More

- Book: [Behind the Screen](#) Sarah Roberts
- Book: [Custodians of the Internet](#) by Tarleton Gillespie

16. Crowdsourcing

Many of the social media phenomena we've been looking at already are caused by people working together, that is **crowdsourcing**. So let's look more specifically at crowdsourcing.

16.1. Crowdsourcing Definition

When tasks are done through large groups of people making relatively small contributions, this is called **crowdsourcing**. The people making the contributions generally come from a crowd of people that aren't necessarily tied to the task (e.g., all internet users can edit

Wikipedia), but then people from the crowd either get chosen to participate, or volunteer themselves.

When a crowd is providing financial contributions, that is called crowdfunding (e.g., [patreon](#), [kickstarter](#), [gofundme](#)).

Humans have always collaborated on tasks, and [crowds have been enlisted in performing tasks long before the internet existed](#). What social media (and other internet systems) have done is expand the options for how people can collaborate on tasks.

16.1.1. Different Ways of Collaborating and Communicating

There have been many efforts to make computer replicate the experience of communicating with someone in person, through things like video chats, or even [telepresence robots](#). But there are ways that attempts to recreate in-person interactions inevitably fall short and don't feel the same. Instead though, we can look at different characteristics that computer systems can provide, and find places where computer-based communication works better, and is [Beyond Being There \(pdf here\)](#).

Some of the different characteristics that means of communication can have include (but are not limited to):

- **Location:** Some forms of communication require you to be physically close, some allow you to be located anywhere with an internet signal.
- **Time delay:** Some forms of communication are almost instantaneous, some have small delays (you might see this on a video chat system), or have significant delays (like shipping a package).
- **Synchronicity:** Some forms of communication require both participants to communicate at the same time (e.g., video chat), while others allow the person to respond when convenient (like a mailed physical letter).
- **Archiving:** Some forms of communication automatically produce an archive of the communication (like a chat message history), while others do not (like an in-person conversation)
- **Anonymity:** Some forms of communication make anonymity nearly impossible (like an in-person conversation), while others make it easy to remain anonymous.

Because of these (and other) differences, different forms of communication might be preferable for different tasks. For example, you might send an email to the person sitting next at work to you if you want to keep an archive of the communication (which is also conveniently grouped into email threads). Or you might send a text message to the person sitting next to you if you are criticizing the teacher, but want to do so discretely, so the teacher doesn't notice.

These different forms of communication can then support different methods of crowdsourcing.

16.2. Planned Crowdsourcing Examples

Let's now consider some examples of planned crowdsourcing, meaning a system or task was intentionally created and given to a crowd to work on.

16.2.1. Crowdsourcing Platforms

Some online platforms are specifically created for crowdsourcing. For example:

- [Wikipedia](#): Is an online encyclopedia whose content is crowdsourced. Anyone can contribute, just go to an unlocked Wikipedia page and press the edit button. Institutions don't get special permissions (e.g., [it was a scandal when US congressional staff edited Wikipedia pages](#)), and the expectation that editors do not have outside institutional support is intended to encourage more people to contribute.

- [Quora](#): An crowdsourced question and answer site.
- [Stack Overflow](#): A crowdsourced question and answer site specifically for programming questions.
- [Amazon Mechanical Turk](#): A site when you can pay for crowdsourcing small tasks (e.g., pay a small amount for each task, and then let a crowd of people choose to do the tasks and get paid).
- [Upwork](#): A site that lets people find and contract work with freelancers (generally larger and more specialized tasks than Amazon Mechanical Turk).
- Project Sidewalk: Crowdsourcing sidewalk information for mobility needs (e.g., wheelchair users).

16.2.2. Example Crowdsourcing Tasks

You probably already have some ideas of how crowds can work together on things like editing articles on a site like Wikipedia or answer questions on a site like Quora, but let's look at some other examples of how crowds can work together.

[Fold-It](#) is a game that lets players attempt to fold proteins. At the time, researchers were having trouble getting computers to do this task for complex proteins, so they made a game for humans to try it. Researchers analyzed the best players results for their research and were able to publish scientific discoveries based on the contributions of players.



Fig. 16.1 Screenshot of the fold-it game.

A [research study](#) demonstrated the power of crowd work by having Mechanical Turk workers build off of the work done by previous workers. To demonstrate, they wrote a note with intentionally bad and almost undecipherable handwriting:

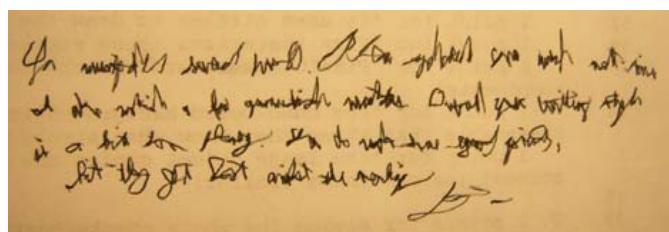


Fig. 16.2 A note written with intentionally bad handwriting.

Turkers (the people who do Mechanical Turk tasks) were then given the handwritten note and after the first few attempts at deciphering it, Turkers were either a previous attempt at deciphering the note, or asked to vote on which interpretations were improvements. They were instructed to leave parentheses around sections they weren't sure about. Here is a selection of subsequent attempts at interpreting the note ([from the paper](#)):

version 1:

- You (?) (?) (?) (work). (?) (?) (?) work (not) (time). I (?) (?) a few grammatical mistakes. Overall your writing style is a bit too (phoney). You do (?) have good (points), but they got lost amidst the (writing). (signature)

version 4:

- You (misspelled) (several) (words). (?) (?) (?) work next (time). I also notice a few grammatical mistakes. ...

version 5:

- You (misspelled) (several) (words). (Plan?) (spellcheck) (your) work next time. I also notice a few grammatical mistakes. Overall your writing style is a bit too phoney. You do make some good (points), but they got lost amidst the (writing). (signature)

version 6:

- You (misspelled) (several) (words). Please spellcheck your work next time. I also notice a few grammatical mistakes. Overall your writing style is a bit too phoney . You do make some good (points), but they got lost amidst the (writing). (signature)

16.3. Ad-hoc Crowdsourcing Examples

Crowdsourcing isn't always pre-planned or designed for. Sometimes a crowd stumbles into crowd tasks in an unplanned, [ad hoc](#) manner. Like identifying someone and sharing the news in this scene from the movie [Crazy Rich Asians](#):

Crazy Rich Asians - Rachel Chu trending in Singapore



16.3.1. "Solving" a "Problem"

When social media users work together, we can consider what problem they are solving. For example, for some of the Tiktok Duet videos from the virality chapter, the "problem" would be something like "how do we create music out of this source video" and the different musicians contribute their own piece to the solution. For some other examples:

- In the case of a [missing hiker rescued after Twitter user tracks him down using his last-sent photo](#), the "problem" was "where did the hiker disappear?" and the crowd investigated whatever they could to find the solution of the hiker's location.
- In the case of [Canucks' staffer uses social media to find fan who saved his life](#), the "problem" was "who is the fan who saved the Canucks' staffer's life?" and the solution was basically to try to identify and dox the fan (though hopefully in a positive way).
- In the case of [Twitter tracks down mystery couple in viral proposal photos](#), the problem was "who is the couple in the photo?" and the solution was again to basically dox them, though in the article they seemed ok with it.

16.3.2. Well Intentioned Harm

Sometimes even well intentioned efforts can do significant harm.

For example, in the immediate aftermath of the 2013 Boston Marathon bombing, FBI released a security photo of one of the bombers and asked for tips. A group of Reddit users decided to try to identify the bomber(s) themselves. They quickly settled on a missing man (Sunil Tripathi) as the culprit (it turned out had died by suicide and was in no way related to the case), and flooded the Facebook page set up to search for Sunil Tripathi, causing his family unnecessary pain and difficulty. The person who set up the “Find Boston Bomber” reddit board said “[It Was a Disaster](#)” but “[Incredible](#)” and [Reddit apologized for online Boston ‘witch hunt’](#).

16.3.3. Social and political movements

Some ad hoc crowdsourcing can be part of a social or political movement. For example, [Social media organizing](#) played a role in the Arab Spring revolutions in the 2010s, and Social Media platforms were a large part of the [#MeToo movement](#), where victims of sexual abuse/harassment spoke up and stood together.

16.3.4. Crowd harassment

Social media crowdsourcing can also be used for harassment, which we’ll look at more in the next couple chapters. But for some examples: the case of Justine Sacco involved crowdsourcing to identify and track her flight, and even get a photo of her turning on her phone.

16.3.5. Spreading rumors and disinformation

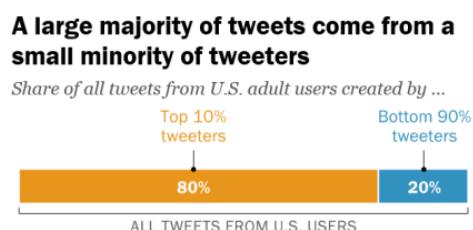
Crowds on social media can also share rumors, and can be [an essential \(if unreliable\) way of spreading information during a crises](#).

Disinformation campaigns also make use of crowdsourcing. An academic research paper [Disinformation as Collaborative Work \(pdf\)](#) lays out a range of disinformation campaigns:

- **Orchestrated:** Entirely fake and astro-turfed, no genuine users contributing.
- **Cultivated:** Intentionally created misinformation that is planted in a community. It is then spread by real users not aware they are part of a disinformation campaign.
- **Emergent and self-sustaining:** Communities creating and spreading their own rumors or own conspiracy narratives.

16.4. Power Users and Lurkers

When looking at who contributes in crowdsourcing systems, or with social media in generally, we almost always find that we can split the users into a small group of **power users** who do the majority of the contributions, and a very large group of **lurkers** who contribute little to nothing. For example, [Nearly All of Wikipedia Is Written By Just 1 Percent of Its Editors](#), and on StackOverflow “[A 2013 study has found that 75% of users only ask one question, 65% only answer one question, and only 8% of users answer more than 5 questions.](#)” We see the same phenomenon on Twitter:



Note: No institutional accounts are included.
Source: Survey of U.S. adult Twitter users conducted Nov. 21-Dec. 17, 2018. Data about respondents' Twitter activity collected via Twitter API.
“Sizing Up Twitter Users”

PEW RESEARCH CENTER

Fig. 16.3 [Summary of Twitter use by Pew Research Center](#)

16.5. Visualizing Networks

Visualizing crowds and social media networks can be done with Python. Unfortunately I don't have time to put this together at the moment (maybe by the time class starts).

So for now, I'll point you to the [Network Analysis](#) section of Melanie Walsh's [Introduction to Cultural Analytics & Python](#) online textbook.

16.6. Reflection Questions

- In what ways do you think you've participated in any crowdsourcing online?
- What do you think a social media company's responsibility is for the crowd actions taken by users on its platform?
- Do you think there are ways a social media platform can encourage good crowdsourcing and discourage bad crowdsourcing?

16.7. Learn More

If you want to learn more about crowdsourcing, you can look at the research from the [ACM Conference On Computer-Supported Cooperative Work And Social Computing](#). For example, you can see:

- [Best paper awards from 2022](#)
- [Best paper awards from 2021](#)
- [Best paper awards from 2020](#)

17. Harassment

We've referenced harassment a number of times already, but let's look at it in more detail.

17.1. Individual harassment

Individual harassment (one individual harassing another individual) has always been part of human cultures, but social media provides new methods of doing so.

There are many methods by which through social media.

This can be done privately through things like:

- Bullying: like sending mean messages through DMs
- Cyberstalking: Continually finding the account of someone, and creating new accounts to continue following them. Or possibly researching the person's physical location.
- Hacking: Hacking into an account or device to discover secrets, or make threats.
- Tracking: An abuser might track the social media use of their partner or child to prevent them from making outside friends. They may even install spy software on their victim's phone.
- Death threats / rape threats
- Etc.

Individual harassment can also be done publicly before an audience (such as classmates or family). For example:

- Bullying: like posting public mean messages
- Impersonation: Making an account that appears to be from someone and having that account say things to embarrass or endanger the victim.
- [Doxing](#): Publicly posting identifying information about someone (e.g., full name, address, phone number, etc.).

- Revenge porn / deep-fake porn
- Etc.

17.1.1. Reflections

- Have you experienced or witnessed harassment on social media (that you are willing to share about)?

17.2. Crowd Harassment

Harassment can also be done through crowds. Crowd harassment has also always been a part of culture, such as riots, mob violence, revolts, revolution, government persecution, etc.

Social media then allows new ways for crowd harassment to occur.

Crowd harassment includes all the forms of individual harassment we already mentioned (like bullying, stalking, etc.), but done by a group of people.

Additionally, we can consider the following forms of crowd harassment:

- **Dogpiling:** When a crowd of people target or harass the same person.
- Public Shaming (this will be our next chapter)
- Cross-platform raids (e.g., [Achan group planning harassment on another platform](#))
- **Stochastic terrorism**
 - [The use of mass public communication, usually against a particular individual or group, which incites or inspires acts of terrorism which are statistically probable but happen seemingly at random.](#)
 - See also: [An atmosphere of violence: Stochastic terror in American politics](#)

In addition, fake crowds (e.g., bots or people paid to post) can participate in crowd harassment. For example:

"The majority of the hate and misinformation about [Meghan Markle and Prince Henry] originated from a small group of accounts whose primary, if not sole, purpose appears to be to tweet negatively about them. [...] 83 accounts are responsible for 70% of the negative hate content targeting the couple on Twitter."

- [Twitter Data Has Revealed A Coordinated Campaign Of Hate Against Meghan Markle](#)

17.2.1. Reflection Question

Do you believe crowd harassment is ever justified?

17.3. Who gets harassed?

While anyone is vulnerable to harassment online (and offline as well), some people and groups are much more prone to harassment, particularly marginalized and oppressed people in a society.

Historically of course, different demographic groups have been subject to harassment or violence, such as women, LGBTA+ people, and Black people (e.g., the [FBI trying to convince Martin Luther King Jr. to commit suicide](#)).

On social media this is true as well. For example, the last section mentioned the (partially bot driven) harassment campaign against Meghan Markle and Prince Henry was at least partially driven by Meghan Markle being Black (the [same racism shown in the British Press](#)).

When Amnesty International looked at online harassment, they found that:

- Women of colour, (black, Asian, Latinx and mixed-race women) were 34% more likely to be mentioned in abusive or problematic tweets than white women.
- Black women were disproportionately targeted, being 84% more likely than white women to be mentioned in abusive or problematic tweets.

Troll Patrol Findings

17.3.1. Intersectionality

As we look at the above examples we can see examples of [intersectionality](#), which means that not only are people treated differently based on their identities (e.g., race, gender, class, disability, weight, height, etc.), but combinations of those identities can compound unfair treatment in complicated ways.

For example, you can test a resume filter and find that it isn't biased against black people, and it isn't biased against women. But it might turn out that it is still biased against black women. This could happen because the filter "fixed" the gender and race bias by over-selecting white women and black men, while under-selecting black women.

Key figures:

-  [Kimberlé Crenshaw](#), present USA
-  [bell hooks](#), present USA

17.4. Ethics and Harassment

17.4.1. Moderation and Violence

You might remember from Chapter 14 that social contracts, whether literal or metaphorical, involve groups of people all accepting limits to their freedoms. Because of this, some philosophers say that a state or nation is, fundamentally, violent. Violence in this case refers to the way that individual Natural Rights and freedoms are *violated* by external social constraints. This kind of violence is considered to be *legitimated* by the agreement to the social contract. This might be easier to understand if you imagine a medical scenario.

- Say you have broken a bone and you are in pain. A doctor might say that the bone needs to be set; this will be painful, and kind of a forceful, "violent" action in which someone is interfering with your body in a painful way. So the doctor asks if you agree to let her set the bone. You agree, and so the doctor's action is construed as being a legitimate interference with your body and your freedom.
- If someone random just walked up to you and started pulling at the injured limb, this unagreed violence would not be considered legitimate. Likewise, when medical practitioners interfere with a patient's body in a way that is non-consensual or not what the patient agreed to, then the violence is considered illegitimate, or morally bad.

We tend to think of violence as being another "normatively loaded" word, like authenticity. But where authenticity is usually loaded with a positive connotation—on the whole, people often value authenticity as a good thing—violence is loaded with a negative connotation. Yes, the doctor setting the bone is violent and invasive, but we don't usually call this "violence" because it is considered to be a legitimate exercise of violence. Instead, we reserve the term "violence" mostly for describing forms of interference that we consider to be morally bad.

17.4.2. A Bit of History

In much of mainstream Western thought, the individual's right to freedom is taken as a supreme moral good, and so anything that is viewed as an illegitimate interference with that individual freedom is considered violence or violation. In the founding of the United States, one thing on people's minds was the way that in a Britain riddled with factions and

disagreement, people of one subgroup could not speak freely when another subgroup was in power. This case was unusual because instead of one group being consistently dominant, the Catholic and Protestant communities alternated between being dominant and being oppressed, based on who was king or queen. So the United States wanted to reinforce what they saw as the value of individual freedoms by writing it into the formal, explicit part of our social contract. Thus, we got the famous First Amendment to the Constitution, saying that individuals' right to freely express themselves in speech, in their religion, in their gatherings, and so on could not legally be interfered with.

As a principle, the concept is pretty clear: let people do their thing. But we do still live in a society which does not permit total freedom to do whatever one wants, with no consequences. Some actions do too much damage, and would undermine the society of freedom, so those actions are written into the law (that is, *proscribed*) as a basis for reprisals. This happens a few ways:

- Some are proscribed as crimes that lead to arrest, trial, and possibly incarceration.
- Some are proscribed as concepts or categories of things, which a person could use to take someone else to court. For example, copyright infringement doesn't usually result in someone showing up to arrest and imprison in the States. But if someone believes their copyrights have been violated, they can sue the offending party for damages pay, etc. The concept of copyright is proscribed in law, so it forms the basis for such lawsuits.

Beyond what is proscribed by law, there are plenty of other actions and behaviors we don't want people to be doing in our society, but they are not such as should be written into law. I don't want my friends to lie to me, generally speaking, but this is not against the law. It would be weird if it was! Plain old lying isn't proscribed, but perjury is (lying under oath in a court of law). The protections of freedom in the First Amendment were designed to help articulate a separation between what we might not like (e.g., someone having a different faith, or someone lying) and what is actually damaging enough to warrant formal legal mechanisms for reprisal (e.g. perjury). The Catholics and the Protestants don't need to like each other, but they have the right to coexist in this society regardless of which group currently has a monarch on the throne.

17.4.3. So what is harassment?

One useful way to think about harassment is that it is often a pattern of behavior that exploits the distinction between things that are legally proscribed and things that are hurtful, but not so harmful as to be explicitly prohibited by law given the protection of freedoms. Let's use an example to clarify.

- Suppose it's been raining all day, and as I walk down the sidewalk, a car drives by, spraying me with water from the road. This does not make me happy. It makes me uncomfortable, since my clothes are wet, and it could hurt me if wet clothes mean I get so cold I become ill. Or it could hurt me if I were on my way to an important interview, for which I will now show up looking sloppy. But the car has done nothing wrong, from a legal standpoint. There is no legal basis for reprisals, and indeed it would seem quite ridiculous if I tried to prosecute someone for having splashed me by driving near me. In a shared world, we sometimes wind up in each other's splash zones.
- Now, suppose it was more dramatic than that. Suppose the car had to really veer to spray me with the puddle, such that they *could* be described as driving recklessly, if anyone happened to be describing it. This is not the splash zone of regular living; it's malice. But it's still not illegal, nor the basis for legal action.
- Finally, suppose it's not just one car. There is a whole caravan of cars. I recognize the drivers as classmates whom I don't get along with. They have planned a coordinated strike, each driving through the puddles so fast I can't hardly catch a breath between splashes. My bag is soaked; my laptop and phone permanently damaged. Since damaging someone else's private property *is* proscribed, I could try to prosecute the drivers. I have no idea if this hypothetical case would get anywhere in a real court, but if

I could get a judge onside, they might issue a fine, to be paid by the drivers, to answer for my damages (that is, to pay for the replacement of my private property which was destroyed, specifically my laptop and phone).

At a guess, I would suspect that it would be very difficult to get anywhere with such a suit in court. Puddle-based harassment isn't something that is recognized by law. This is what harassment does: it uses a pattern of minorly hurtful actions, so that the harasser can maintain plausible deniability about intent to harm, or at least, failing that, can avoid formal consequences.

When harassment concepts get proscribed, this situation shifts. Think about employment law in the States. Depending on what State you're in and what sector, employment law does not permit racial harassment in the workplace. This means that if you can show a pattern of repeating behavior which is hurtful and based on racially coded comments, then you might have a viable case for a racial harassment suit. (Practically, this probably doesn't mean suing. It means notifying HR that you have evidence of the pattern and request that they take disciplinary action. What the law does say is that if the harassing party subsequently sues for something like wrongful termination, the company has a legal basis for construing your evidence as showing a pattern of harassment.)

If there were a rise in, or a new recognition of, widespread and harmful puddle-based harassment, we might gather with activists and fight to get puddle-based harassment recognized by law, in order to reduce its occurrence. Not that this would be easy, but it would give us the legal basis for pressing charges when coordinated puddle-attacks occur. Getting the action proscribed by the law doesn't stop people from taking that action. They are still free to puddle-splash at will. But there would be a possibility of consequences, should their pedestrian victims seek reprisal.

Harassment is behavior which uses a pattern of actions which are permissible by law, but still hurtful.

Variations:

- Where a relevant harassment definition exists in law, there can be legal consequences.
- Other institutions can also make their own harassment policies. The consequences would not arise at the legal level, but at the social level. Many universities have policies about sexual harassment which are much richer and more detailed than statutory law. If behavior is reported which is defined by the university policy as harassment, then they can issue consequences such as suspension of the student.
- Implicit policies can be implemented as well. I don't have a formal harassment policy that I require my houseguests to sign before entering my home; but it is *my* home, and if they start behaving in ways that I consider problematic, I do have the right to kick them out of my house.

Harassment in social media contexts can be difficult to define, especially when the harassment pattern is created by a collective of seemingly unconnected people. Maybe each individual action can be read as unpleasant but technically okay. But taken together, all the instances of the pattern lead up to a level of harm done to the victim which can do real damage.

Because social media spaces are to some extent private spaces, the moderators of those spaces can ask someone to leave if they wish. A Facebook group may have a 'policy' listed in the group info, which spells out the conditions under which a person might be blocked from the group. As a Facebook user, I could decide that I don't like the way someone is posting on my wall; I could block them, with or without warning, much as if I were asking a guest to leave my house.

In the next section, we will look in more detail about when harassment tactics get used; how they get justified, and what all this means in the context of social media.

17.5. Justifying Harassment

So let's look at how harassment gets justified.

One research paper ([Morally Motivated Networked Harassment as Normative Reinforcement](#)) suggests a process that often happens with online harassment, where the harassers feel their actions are justified. They say these play out as follows:

- A **target** is identified as breaking the norm of a community (often not their own community, so this is a case of context collapse). This provides a justification for people to harass the target.
- A key social media account (the **amplifier**), promotes the accusation in their community (again, often not the one the target is in).
- The amplifier's audience then harass the target.
- The target experiences negative emotions (stress, depression, etc.), and self-censors and withdraws. The targets' speech (and others who might have said something similar) is therefore silenced.
- The amplifier's network found a common enemy and cause, and this reinforces their values and norms.

Does this sound bad? Let's look at some more specific examples and see what you think.

17.5.1. Examples Attempts at Justifying Harassment

Doxing Racist Organization Members

We'll start in a time before the Internet:

The [Ku Klux Klan](#) (KKK) is an American white-supremacist terrorist organization known to harass and murder Black people and others. Members of the KKK keep their identity secret by wearing white robes and hoods over their faces. Often influential and powerful members of society were part of the KKK, such as police officers and government officials.

In the 1920s, [a magazine called Tolerance published lists of members of the KKK and their addresses](#), what we would now call "doxing." They hoped to end the hateful and violent KKK organization.

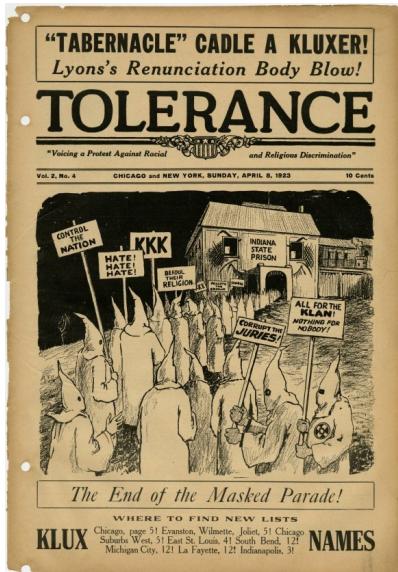


Fig. 17.1 Tolerance magazine from 1923.

EAST ST. LOUIS	
d? KLAN ROLL HAS NOTABLE NAMES	
J. A. STERNBERG at Blue Bird Lanch sides 845 Collis Avenue	
FRED W. STENZ PRUDENTIAL INS sider 1125 N. 15th St.	
A. P. STEWART resides, 3021 Waverly JOSEPH M. ST auto mechanic; resides none.	
EDWARD STRAHL er; resides, 620 North H. M. STEWART er of STEWAR MACK, National Se	
The following names appear upon the membership roll of the Ku Klux Klan:	
C. A. HARND, hog sales man; resides, 3212 Audubon Ave	
CHARLES HOUSEWORTH foreman, CENTRAL LUMBER COMPANY; resides, 517 North	
9th Street	
E. HARROD, general car foreman, NEW YORK CEN	
W.M. H. STUBB special agent, Southern resides, 623 Converse	
DR. H. G. STANT ian; resides, 1818 Street.	
C. STORECI istant engineer, Sab way; resides, 511 N.	
CLAUDE R. S merchan Stock Yards	
CARL S. SWOFF	

Fig. 17.2 Part of the East St. Louis list of KKK members.

As a more recent event on internet-based social media, we find [Twitter users trying to identify participants at a white supremacist rally](#):

Fig. 17.3 [Results of the modern doxing campaign](#)

- Related: [Is it ethical to punch a Nazi?](#)

The Lion-Killing Dentist

In 2015, a US dentist named Walter Palmer went to Zimbabwe, lured a lion out of a protected area, and killed it. Many people were upset about this, and that there seemed to be no legal consequences for Dr. Palmer.

Angry people sent a surge of traffic to Dr. Palmer's website, which was taken offline. Vitriolic reviews flooded his Yelp page. A Facebook page titled "Shame Lion Killer Dr. Walter Palmer and River Bluff Dental" drew thousands of users. Dr. Palmer's face was scrubbed from industry websites.

- [Killer of Cecil the Lion Finds Out That He Is a Target Now, of Internet Vigilantism](#)

Dr. Palmer later apologized for killing the lion, but then in 2020, [he went to Mongolia and killed a protected wild ram](#).

One phrase that became popular on Twitter in 2022, especially as Elon Musk was in the process of buying Twitter, was: "It is always morally correct to bully billionaires." (Note: We could not find the exact origins of this phrase or its variations).

Trolling

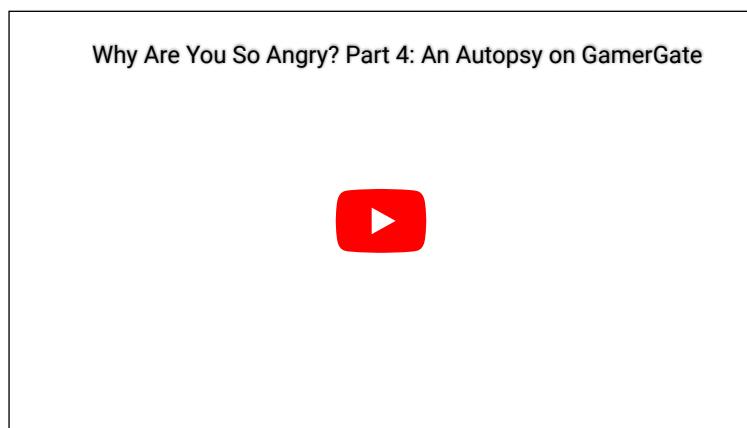
We already mentioned this in the trolling chapter, but we thought we'd copy it here again, but this is one troll's justification for trolling:

The purpose of the community ... I guess is to exchange ideas and techniques, and to plan co-ordinated trolling. The underlying philosophical purpose or shared goal, anyway, would be to disrupt people's rosy vision of the internet as their own personal emotional safe place that serves as a proxy for real-life interactions they are lacking (i.e. going online to demonstrate one's grief over a public disaster like Japan [2011 Tsunami] with total strangers who have no real connection to the event).

- From [Interview with a troll](#)

Gamergate

[Gamergate](#) was a harassment campaign in 2014-2015 that targeted non-men in gaming: Zoë Quinn, Brianna Wu, and Anita Sarkeesian. The harassment was justified by various false claims (e.g., journalistic malpractice), but mostly motivated by either outright misogyny or feeling threatened by critiques of games/gaming culture from a not straight-white-male viewpoint. The video below talks about how two factions within gamergate fed off each other (you can [watch the whole gamergate series here](#))



17.5.2. Reflection Questions

- When do you think crowd harassment is justified (or do you think it is never justified)?
- Do you feel differently about crowd harassment if the target is rich, famous, or powerful (e.g., a politician)? Do you feel different about crowd harassment depending on what the target has been doing or saying?

17.6. Stopping Harassment?

So how can platforms and individuals stop themselves from being harassed?

Well, individuals can block or mute harassers, but the harassers may be a large group, or they might make new accounts.

They might also try to use the legal system, but online harassment is often not taken seriously, and harassers often use tactics that avoid being illegal.

The platform itself sometimes can be helpful. Reporting harassment might result in the user being banned, or the platform might decide to take out entire problematic sections, such as [when Reddit banned its most toxic subreddits, and found it reduced toxic behavior on the site](#)

[overall](#).

There are also other tools to help individuals that are getting harassment from a crowd. For example, the Twitter app "[block-party](#)" supports mass blocking and other advanced features.

17.7. Design Example: Quoting

17.7.1. Quote Tweets

The way social media sites are designed can encourage and discourage different forms of harassment.

For example, people have made complaints about how [Quote Tweets Have Turned Us All Into Jerks](#). And the way that even trying to defend people can increase the harassment they face. One of the arguments is that by allowing quote Tweets, users will find a Tweet they disagree with, and quote the Tweet with a joke, insult, or comment to show how bad the original Tweet was ("dunking"). Then the original Tweet will spread through communities who disagree with it, all trying to do their own version of their best dunk or insult. As it spreads, some users may turn to other means of harassment, like direct messaging threats, or doxing the original Tweeter. Katherine Cross argues in [It's Not Your Fault You're a Jerk on Twitter: The design of the internet lets you harass and harm people without ever once interacting with them directly](#). [Even if you're trying to defend them](#), that even people jumping in to defend the original Tweet may only cause it to go more viral and get even more negative attention.

In 2019 [Twitter began considering how to measure "health" of interactions](#) on the platform and figure out how to optimize their platform for healthier interactions. In 2020 [Twitter began giving users a warning before posting something that its algorithm guessed could be offensive](#), and [made further updates in 2021](#).

17.7.2. Mastodon

When creating the Twitter-like social media protocol Mastodon, its creator, Eugen Rochko, decided not to allow quote-tweet like posts:

I've made a deliberate choice against a quoting feature because it inevitably adds toxicity to people's behaviours. You are tempted to quote when you should be replying, and so you speak at your audience instead of with the person you are talking to. It becomes performative. Even when doing it for "good" like ridiculing awful comments, you are giving awful comments more eyeballs that way. No quote toots. Thank's

[Eugen](#) in 2018

But others have argued that design decisions and community decisions made on Mastodon, such as no quotes (as well as their content-warning system) have made it more outwardly polite. But they also complain that this has made the platform very white, hostile to people of color talking about experiences of racism, and difficult to make a social movement. When masses of Twitter users migrated to Mastodon following Elon Musk's purchase of Twitter in the fall of 2022, there was renewed discussion:

[@mekkaokereke@mastodon.cloud questions:](#)

Is it possible to drive social change through Mastodon? Could "Black Lives Matter" have happened on Mastodon? Or do the "intentionally slow, pleasant conversation" features eliminate the possibility of this? Do the "interest silo" tendencies discourage cross pollination?

[...]

I know that we can have more pleasant interactions on Mastodon than on Twitter.
I already feel it.

What I'm unsure of, is if that means giving up on the capacity for social change.
Are we Lotus eating?

And [Dr. Jonathan Flowers argues](#):

The quote tweet function in conjunction with the hashtag are what allow users to align with communities, and communities with conversations through how they enable cultural practices by means of a digital environment.

On Black Twitter, the quote tweet and hashtag enable what Black cultural scholars call "call and response," something crucial to Black community practices. The hashtags curate the conversation and allow for its visibility.

(See also an interview with Dr. Jonathan Flowers on [The Whiteness of Mastodon](#))

Writer [Leslie Ye argued](#) about some of the advantages of what Twitter:

many of us have spent our lives observing institutional power from the outside, how power behaves, how power acts, when confronted when communities like ours who are actually able to HOLD power to account, connect the dots across expertises and specialties

[...]

[Twitter] is a place where we have direct access to the most powerful and can hold them to account

Professor John R. Marks, IV argued that the [spread of negative content was actually a good thing on Twitter](#).

Here's the thing:

Twitter's ability to rapidly spread objectionable and distressing content is (was?) the *best* thing about it, not the worst, see e.g. police brutality.

It's not pleasant, but long run it's more valuable than "nuanced / moderated conversation," which you can get elsewhere.

This is more-or-less what is wrong with how many – if not *most* – picture
#mastodon. and the #fediverse

#blackmastodon #blackfedi

Fig. 17.4 When the FBI account made a [Tweet in honor of Martin Luther King Jr. on the MLK holiday](#), author Marc Lamont Hill [used a quote tweet to dunk on the FBI Tweet by posting a copy of the letter the FBI sent Martin Luther King Jr. encouraging him to kill himself](#). This is a different style of making the same point as the Tweet we showed in the Trolling chapter where Jaboukie Young-White impersonated the FBI account.

On January 2nd, 2023, Mastodon creator [Eugen Rochko](#) said:

I don't feel as strongly about quote posts as I did in 2018. Personally, I am not a fan, but there is clearly a lot of demand for it. We're considering it.

17.7.3. Reflection Questions

- How does social media design enable or reduce harassment?
 - What good things are lost in trying to reduce harassment?
 - How do you balance these different concerns?

17.7.4. Further Reading

- [Quote Tweeting: Over 30 Studies Dispel Some Myths](#)
 - Black Twitter, quoting, and white views of toxicity on Mastodon

17.8. Reflection Questions

- How do social media platforms make harassment possible?
 - How do you think social media platforms should handle crowd harassment? Are there things they should do to reduce it? Should they consider whether harassment is justified in some instances?

17.9 Learn More

- [I've Had a Cyberstalker Since I Was 12](#)
 - [It's Not Your Fault You're a Jerk on Twitter](#): The design of the internet lets you harass and harm people without ever once interacting with them directly. Even if you're trying to defend them.
 - [Why social networks need better blocking tools](#)
 - [Chrissy Teigen's fall from grace: The rise and fall of Chrissy Teigen shows how drastically Twitter changed in 10 years.](#)

18. Public Shaming

In the previous chapter we talked about harassment, including crowd harassment. Now let's look more specifically at public shaming.

18.1. Shame vs. Guilt in childhood development

Before we talk about public shaming and adults, let's look at the role of shame in childhood.

In at least some views about shame and childhood^[1], shame and guilt hold [different roles in childhood development](#):

- **Shame** is the feeling that "I am bad," and the natural response to shame is for the individual to hide, or the community to ostracize the person.
- **Guilt** is the feeling that "This specific action I did was bad," and the natural response to feeling of guilt is for the guilty person to want to repair the harm of their action.

In [this view](#), a good parent might see their child doing something bad or dangerous, and tell them to stop. The child may feel shame (they might not be developmentally able to separate their identity from the momentary rejection). The parent may then comfort the child to let the child know that they are not being rejected as a person, it was just their action that was a problem. The child's relationship with the parent is repaired, and over time the child will learn to feel guilt instead of shame, and seek to repair harm instead of hide.

^[1] This view of shame/guilt is perhaps more individualistic and perhaps [more common in individualistic cultures](#). It might work differently in other cultures (e.g., [face](#))

18.2. Online Shaming

While public shaming has always been a part of human culture, the Internet and social media have created new ways of doing so.

We've seen examples of this before with Justine Sacco, and with crowd harassment (particularly dogpiling).

Another example we can look at is Jimmy Kimmel's annual Halloween prank, where he has parents film their children as they tell the parents tell children that the parents all ate all the kids' halloween candy. Parents post these videos online, where viewers are intended to laugh at the distress, despair, and sense betrayal the children express. I will not link to these videos which I find horrible, but instead link you to these articles:

- [Jimmy Kimmel's Halloween prank can scar children. Why are we laughing? \(archived copy\)](#)
- [Jimmy Kimmel's Halloween Candy Prank: Harmful Parenting?](#)

We can also consider events in the #MeToo movement as at least in part public shaming of sexual harassers (but also of course solidarity and organizing of victims of sexual harassment, and pushes for larger political, organizational, and social changes).

18.2.1. Aside on "Cancel Culture"

The term "cancel culture" can be used for public shaming, but is used in a variety of ways, and it doesn't refer to just one thing.

The offense that someone is being canceled for can range from sexual assault of minors (e.g., R. Kelly, Woody Allen, Kevin Spacey), to minor offenses or even misinterpretations.

The consequences for being "canceled" can range from simply the experience of being criticized, to loss of job or criminal charges.

Given the range of things “cancel culture” can be referring to, we’ll mostly stick to talking here about “public shaming.”

18.3. Perspectives on the Ethics of Public Shaming

We just looked at how shame might play out in childhood development, let’s look at different views of people being shamed in public.

18.3.1. Weak against strong

Jennifer Jacquet argues that shame can be morally good as a tool the weak can use against the strong:

The real power of shame is it can scale. It can work against entire countries and can be used by the weak against the strong. Guilt, on the other hand, because it operates entirely within individual psychology, doesn’t scale.

[...]

We still care about individual rights and protection. Transgressions that have a clear impact on broader society – like environmental pollution – and transgressions for which there is no obvious formal route to punishment are, for instance, more amenable to its use. It should be reserved for bad behaviour that affects most or all of us.

[...]

A good rule of thumb is to go after groups, but I don’t exempt individuals, especially not if they are politically powerful or sizeably impact society. But we must ask ourselves about the way those individuals are shamed and whether the punishment is proportional.

- [Jennifer Jacquet: ‘The power of shame is that it can be used by the weak against the strong’](#)

18.3.2. Schadenfreude

Another way of considering public shaming is as **schadenfreude**, meaning the [enjoyment obtained from the troubles of others](#).

A 2009 satirical article from the parody news site The Onion satirizes public shaming as being for objectifying celebrities and being entertained by their misfortune:

Media experts have been warning for months that American consumers will face starvation if Hollywood does not provide someone for them to put on a pedestal, worship, envy, download sex tapes of, and then topple and completely destroy.

- [Nation Demands Fresh Celebrity Meat - The Onion](#)

18.3.3. Normal People

While the example from The Onion above focuses on celebrity, in the time since it was written, social media has taken a larger role in society and democratized celebrity,. As comedian Bo Burnham puts it:

“[This] celebrity pressure I had experienced on stage has now been democratized and given to everybody [through social media]. And everyone is feeling this pressure of having an audience, of having to perform, of having a sort of, like, proper noun version of your own name and then the self in your heart.” ([NPR Fresh Air Interview](#))

Also Rebecca Jennings worries about how public shaming is used against “normal” people who are plucked out of obscurity to be shamed by huge crowds online:

"Millions of people became invested in this (niche! not very interesting!) drama because it gives us something easy to be angry or curious or self-righteous about, something to project our own experiences onto, and thereby contributing even more content to the growing avalanche. Naturally, some decided to go look up the central character's address, phone number, and workplace and share it on the internet.

[...]

'It's on social media, so it's public!' one could argue as a case for people's right to act like forensic analysts on social media, and that is true. But this justification is typically valid when a) the person posting is someone of note, like a celebrity or a politician, and b) when the stakes are even a little bit high. In most cases of normal-person canceling, neither standard is met. Instead, it's mob justice and vigilante detective work typically reserved for, say, unmasking the Zodiac killer, except weaponized against normal people.

[...]

Platforms like TikTok, where even people with few or no followers often go viral overnight, expedite the shaming process.

- ◦ [Stop canceling normal people who go viral](#)

18.3.4. Enforcing Norms

In the philosophy paper [Enforcing Social Norms: The Morality of Public Shaming](#), Paul Billingham and Tom Parr discuss under what conditions public shaming would be morally permissible. They are concerned not with actions primarily intended to induce shame in the target, but rather actions that may cause a person to shame, but are motivated by "seeking to draw attention to a social norm violation, and to rally others to their cause."

In this situation they outline the following constraints that must be considered when publicly shaming someone in this way:

- **Proportionality:** The negative consequences of shaming someone should not be worse than the positive consequences
- **Necessity:** There must not be another more effective method of achieving goal
- **Respect for Privacy:** There must not be unnecessary violations of privacy
- **Non-Abusiveness:** The shaming must not use abusive tactics.
- **Reintegration** "Public shaming must aim at, and make possible, the reintegration of the norm violator back into the community, rather than permanently stigmatizing them."

18.3.5. Reflection questions

- What do you consider to be the most important factors in making an instance of public shaming bad?
- What do you consider to be the most important factors in making an instance of public shaming good (if you think that is possible)?

18.4. Repair and Reconciliation

The idea of repair (or reconciliation) has shown up a couple times already, both in the role of shame in child development, and in the [Enforcing Social Norms: The Morality of Public Shaming](#) paper. Let's look more at what a repair might or might not look like.

18.4.1. Limits of Reconciliation

When we think about repair and reconciliation, many of us might wonder where there are limits. Are there wounds too big to be repaired? Are there evils too great to be forgiven? Is anyone ever totally beyond the pale of possible reconciliation? Is there a point of no return?

One way to approach questions of this kind is to start from *limit cases*. That is, go to the farthest limit and see what we find there by way of template, then work our way back toward the everyday. Let's look at two contrasting limit cases: one where philosophers and cultural leaders declared that repairs were possible even after extreme wrongdoing, and one where the wrongdoers were declared unforgivable.^[1]

Nuremberg Trials

After the defeat of Nazi Germany, prominent Nazi figures were put on trial in the [Nuremberg Trials](#). These trials were a way of gathering and presenting evidence of the great evils done by the Nazis, and as a way of publicly punishing them. We could consider this as, in part, a large-scale public shaming of these specific Nazis and the larger Nazi movement.

Some argued that there was no type of reconciliation or forgiveness possible given the crimes committed by the Nazis. Hannah Arendt argued that not even any punishment that could ever be sufficient:

The Nazi crimes, it seems to me, explode the limits of the law; and that is precisely what constitutes their monstrousness. For these crimes, no punishment is severe enough. It may well be essential to hang Göring, but it is totally inadequate.

- [Hannah Arendt/Karl Jaspers correspondence, 1926-1969](#)

See also:

- [Eichmann in Jerusalem: A Report on the Banality of Evil](#) by Hannah Arendt

Truth and Reconciliation Commission

In South Africa, when the oppressive and violent racist [apartheid](#) system ended, Nelson Mandela and Desmond Tutu set up the [Truth and Reconciliation Commission](#). The commission gathered testimony from both victims and perpetrators of the violence and oppression of apartheid. We could also consider this, in part, a large-scale public shaming of apartheid and those who hurt others through it. Unlike the Nuremberg Trials, the Truth and Reconciliation Commission gave a path for forgiveness and amnesty to the perpetrators of violence who provided their testimony.

See also:

- [What Archbishop Tutu's ubuntu credo teaches the world about justice and harmony.](#)

18.4.2. Steps for Repentance

For when reconciliation is possible, what would it look like?

In the article [Famous abusers seek easy forgiveness. Rosh Hashanah teaches us repentance is hard.](#) by Rabbi Danya Ruttenberg, she outlines a set of steps for "repentance" needed for someone to have their relationship with others repaired:

1. "The bad actor must **own the harm** perpetrated, ideally publicly"
2. "They must do the hard internal work to **become the kind of person who does not harm in this way** — which is a massive undertaking, demanding tremendous introspection and confrontation of unpleasant aspects of the self"
3. "They must **make restitution for harm done**, in whatever way that might be possible"
4. "Then — and only then — they must **apologize sincerely to the victim**"
5. "Lastly, **the next time** they are confronted with the opportunity to commit a similar misdeed, they must **make a different, better choice**"

18.4.3. Repair Example

On February 6, 2022, Jeremy Schneider became the Twitter “main character of the day” for posting the following Tweet, which was widely condemned as being mean and not understanding of other people’s experiences:



Fig. 18.1 [Jeremy Schneider's Tweet](#)

In what was an unusual turn of events for a Twitter “main character of the day,” Jeremy Schneider later made an apology that was mostly accepted by the Twitter users who had criticized his Tweet:

A screenshot of a Twitter thread by user @J_Schneider. The first tweet in the thread, dated Feb 9, says: "After three days of reflecting on this tweet and an evening spent reading at a bar, I have some thoughts." It has 351 replies, 1,632 retweets, and 8,932 likes. The second tweet in the thread, also dated Feb 9, says: "First off, this tweet was mean. Uncharacteristically mean. ‘Nobody likes you?’ I don’t talk like that in real life, why would I tweet that? And saying it to people minding their own business reading a book? Yeah, that’s mean. I’m sorry." It has 86 replies, 279 retweets, and 7,788 likes. The third tweet in the thread, also dated Feb 9, says: "I’m glad I tried reading in the bar, I still don’t quite get it. I struggle to read if I don’t have quiet. That doesn’t mean other people don’t like it. I always say “don’t yuck somebody else’s yum,” why should I yuck somebody else’s bar behavior when it isn’t affecting me?" It has 27 replies, 58 retweets, and 3,835 likes. The fourth tweet in the thread, also dated Feb 9, says: "I once had a friend tell me he brought a book to the bar to pick up girls. It was the most insufferable thing I have ever heard. I started seeing men reading at the bar through that lens. I thought they were being was conspicuous and pretentious. I was being presumptuous." It has 18 replies, 46 retweets, and 3,016 likes. The fifth tweet in the thread, also dated Feb 9, says: "Many pointed out that some people bring books to bars to ward off unwanted conversation or advances. This is not something I had considered. I’m especially ashamed I overlooked this." It has 35 replies, 95 retweets, and 5,107 likes.

Fig. 18.2 Part 1 of Jeremy Schneider's apology

Jeremy Schneider  @J_Schneider - Feb 9

I love reading! This tweet somehow became construed as an attack on reading. If it weren't for reading, I wouldn't have a job. And I love books! I'd like to write one one day! I just prefer to read them in quiet places.

8 29 2,510

Jeremy Schneider  @J_Schneider - Feb 9

This 77-character tweet made me The Main Character on Twitter, and it sucked. I was Brandon Knight, Twitter was DeAndre Jordan. My mean tweet was met with some funny tweets and lots of mean tweets. That sucked. I asked for it, but it sucked.

17 57 3,082

Jeremy Schneider  @J_Schneider - Feb 9

Tweeting from the hip has served me well. People know me for my irreverent observational non sequiturs, food pics, Marvel takes and love of the film Armageddon. I was trying to be funny. I clearly missed the mark. I'll be thinking a little harder before I hit send from now on.

24 46 2,553

Jeremy Schneider  @J_Schneider - Feb 9

So please know, if you're someone who brings a book to the bar... people like you fine. In fact, you have numbers. And they're ready to back you up on the internet.

31 212 5,810

Jeremy Schneider  @J_Schneider - Feb 9

And if someone ever writes a book about the worst Twitter draggings of all time, I'll be happy to sign your copy, right on the chapter about me.

I promise I won't tweet about you if I see you reading it at a bar.

328 116 6,969

Fig. 18.3 Part 2 of Jeremy Schneider's apology

18.4.4. Reflection questions

- Do you think there are situations where reconciliation is not possible?
- What would reconciliation look like (if possible), when a social media platform is used in a genocide (see: [Meta urged to pay reparations for Facebook's role in Rohingya genocide](#))
- Does Jeremy Schneider's apology cover the five steps of repentance listed by Rabbi Danya Ruttenberg?
- Pick a situation where someone is being publicly shamed. Who is responsible for accepting or rejecting their apology/repentance?
- Pick a social media platform and a situation where someone is being publicly shamed. What might that person do to try to repair or reconciliation after the public shaming?
- Pick a social media platform. In what ways does that platform make it difficult to repair or reconciliation after public shaming?

[1] We give these two examples to illustrate how important it is to appreciate the breadth of views on this incredibly difficult question, not to imply that one view or the other is preferable. The Nuremberg Trials or the Truth and Reconciliation Commission are both attempts at responding to great evils, and we believe it is important to understand different views of people who suffered. So take your time to think through your intuitions about these limit cases, and research different perspectives on these events (and [other atrocities](#)), and then work your way back to the everyday context of social media posting.

18.5. Design a Retract Feature

Professor Kate Starbird regularly called for Twitter to introduce a [retract button](#). This would help with misinformation, as a user who realized they posted false information could leave a tweet up, but put a retraction over it. It also would solve a dilemma where people who tweeted something they regretted felt caught between the choice of deleting a tweet (making it look like they were hiding their history), or leaving it up (looking like they stood by their bad tweet). Therefore a retraction feature could be used by someone who was being publicly shamed as a means of apologizing.

So now, it's your turn to think about how you would want a retraction feature to work on a social media site like Twitter:

- How would a user do the retraction? What options would they have (e.g., can they choose to keep or delete the original tweet content)? What additional information would they be able to provide?
- How would that retracted tweet look when viewed?
- How would that retracted tweet look when it is part of a retweet or quote tweet?
- Would there be any notifications sent when a tweet is retracted?
- Outline 3 different examples of how and when a user might retract a tweet
 - E.g., misinformation, regret bad idea, regret mean tone, etc.

18.6. Learn More

- [Trauma and Shame](#) (in childhood development)
- [Famous abusers seek easy forgiveness. Rosh Hashanah teaches us repentance is hard. By Danya Ruttenberg](#)
- [Twitter, the Intimacy Machine](#)
 - "Twitter incentivizes its users to take trust falls, and then it rewards other users for blocking the catch. Twitter is a technology finely tuned to call forth, and then crush, intimacy."
- [Nation Demands Fresh Celebrity Meat](#) - The Onion (note: The Onion is a satire/joke newspaper)
-

19. Capitalism

Now let's step back and look at how capitalism, which will help explain many of the decisions made in the design and running many social media platforms.

19.1. What is Capitalism?

Why do social media platforms make decisions that harm users? And why do social media platforms sometimes go down paths of self-destruction and alienating their users? Sometimes these questions can be answered by looking at the economic forces that drive decision making on social media platforms, in particular with capitalism.

So let's start by defining capitalism.

19.1.1. Definition of Capitalism:

Capitalism is:

"an economic system characterized by private or corporate ownership of capital goods, by investments that are determined by private decision, and by prices, production, and the distribution of goods that are determined mainly by competition in a free market"

- [Merriam-Webster Dictionary](#).

In other words, capitalism is a system where:

- Individuals or corporations own businesses
- These business owners make what they want and set their own prices. They compete with other businesses to convince customers to buy their products.
- These business owners then hire [wage-laborers](#) at predetermined rates for their work, while the owners get the excess business profits or losses.

Related Terms

Here are a few more terms that are relevant to capitalism that we need to understand in order to get to the details of decision making and strategies employed by social media companies.

- Shares / Stocks
 - Shares or stocks are ownership of a percentage of a business, normally coming with getting a percentage of the profits and a percentage of power in making business decisions.
 - Companies then have a board of directors who represent these shareholders. The board are in charge of choosing who runs the company (the CEO). They have the power to hire and fire CEOs
 - For example: in 1985, the board of directors for Apple Computers denied Steve Jobs (co-founded Apple) the position of CEO and then they fired him completely
 - CEOs of companies (like Mark Zuckerberg of Meta) are often both wage-laborers (they get a salary, Zuckerberg gets a tiny symbolic \$1/year) and shareholders (they get a share of the profits, Zuckerberg owns 16.8%)
- Free Market
 - Businesses set their own prices and customers decide what they are willing to pay, so prices go up or down as each side decides what they are willing to charge/spend (no government intervention)
 - See supply and demand
 - What gets made is theoretically determined by what customers want to spend their money on, with businesses competing for customers by offering better products and better prices
 - Especially the people with the most money, both business owners and customers
- Monopoly.
 - “a situation where a specific person or enterprise is the only supplier of a particular thing”
 - Monopolies are considered anti-competitive (though not necessarily anti-capitalist). Businesses can lower quality and raise prices, and customers will have to accept those prices since there are no alternatives.
 - Cornering a market is being close enough to a monopoly to mostly set the rules (e.g., Amazon and online shopping)

19.1.2. Socialism

Let's contrast capitalism with socialism:

Socialism, in contrast is a system where:

- A government owns the businesses (sometimes called “government services”)
- A government decides what to make and what the price is
 - the price might be free, like with public schools, public streets and highways, public playgrounds, etc.
- A government then may hire wage-laborers at predetermined rates for their work, and the excess business profits or losses are handled by the government
 - For example, losses are covered by taxes, and excess may pay for other government services or go directly to the people (e.g., Alaska uses its oil profits to pay people to live there).

As an example, there is one Seattle City Sewer system, which is run by the Seattle government. Having many competing sewer systems could actually make a big mess of the underground pipe system.

19.1.3. Accountability in Capitalism and other systems

Let's look at who the leaders of businesses (or services) are accountable for in capitalism and other systems.

Democratic Socialism (i.e., "Socialists^[1]")

With socialism in a representative democracy (i.e., "democratic socialism"), the government leaders are chosen by the people through voting. And so, while the governmental leaders are in charge of what gets made, how much it costs, and who gets it, those leaders are accountable to the voters. So, in a democratic socialist government, theoretically every voter has an equal say in business (or government service) decisions.

Note, that there are limitations to the government leaders being accountable to the people their decisions affect, such as government leaders ignoring voters' wishes, or people who can't vote (e.g., the young, non-citizens, oppressed minorities) and therefore don't get a say.

Capitalism

In capitalism, business decisions are accountable to the people who own the business. In a **publicly traded** business, that is the shareholders. The more money someone has invested in a company, the more say they have. And generally in a capitalist system, the rich have the most say in what happens (both as businesses owners and customers), and the poor have very little say in what happens.

When shareholders buy stocks in a company, they are owed a percentage of the profits. Therefore it is the company leaders' **fiduciary duty** to maximize the profits of the company (called the **Friedman Doctrine**). If the leader of the company (the CEO) intentionally makes a decision that they know will reduce the company's profits, then they are cheating the shareholders out of money the shareholders could have had. CEOs mistakenly do things that lose money all the time, but doing so on purpose is a violation of fiduciary duty.

There are many ways a CEO might intentionally lower profits unfairly, such as by having their company pay more than necessary when buying something from the CEO's friend's company. But even if a CEO decides to reduce profits for a good reason (e.g., it may be unethical to overwork the employees), then they are still violating their fiduciary duty, and the board of directors might fire them or pressure them into prioritizing profits above all else.

For example, the actor Stellan Skarsgård complained that in the film industry, it didn't matter if a company was making good movies at a decent profit. If there is an opportunity for even more profit by making worse movies, then that is what business leaders are obligated to do:

"When raw market forces come in, [movie] studios start being run by companies that don't care if they're dealing in films or toothpaste so long as they get their 10% [return]. When AT&T took over Time Warner, it immediately told HBO to become lighter and more commercial. They were always making money. But not enough for an investor."

- [Stellan Skarsgård](#)

Or as another example, if the [richest man in the world offers to buy out a social media site for more than its worth](#), then it is the fiduciary duty of the leaders of the social media site to accept that offer. It doesn't matter if it is clear that this rich man doesn't know what he is doing and is likely to destroy the social media site, and potential cause harms to society-at-large; the fiduciary duty of the company leaders is to get as much money as possible to their shareholders, and they can't beat being overpaid by the richest man in the world. Rejecting that deal would be cheating the stock holders out of money.

CEOs of social media companies, under the pressure from the board of directors, might also make decisions that prioritize short-term profits for the shareholders over long term benefits, leading to what author Corey Doctorow calls the "Enshittification" of platforms (See his article: [The 'Enshittification' of TikTok: Or how, exactly, platforms die](#), also [archived here](#)).

Privately owned businesses or organizations are a little different in that the owner (or owners) have full say on what happens, and is free to make it as unprofitable or profitable as they want. Though, if the private ownership of the business [was purchased with loans](#), then

they have some responsibilities to the lenders.

Other Accountability Models

Besides the privately owned and publicly traded businesses in capitalism, and government services in socialism, there are other accountability models as well. For example:

In a **publicly funded** organization, **non-profit** organization, or **crowd funded** project (e.g., [Wikipedia](#), [NPR](#), [Kickstarter projects](#), [Patreon creators](#), charities), the investors (or donors) are not investing in profits from the organization, but instead are investing in the product or work the organization does. Therefore the responsibility to investors is not to make profits, but to do the work investors are paying for. In this model, the more money someone invests or donates, the more say they have over what the organization does (like capitalism, and unlike democratic socialism). For example, when buying groceries, you might let the grocery store take an extra \$5 from you to give to a charity that gives food to the needy. Then the grocery store corporation will give \$5 to the charity, but the corporation also gets \$5 more say in how the charity operates (and they can pressure the charity to not do anything that hurts the corporation's profits, and thus look charitable without violating their fiduciary duty).

In a **consumer co-operative** businesses and organizations, the customers of the business have a say in how the business is run, and therefore the leaders are accountable to the customers. So if the customers want the business to do something that can only be done by treating the employees poorly, then the business leaders are obligated to follow the customer demands. If the company makes excess profits, that money is sent out to the customers. An example of a consumer co-operative is the outdoor recreation gear store [REI](#).

In a **worker co-operative** businesses and organizations, the employees at the company are the people who have a say in how the business is run, and therefore the leaders are accountable to the employees (rather than vice-versa). Since the business leaders controlled by the workers, this is a system where the workers control [the means of production](#) (e.g., they control the factories, offices or other business resources). If the business makes excess profits, that money is sent out to the employees.

19.1.4. Reflection Questions

- In what ways do you see capitalism, socialism, and other funding models show up in the country you are from or are living in?

[1] Advocates for socialism are often referring to democratic socialism. This is different than "National Socialists" which is shortened to "[Nazi](#)," and is a form of [Fascism](#). While Nazis do have government leaders deciding on what gets made and who gets it, that is because it is a totalitarian dictatorship run by one person (e.g., Adolf Hitler), who is [accountable to no one](#). Nazis historically have been [very opposed to socialism](#), and have a [mixed relationship with capitalism](#). What Nazis are primarily concerned with is "[cleansing](#)" their nation from people who aren't part of the "[true people](#)." So their goal is identify all the "undesirable" people (e.g., Jewish people, Roma people, queer people, disabled people, etc.), and take their stuff, and then deport or murder them in a genocide. From an ethics perspective, we'd like to state that Nazis (and other Fascists) are very bad.

19.2. Meta's Capitalist Strategy

Now that we've looked at what capitalism is, let's pick a particular example of a social media company ([Meta](#), which owns Facebook, Instagram, WhatsApp, etc.), and look at its decisions through a capitalism lense.

19.2.1. Surveillance Capitalism

Meta's way of making profits fits in a category called [Surveillance Capitalism](#).

Surveillance capitalism began when internet companies started tracking user behavior data to make their sites more personally tailored to users. These companies realized that this data was something that they could profit from, so they began to collect more data than strictly necessary ("behavioral surplus") and see what more they could predict about users. Companies could then sell this data about users directly, or (more commonly), they could keep their data hidden, but use it to sell targeted advertisement. So, for example, Meta might let an advertiser say they want an ad to only go to people likely to be pregnant. Or they might [let advertisers make ads go only to "Jew Haters"](#) (which is ethically very bad, and something Meta allowed).

19.2.2. Meta's Business Model

So, what Meta does to make money (that is, how shareholders get profits), is that they collect data on their users to make predictions about them (e.g., demographics, interests, etc.). Then they sell advertisements, giving advertisers a large list of categories that they can target for their ads.

The way that Meta can fulfill their fiduciary duty in maximizing profits is to try to get:

- **More users:** If Meta has more users, it can offer advertisers more people to advertise to.
- **More user time:** If Meta's users spend more time on Meta, then it has more opportunities to show ads to each user, so it can sell more ads.
- **More personal data:** The more personal data Meta collects, the more predictions about users it can make. It can get more data by getting more users, and more user time, as well as finding more things to track about users.
- **Reduce competition:** If Meta can become the only social media company that people use, then they will have cornered the market on access to those users. This means advertisers won't have any alternative to reach those users, and Meta can increase the prices on their ads.

19.2.3. How Meta Tries to Corner the Market of Social Media

To increase profits, Meta wants to corner the market on social media. This means they want to get the most users possible to use Meta (and only Meta) for social media. Before we discuss their strategy, we need a couple background concepts:

- **Network effect:** Something is more useful the more people use it (e.g., telephones, the metric system). For example, when the [Google+ social media network](#) started, not many people used it, which meant that if you visited it there wasn't much content, so people stopped using it, which meant there was even less content, and it was eventually shut down.
- **Network power:** When more people start using something, it becomes harder to use alternatives. For example, Twitter's large user base makes it difficult for people to move to a new social media network, even if they are worried the new owner is going to ruin it, since the people they want to connect with aren't all on some other platform. This means Twitter can get much worse and people still won't benefit from leaving it.

Let's look at a scene from the movie *The Social Network* (about the origins of Facebook), where Sean Parker (who created the music sharing app [Napster](#)) talks to Facebook founders Mark Zuckerberg and Eduardo Saverin about their strategy to grow Facebook:

The Social Network (2010) - A Billion Dollars Scene (6/10) |...



In that clip you will notice strategies for trying to use the network effect (though they don't call it that) by targeting specific users to try to make Facebook more desirable than competitors. They also discuss how they could start running ads now (making them a million dollars). But instead, if they don't sell ads now (running the company at a loss) then they can maximize their growth. Then, when they have grown much larger and have enough network power, users won't quit when they start selling ads later (and they'll make a billion dollars).

So, looking back at Meta's goal (most users possible to use Meta, and only Meta for social media), let's look at some obstacles and how Meta tries to overcome these obstacles:

- Obstacle: Users don't want ads on Facebook
 - Solution: No ads until Facebook has attracted enough users (network power) so that users won't leave when ads are introduced (Facebook introduced ads in 2007)
- Obstacle: People speak different languages
 - Solution: Increase language support of Facebook so more people can use the site
- Obstacle: Not everyone has the internet
 - Solution: [Give them free internet](#), but push them to Facebook while doing so (called [Free Basic](#))
- Obstacle: A competing company social media company has a user base (e.g., [Instagram](#), [Snapchat](#))
 - Solution: Try to purchase the company, or copy their features

19.3. Responses to Meta's Business Strategies

Let's look at some responses to Meta's business plan.

19.3.1. Competition

When Facebook started, there were already other social media platforms in use that Facebook had to compete against, but Facebook became dominant. Since then other companies have tried to compete with Facebook, with different levels of success.

Google+ tried to mimic much of what Facebook did, but it got little use and never took off (not enough people to benefit from the network effect).

Other social media sites have used more unique features to distinguish themselves from Facebook and get a foothold, such as Twitter with its character limit (forcing short messages, so you can see lots of posts in quick succession), Vine and then TikTok based on short videos, etc.

[Mastodon \(Fediverse\)](#) set of connected social media platforms that it is part of has a different way of distinguishing itself as a social media network, in that it is an open-source, community funded social media network (no ads), and hopes people will join to get away from corporate control.

Other social media networks have focused on parts of the world where Facebook was less dominant, and so they got a foothold there first, and then spread, like the social media platforms in China (e.g., Sina Weibo, QQ, and TikTok).

19.3.2. Privacy Concerns

Another source of responses to Meta (and similar social media sites), is concern around privacy (especially in relation to surveillance capitalism).

The European Union passed the [General Data Protection Regulation \(GDPR\)](#) law, which forces companies to protect user information in certain ways, and give users a "[right to be forgotten](#)" online.

Apple also is concerned about privacy, so it introduced [app tracking transparency in 2021](#). In response, [Facebook says Apple iOS privacy change will result in \\$10 billion revenue hit this year](#). Note that Apple can afford to be concerned with privacy like this because it does not make much money off of behavioral data. Instead, [Apple's profits](#) are mostly from hardware (e.g., iPhone) and services (e.g., iCloud, Apple Music, Apple TV+).

19.4. Meta vs. Users

Let's take a moment and look at how Meta's business decisions relate to what its users want.

Remember that Meta is a company owned by shareholders in a capitalist system, so decisions are driven by fiduciary duty, that is, maximizing the profits of the shareholders. And among shareholders, those who have invested the most money get the most say in what Meta does.

In this system, users of Meta's social media platforms have very little say in decisions made by the company. The users of Meta have few actions they can take that influence the company, but what they can do is:

- Use the site less or delete their account. Individually, this doesn't do much, but if they do this in coordination with others (e.g., a boycott), then this can affect Meta.
 - For example, when Facebook would make interface changes, users would all complain together, and Facebook worried people would all leave together. In order to prevent this, they began slowly rolling out changes, only giving it to some users at a time, making it harder for users to coordinate leaving together.



Fig. 19.1 [Tweet](#) relating the crash of Tumblr value to the potential crash of Twitter value right after Elon Musk purchased Twitter.

- Vote for government representatives (or pressure the government) so that they will regulate social media sites
 - Meta spends a lot of money to lobby US government leaders, so they won't be inclined to regulate Meta in a way it doesn't like

19.5. Imagining Alternatives

Now try thinking about different ways online social media could work.

Are these alternatives good ideas? 🤔

Reflect on these prompts and try to work out what the consequences would be for different ways of social media working:

- What if government regulations said that social media sites weren't allowed make money based on personal data / targeted advertising.
 - What other business models could they use? How would social media sites be different?
- What if government regulations were made to encourage a free market by requiring that users could switch social media sites easily ([interoperability](#)). How would this work?
 - Would you be able to move all your data? Would you still be able to see the content your friends post on the site you used to be on?
- What if there were a social media site funded by the government as a government service (e.g., democratic socialism)?
 - What could this social media site do differently? What do you think would work well, what would work poorly?
 - Private companies are allowed to restrict speech in ways government entities are not. How would this impact content moderation if government funds were used?
- What if social media sites were publicly funded or crowd funded (like NPR for radio, and PBS for TV, Wikipedia)? Note: Mastodon is trying to do this.

19.6. Programming, Gender, Status, and Money

While we've been talking about capitalism and social media platforms, we also want to look at the world of programming as well. In particular, we want to highlight how the profession of programming went from being a disrespected, low-pay job for women, to being a highly respected and high paying job for men.

19.6.1. Programming as Women's Work

As you may have noticed in chapter 2 of the book, the first programmers were almost all women. When computers were being invented, men put themselves in charge of building the physical devices (hardware), and then gave the work of programming the computer (software) to their assistants, often women. So, for example, you can see this at various stages of computer development, such as:

- 1800s: [Charles Babbage](#) describes the first full computer (Analytical Engine), and [Ada Lovelace](#) writes down the first computer program for it.
- 1945: The first general-purpose electrical computer was created by men and programmed by women
- 1950s: Grace Hopper invents the compiler to help with programming the computers (built by men)

As women were advancing the field of computer programming, some of them became frustrated with how they were viewed, such as Margaret Hamilton:



Fig. 19.2 [Photo](#) of Margaret Hamilton next to the computer program source code (which she was in charge of) for the [Apollo missions](#) to the moon.

When Margaret Hamilton was in charge of creating the software to run on the Apollo rockets, the men around her considered programming to be easy and less serious than the “engineering” they were doing in building the rocket. So, she began calling the programming she was doing “[software engineering](#)” to convey the complexity and rigor of the work she and her team were doing. She was able to convince her colleagues, and the term “software engineering” became common.

Still, up through the 1960s and 1970s, most computer companies made their money by selling the physical hardware. They happened to include some software to go with it, and people who bought the hardware would sometimes hire people to make more software. So software was still considered secondary, and up until the early 1980s, [women were getting around 37% of computer science degrees](#).

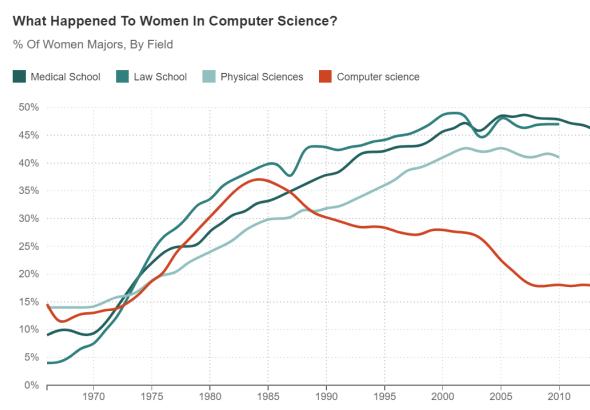


Fig. 19.3 Graph showing percentage of women receiving degrees in different fields [from NPR](#).

19.6.2. Programming for Boys and Men

In the early 1980s, a number of things changed which ended up with programming seen as a male profession, and a highly profitable and respected one.

One of the changes was that some men in the computer business figured out how to make money selling software. This was particularly the case for Bill Gates who convinced companies like IBM to license his software, so he could continue making money as more people used it.

Another change was that as computers became small enough for people to buy them for their homes, they became seen as toys for boys and not girls. The same transition is seen in video games consoles from being for the whole family, to [being for boys only](#) (e.g., the Nintendo [Game Boy](#)). In the end, computer programming became profitable and male dominated.

As many are trying to get women into programming, so that they aren't cut out of profitable and important fields, [Amy Nguyen warns](#) that men might just decide that programming is low status again (as has happened before in many fields):

The history of women in the workplace always tells the same story: women enter a male-dominated profession, only to find that it's no longer a respectable field. Because they're a part of it, so men leave in droves. Because women do it, and therefore it must not be important. Because society would rather discredit an entire profession than acknowledge that a female-dominated field might be doing something that actually matters.

19.6.3. See Also

- [The Gendered History of Human Computers](#)
- Twitter threads on women in professions
 - [poultry industry](#)
 - [women's sports](#)

19.7. Learn More

- [Shoshana Zuboff on Surveillance Capitalism's Threat to Democracy](#)
- [Demonopolizing the Internet with Interoperability](#)
- [Your Power is in Another Castle](#)

20. Colonialism

Let's take a final step back now and look at social media and how it plays out on a global scale, in particular through the lense of colonialism.

20.1. What is Colonialism?

As most social media platforms are headquartered in a very set of locations (e.g., Silicon Valley in the US, and Beijing China), but used all over the world, it is important for us to look at the concepts and history of colonialism to understand what it means for social media to be controlled in these few places.

So let's start by defining colonialism and some related concepts.

20.1.1. Colonialism Defined

[Colonialism](#) is when one group or country subjugates another group, often imposing laws, religion, culture, and languages on that group, and taking resources from them. Colonialism is often justified by belief that the subjugated people are inferior (e.g., barbaric, savage, godless, backwards), and the superiority of the group doing the subjugation (e.g., civilized, advanced).

- Key figures:
 -  [Hernán Cortés](#), 1500s, Spain → America
 -  [Francisco Pizarro](#), 1500s, Spain → South America
 -  [John Smith](#), 1600s, England → North America



- [King Leopold II of Belgium](#), 1800s, Belgium → Congo

["White Saviors"](#)

Sometimes colonialism is a little bit more subtle. For example, the term "White Savior" is a sarcastic term for white people being seen as liberating or rescuing "helpless" non-white people. This is common in TV and movies (see the TVTropes entries on [Mighty Whitey](#), and [White Man's Burden](#)). For example, consider movies like James Cameron's Avatar movies, Dances with Wolves, The Last Samurai (starring the Tom Cruise), The Blind Side, The Help, La La Land ([where a white man is trying to save "real" Jazz music](#)), etc.

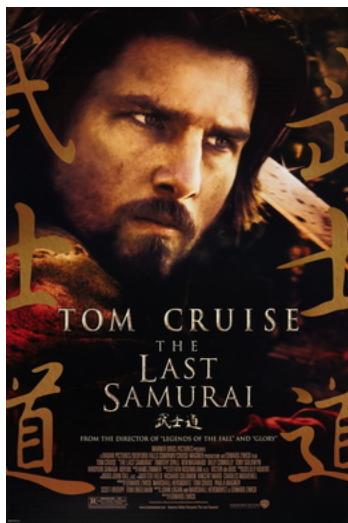


Fig. 20.1 [Poster](#) for the movie [The Last Samurai](#), starring white American Tom Cruise.

20.1.2. [Decolonization / Postcolonialism / Liberation / Landback](#)

Counter to colonialism, decolonization, postcolonialism, liberation, and landback are movements where the colonized/oppressed take back power from the colonialists/oppressors, and grapple with the consequences of having been colonized. This may be a response to colonization by:

- Government occupation (e.g., England ruling India/Pakistan, USA removing Indigenous Americans from their land, USA ruling Cuba and the Philippines)
 - Key figures:
 - [Mahatma Gandhi](#), 1800s-1900s, India
 - [Toussaint Louverture](#), 1700s-1800s, Haiti
 - [Patrice Lumumba](#), 1900s, Congo
- Oppressed group in a country with restricted rights or ability to make their voices heard (e.g., women's rights and civil rights movements in USA)
 - Key figures:
 - [Susan B. Anthony](#), 1800s-1900s, USA
 - [Martin Luther King Jr.](#), 1900s, USA
 - [Nelson Mandela](#), 1900s-2000s, South Africa
- Cultural and economic dominance (e.g., the global power centers of Silicon Valley, Hollywood, Wall Street, etc.)
 - Key figures:
 - [Gayatri Chakravorty Spivak](#), present, India, USA
 - [Edward Said](#), 1900s-2000s, Palestine, USA

20.2. Colonialism in Tech

The tech industry is full of colonialist thinking and practices, some more subtle than others.

To begin with, much of the tech industry is centralized geographically, specifically in Silicon Valley, San Francisco, California. The leaders and decisions in how tech operates come out of this one wealthy location in a wealthy nation.

Then, much of tech is dependent on exploiting cheap labor, often in dangerous conditions, in other countries (thus extracting the resource of cheap labor, from places with "inferior" governments and economies). This labor might be physical labor, or dealing with dangerous chemicals, or the content moderators who deal with viewing horrific online content.

Tech industry leaders in Silicon Valley then take what they made with exploited labor, and sell it around the world, feeling good about themselves, believing they are benefitting the world with their "superior" products.

20.2.1. Example: One Laptop Per Child

An example of how this can play out, is the failed [One Laptop Per Child](#) (OLPC) project.

In late 2005, tech visionary and MIT Media Lab founder Nicholas Negroponte [introduced a] \$100 laptop would have all the features of an ordinary computer but require so little electricity that a child could power it with a hand crank

- [OLPC's \\$100 laptop was going to change the world — then it all went wrong](#)

OLPC wanted to give every child in the world a laptop, so they could learn computers, believing he would benefit the world. But this project failed for a number of reasons, such as:

- The physical device didn't work well. The hand-powered generator was unreliable, the screen too small to read. OLPC was not actually providing a "superior" product to the rest of the world.
- When they did hand out some, it didn't come with good instructions. Kids were just supposed to figure it out on their own. If this failed, it must be the fault of the poor people around the world.
- It wasn't designed for what kids around the world would actually want. They didn't take input from actual kids around the world. OLPC thought they had superior knowledge and just assumed they knew what people would want.

In the end, this project fell apart, and most of tech moved on to whatever next big idea to save the world.

20.3. Colonialism in Programming

Colonialism shows up in programming languages as well.

20.3.1. Programming in English

Most programming languages are based in English, and there are very few [non-English programming languages](#), and those that exist are rarely used.

The reason few non-English programming languages exist is due to the network effect, which we mentioned last chapter. Once English became the standard language for programming, people who learn programming learn English (or enough to program with it). Attempts to create a non-English programming language face an uphill battle, since even those that know that language would still have to re-learn all their programming terms in the non-English language.

Now, since many people do speak other languages, you can often find comments, variable names, and even sometimes coding libraries which use non-English languages, but the core coding terms (e.g., `for`, `if`, etc.), are still almost always in English.

See also this academic paper: [Non-Native English Speakers Learning Computer Programming: Barriers, Desires, and Design Opportunities](#)

20.3.2. Programming Adoption Through Silicon Valley

The book [Coding Places: Software Practice in a South American City](#), by Dr. Yuri Takhteyev explores how programming in Brazil differs from programming in Silicon Valley. Dr. Takhteyev points out that since tech companies are centralized in Silicon Valley, this then means they Silicon Valley determines which technologies (like programming languages or coding libraries) get adopted. He then compares this to a how the art world works: "[If you want to show \[your art\] in Chicago..you must move to New York](#)". He then rewords this for tech:

if you want your software to be used widely in Brazil, you should write it in Silicon Valley.

We can see this happening in a [study by StackOverflow](#). They found that some technologies which are gaining in popularity in Silicon Valley (Python and R), are not commonly used in poorer countries, whereas programming tech that is considered outdated in Silicon Valley (android and PHP), is much more popular in poorer countries.

In his book, Takhteyev tracks the history of the [Lua programming language](#), which was invented in Brazil, but became adopted in Silicon Valley. In order to gain popularity in Silicon Valley (and thus the rest of the world), the developers had to make difficult tradeoffs, no longer customizing it for the needs of their Brazilian users.

20.4. Mark Zuckerberg's "Benevolent" Goals

Let's look more at Mark Zuckerberg and Meta as examples.



Fig. 20.2 Time Magazine article: [Inside Facebook's Plan to Wire the World](#), featuring a capitalist doing colonialism. This article is well worth reading.

The subtitle of the above [Time Magazine article](#) is "Mark Zuckerberg is on a crusade to put every single human being online." In it Mark Zuckerberg outlines his humanitarian goal of trying to get every human on earth an Internet connection. Zuckerberg claims he is doing this for benevolent reasons and not selfish ones. The article quotes Sheryl Sandberg (Meta's Chief Operating Officer) saying:

When we've been accused of doing this for our own profit, the joke we have is, God, if we were trying to maximize profits, we have a long list of ad products to build! We'd have to work our way pretty far down that list before we got to this.

We can see this too in Facebook's 2017 mission statement: "Make the world more open and connected."

20.4.1. Questioning Zuckerberg's Plan

Mark Zuckerberg here has put himself in the position of a "White Savior" who has come to fix the problems of people all over the world by giving them the Internet. But we can question whether his plan is a good one.

First: do users want the connection that Mark Zuckerberg is offering? The answer is at least in part yes, as people have signed up for the Internet through Zuckerberg's program, and many are excited to access resources, be connected to the online world like everyone else.

Second: is connecting everyone a good thing? The answer to this is not necessarily yes. The 1979 comedic sci-Fi novel [The Hitchhiker's Guide to the Galaxy](#), mocks the idea of the good of connecting everyone:

[!]f you stick a Babel fish in your ear you can instantly understand anything said to you in any form of language. [...] Meanwhile, the poor Babel fish, by effectively removing all barriers to communication between different races and cultures, has caused more and bloodier wars than anything else in the history of creation.

In fact, there are ways Zuckerberg's plan has already gone poorly. Meta changed motto after "connecting the world" after problems with [genocide](#) and the [January 6th insurrection](#)). So Mark Zuckerberg posted an update:

I used to think that if we just gave people a voice and helped them connect, that would make the world better by itself. In many ways it has. But our society is still divided. Now I believe we have a responsibility to do even more. It's not enough to simply connect the world, we must also work to bring the world closer together.

- [Mark Zuckerberg, March 15, 2021](#)

Meta now has a mission statement of "[give people the power to build community and bring the world closer together](#)." But is this any better?

Again, you can read more about much of this in the [Time Magazine article](#).

20.5. Colonialism and Meta's Strategy

We looked at Mark Zuckerberg's "benevolent" goals and saw his failed efforts at being a "white savior," what about the Meta company? Is Meta being colonialist? What about Meta's fiduciary duty to maximize profits?

Let's go through our earlier definition of colonialism and apply it to Meta and Zuckerberg's goals and actions.

20.5.1. Subjugation

In colonialism, one group or country subjugates another group, often imposing laws, religion, culture, and languages on that group. In this case, Zuckerberg and Meta are imposing their version of the Internet on people around the world. In particular, when Zuckerberg offers free Internet, it only comes with access to a few sites, such as Wikipedia, and of course Facebook. So Zuckerberg is choosing what part of the Internet people get access to. And while the people might gladly accept this deal, the bargain is being made by two people in very unequal positions, and Zuckerberg has almost complete freedom to set the terms of the deal.

See also:

- ['It's digital colonialism': how Facebook's free internet service has failed its users](#)

20.5.2. Taking Resources

In colonialism, the colonialist group also takes resources from the subjugated group. But what resources is Meta getting out of this? Especially if the people they are giving free Internet to don't have money to make it worth selling ads to show them?

In our view, Meta is getting two main benefits out of getting people with no Internet access onto the Internet with Facebook:

More Behavioral Data

They get more behavioral data. Even if they can't sell ads for this group of people yet, they are still accumulating a larger data set with a larger percentage of Earth's population.

Preventing Competition

Most importantly, they can prevent a competitor from taking hold. If these people got Internet access through a non-Facebook option, they might join a new or competing social media network, and through the network effect, that competing Network might take off. And that would be a threat to Meta trying to corner the market on Social Media.

A particularly telling example of this is the story of WhatsApp:

Though WhatsApp was founded in the US (in 2009), it became very popular outside the US, becoming much more commonly used than Facebook Messenger. Facebook was terrified of losing out on the non-US market, since they wanted to control everything, so in 2014 Facebook spent \$19 billion dollars to purchase WhatsApp:

WhatsApp was just too far ahead in the international mobile messaging race for Facebook to catch up [...] Facebook either had to surrender the linchpin to mobile social networking abroad, or pony up and acquire WhatsApp before it got any bigger. It chose the latter.

• [TechCrunch](#)

20.5.3. Belief in Inferiority of the Subjugated People

Finally, colonialism is justified by belief in the inferiority of the subjugated people (e.g., barbaric, savage, godless, backwards), and the superiority of the group doing the subjugation (e.g., civilized, advanced). So how do we see this here?

In the [Time Magazine article](#) mentioned in the last section, Zuckerberg focuses on ways he notices that it is worse in rural India:

Zuckerberg said] ["There were, like, 40 students sitting on the floor, and then the guy running it was saying that there were 1.4 million schools and this was one of the better ones," he said later—he can never resist a statistic. "There was no power. There are no toilets in the whole village!"

But this might not be the whole picture. Perhaps they have different and valuable community arrangements, or stories, or customs, or any number of things that Zuckerberg didn't care to notice. Or if one of the people in rural India came and visited Zuckerberg, perhaps they would say: "Oh Mark, I see. You have no real friends or community. That's sad." So when Zuckerberg and Meta impose their products (and culture) on people in rural India, those people, and the world might be losing something.

Additionally, Zuckerberg also, ignores how he and Meta (and larger industry and world powers) might have exploited people in rural India and be partly responsible for the poverty there.

20.6. Imagining Alternatives

Now try thinking about different ways online social media could work.

Are these alternatives good ideas? 🤔

Reflect on these prompts and try to work out what the consequences would be for different ways of social media working:

- What if social media sites were governed by their users instead of by shareholders (e.g., governed by the subjugated instead of the colonialists)?
 - How would users participate in decision making?
 - Would non-users have a say (e.g., if the whole user base decides to harass a group of non-users)?
 - How do you think the sites would work differently?
- What if social media sites were created in other countries and cultures? (Note: we already have various Chinese social media sites as one point of comparison)
 - What different values would be embedded and what would that look like?
 - For example, many cultures value family connections much more than white Americans do, but current American social media sites do not emphasize them.

20.7. Learn More

- [OLPC's \\$100 laptop was going to change the world — then it all went wrong](#)
- [Inside Facebook's Plan to Wire the World](#)
- ['It's digital colonialism': how Facebook's free internet service has failed its users](#)

21. Conclusions

We've reached the end of the book! Let's look back and what we covered and consider what to do with everything we've talked about.

21.1. What We Covered

We covered a lot of topics in this book, and we hope you learned something and found it valuable!

21.1.1. Social Media

We covered a number of topics in relation to social media:

- Bots
- Data
- History of Social Media
- Authenticity
- Trolling
- Data Mining
- Privacy and Security
- Accessibility
- Recommendation Algorithms
- Virality
- Mental Health
- Content Moderation
- Content Moderators
- Crowdsourcing
- Harassment
- Public Shaming
- Capitalism
- Colonialism

We hope that by the end of this book you know a lot of social media terminology (e.g., context collapse, parasocial relationships, the network effect, etc.), that you have a good overview of how social media works and is used, and what design decisions are made in how social media works, and the consequences of those decisions.

We also hope you are able to recognize how trends on internet-based social media tie to the whole of human history of being social creatures, and can apply lessons from that history to our current situations.

21.1.2. Ethics

We covered a number of ethics frameworks and you got practice applying them in different situations:

- Confucianism
- Taoism
- Virtue Ethics
- Aztec Virtue Ethics
- Natural Rights
- Consequentialism
- Deontology
- Ethics of Care
- Ubuntu
- American Indigenous Ethics
- Divine Command Theory
- Egoism
- Existentialism
- Nihilism

We hope that by the end of this book, you have a familiarity in applying different ethics frameworks, and considering the ethical tradeoffs of uses of social media and the design of social media systems. Again, our goal has been not necessarily to come to the "right" answer, but to ask good questions and better understand the tradeoffs, unexpected side-effects, etc.

21.1.3. Automation

We also covered a number of topics in automation, such as:

- History of programming
- Python Programming Language
- JupyterHub and JupyterNotebooks
- Variables
- Data types (e.g., numbers, strings)
- Reddit Praw library (posting, searching, etc.)
- Other code libraries (e.g., time)
- For Loops
- Conditionals (if/else)
- Lists
- Dictionaries
- Functions (calling, and writing our own)
- Sentiment Analysis
- Recursion (for printing tweets and replies)

We hope that by the end of this course you have a familiarity of what programming is and some of what you can do with it. We particularly hope you have a familiarity with basic Python programming concepts, and an ability to interact with Reddit using computer programs.

21.2. Ethics in Tech

In the first chapter of our book we quoted actor Kumail Nanjiani on tech innovators' lack of consideration of ethical implications of their work.

Of course, concerns about the implications of technological advancement are nothing new.

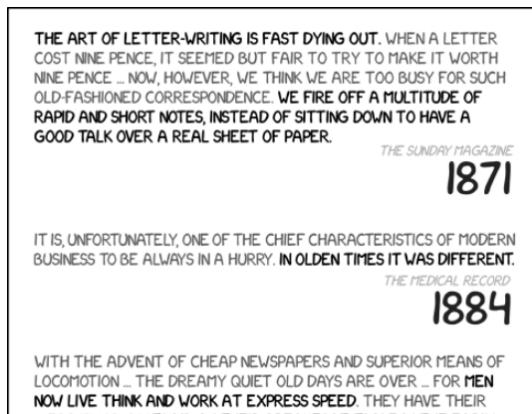


Fig. 21.1 The start of an [xkcd comic](#) compiling a hundred years of complaints about how technology has speed up the pace of life. (full transcript of comic available at [explainxkcd](#))

And inventors ignoring the ethical consequences of their creations is nothing new as well, and gets critiqued regularly:

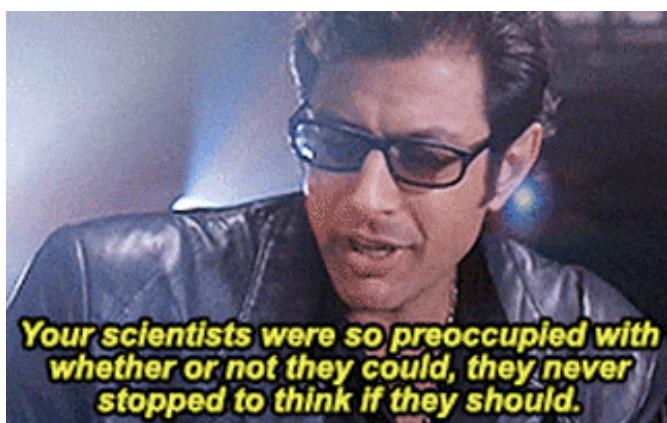


Fig. 21.2 A major theme of the movie [Jurassic Park \(1993\)](#) is scientists not thinking through the implications of their creations.



Alex Blechman
@AlexBlechman

...

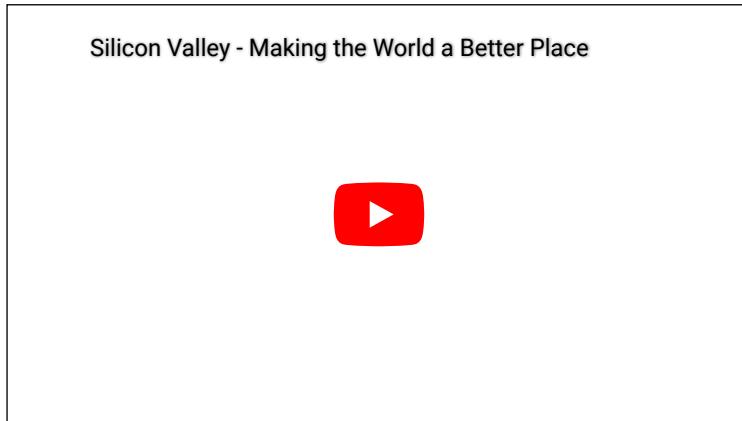
Sci-Fi Author: In my book I invented the Torment Nexus as a cautionary tale

Tech Company: At long last, we have created the Torment Nexus from classic sci-fi novel Don't Create The Torment Nexus

5:49 PM · Nov 8, 2021 · Twitter Web App

Fig. 21.3 [Tweet parodying how tech innovator often do blatantly unethical things](#)

Many people like to believe (or at least convince others) that they are doing something to make the world a better place, as in this parody clip from the [Silicon Valley show](#) (the one Kumail Nanjiani was on, though not in this clip):



But even people who thought they were doing something good regretted the consequences of their creations, such as [Eli Whitney](#) who hoped his invention of the cotton gin would reduce slavery in the United States, but only made it worse, or [Albert Einstein regretting his role in convincing the US government to invent nuclear weapons](#).

21.3. Going Forward

Given all that we've covered and all the potential intended and unintended consequences of social media, here's what we hope for you going forward.

21.3.1. As a Social Media User

As a social media user, we hope you are informed about things like: how social media works, how they influence your emotions and mental state, how your data gets used or abused, strategies in how people use social media, and how harassment and spam bots operate.

We hope with this you can be a more informed user of social media, better able to participate, protect yourself, and make it a valuable experience for you and others you interact with.

For example, you can hopefully recognize when someone is intentionally posting something bad or offensive (like the bad cooking videos we mentioned in the Virality chapter, or an intentionally offensive statement) in an attempt to get people to respond and spread their content. Then you can decide how you want to engage (if at all) given how they are trying to spread their content.

21.3.2. As a Member of Society

As a member of society, we hope you are informed about the role social media plays in shaping society, such as how design decisions and bots can influence social movements (polarizing, spreading, or stifling different them), and the different economic, social, and governmental pressures that social media platforms operate under.

We hope you are then able to advocate for ways of improving how social media operates in society. That might be through voting, or pressuring government officials, or spreading ideas and information, or organizing coordinated actions or protests.

21.3.3. As a Potential Tech Worker

As a potential worker in the tech industry, you might someday find yourself in a position where you have influence over how social media platforms are designed, programmed, or operated (e.g., you could be a programmer, or designer, or content moderator).

We hope that if you find yourself in one of these positions, you consider the ethics of what you are doing. We hope you could then bring those concerns into how you design and implement automated systems for social media sites.

An Example of Action

As an example of what someone in this position might do, let's consider this story from Steve Krenzel, who was a software engineer at Twitter from 2015-2017.

With Twitter's change in ownership last week, I'm probably in the clear to talk about the most unethical thing I was asked to build while working at Twitter.

[...]

Twitter was on its death bed and was desperate for money. A large telco wanted to pay us to log signal strength data in N. America and send it to them.

My plan was to aggregate signal strength by carrier / by location. I worked with Data Science to find a granularity – minimum area size and minimum distinct users per area – that would preserve anonymity even when combined with other sources of data (differential privacy).

When we sent this data to the telco they said the data was useless. They switched their request and said they want to be able to tell how many of our users are entering their competitors' stores.

A bit sketchier, but maybe workable in a privacy respecting way?

We ran an alternative by the telco. They didn't like it and were frustrated. So was Sales. I was asked to go to telco's HQ and figure out exactly what they want.

The subsequent request was absurd.

I wound up meeting with a Director who came in huffing and puffing.

The Director said "We should know when users leave their house, their commute to work, and everywhere they go throughout the day. Anything less is useless. We get a lot more than that from other tech companies."

I responded with some variant of "No fucking way".

There was no universe where I was going to help sell granular identifiable user location data.

This led to more internal meetings. Legal said the request was fine – none of it violated the user ToS [Terms of Service].

Normally they might find another engineer to do this work, but my whole team was aligned with the privacy concerns. Twitter had also just done layoffs (aside: time is a flat circle), so there were no spare engineers around.

[...]

My last email written at Twitter was to Jack [Twitter CEO]. To his credit, he responded quickly with something to the effect of "Let me look into that and make sure there isn't a misunderstanding. It doesn't seem right. We wouldn't want to do that."

It was in his hands now.

As far as I know, the project actually got canned. Jack genuinely didn't like it.

I don't know if this mindset will hold true with the new owner of Twitter though. I would assume Elon will do far worse things with the data.

And, for the any employees still at Twitter, don't underestimate the power of a pocket veto.

Sometimes it doesn't work out, or you have to escalate and risk it back firing, but a good pocket veto is a tool to learn to wield well.

- [Twitter Thread](#)
- [Business Insider Article](#)

You aren't likely to end up in a situation as dramatic as this. If you find yourself making a stand for ethical tech work, it would probably look more like arguing about what restrictions to put on a name field (e.g., minimum length), or arguing that a small piece of data about users is not really needed and shouldn't be tracked. But regardless, if you end up in a position to have an influence in tech, we want you to be able to think through the ethical implications of what you are asked to do and how you choose to respond.

21.4. Final Reflection Questions

How have your views on social media changed (or been reinforced)?

How have your views on ethics changed (or been reinforced)?

How have your views on automation and programming changed (or been reinforced)?

If you could magically change anything about how people behave on social media, what would it be?

If you could magically change anything about how social media sites are designed, what would it be?

If you could magically change anything about how social media sites operate as businesses, what would it be?

If you could design a new social media site, what would you want to do that other social media sites do? What would you want to do differently than other social media sites?

21.5. More Resources

We wanted to conclude by linking you to more resources that you might be interested, some of which we weren't able to delve into in this book.

21.5.1. Recommended Articles

- [A People's History of Black Twitter](#)
- [There Is No Replacement for Black Twitter | WIRED](#)
- [Facebook won't call itself a media company. Is it time to reimagine journalism for the digital age?](#)
- [Social media and science](#), etc.

21.5.2. Recommended Books

- Gender specific
 - [Data Feminism by Catherine D'Ingnazio and Lauren F. Klein](#)
 - [Recoding Gender: Women's Changing Participation in Computing by Janet Abbate](#)
 - [Programmed Inequality: How Britain Discarded Women Technologists and Lost Its Edge in Computing by Mar Hicks](#)
- Race specific
 - [Black Software by Charlton D. McIlwain](#)
 - [Dark Matters: On the Surveillance of Blackness by Simone Browne - Algorithms of Oppression: How Search Engines Reinforce Racism by Safiya Umoja Noble](#)
 - [Coded Bias \(Netflix documentary\)](#)
- Content Moderation
 - [Custodians of the Internet: Platforms, Content Moderation, and the Hidden Decisions That Shape Social Media by Tarleton Gillespie](#)
 - [Behind the Screen: Content Moderation in the Shadows of Social Media by Sarah T. Roberts](#)
- General Social Media
 - [The SAGE Handbook of Social Media](#)
- International programming
 - [Coding Places: Software Practice in a South American City by Yuri Takhteyev](#)
- Economics
 - [Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor by Virginia Eubanks](#)
 - [Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass by Mary L. Gray](#)

- [The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power by Shoshana Zuboff](#)
- Other ethics of tech books
 - [Weapons Of Math Destruction: How Big Data Increases Inequality And Threatens Democracy by Cathy O'Neil - Design Justice: Community-Led Practices to Build the Worlds We Need by Sasha Costanza-Chock](#)
 - [Your Computer Is on Fire](#)
 - [Technically Wrong: Sexist Apps, Biased Algorithms, and Other Threats of Toxic Tech by Sara Wachter-Boettcher](#)
 - [Media Ethics, Free Speech, and the Requirements of Democracy](#).
 - [Viral Justice: How We Grow the World We Want by Ruha Benjamin](#)

21.5.3. Other Social Media Programming Options

Note: We haven't tried these out yet, but we are pointing to what looks like the information you'd need to set yourself up:

- Facebook / Instagram / WhatsApp
 - Developer access: <https://developers.facebook.com/>
 - Python library: <https://facebook-sdk.readthedocs.io/en/latest/api.html>
- TikTok
 - Python library: <https://dteather.com/TikTok-Api/docs/TikTokApi.html>
 - TikTok for developers appears to be geared toward making apps people can use on their accounts: <https://developers.tiktok.com/>
- QQ Weibo
 - Developer access (with some python code):

[https://developers.weixin.qq.com/doc/offiaccount/en/Getting Started/Getting Started \(](https://developers.weixin.qq.com/doc/offiaccount/en/Getting Started/Getting Started ()

Bot Account Set-Ups

Making a Reddit Bot Account

In using this textbook, you will have opportunities to create and run reddit bots on your own reddit account.

While we have made a fake version of Reddit for you to test all the code in this book, we highly encourage you to make a reddit bot account and try it out for real!

Sign up for Reddit

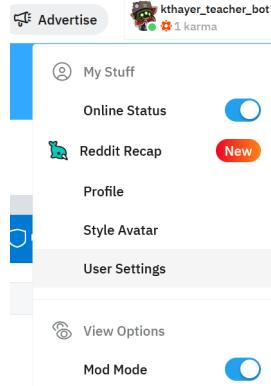
<https://www.reddit.com/register/>

You might want to make a new, separate Reddit account, just for making reddit bots, since you don't want to accidentally get your main reddit account banned or labeled as a bot.

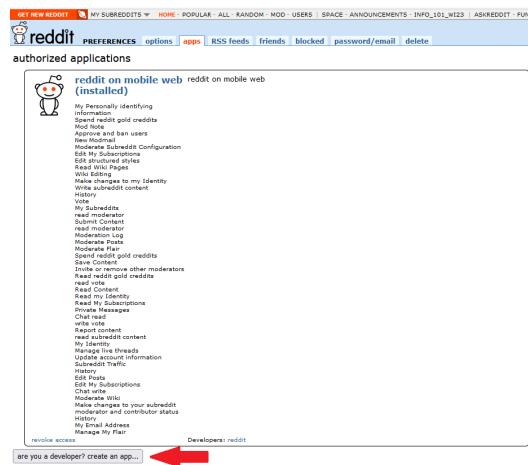
Note: If you want to make a new account and you already have one, you may need to sign out from your current account, or use a different web browser (e.g., Mozilla, Google Chrome, Microsoft Edge, Safari).

Create Reddit bot "application"

Once you are logged into Reddit, go to user settings:



In the user settings, go to the Safety & Privacy tab and click the Manage third-party app authorization link at the bottom. This should take you to an apps tab (you can also try going straight there [with this link](#)). Click on the bottom button that says “are you a developer? create an app...”



Once you are on the create application page, make up a name for your bot (I chose “class_testing_scripts”), then choose the “scripts” type, fill in a description, and for the redirect uri, use “<http://www.example.com/unused/redirect/uri>”

create application

Please read the [API usage guidelines](#) before creating your application. After creating, you will be required to [register](#) for production API use.

name	class_testing_scripts
<input type="radio"/> web app	A web based application
<input type="radio"/> installed app	An app intended for installation, such as on a mobile phone
<input checked="" type="radio"/> script	Script for personal use. Will only have access to the developers accounts
description	This will be used to learn how to program with Reddit as part of a class
about url	<input type="text"/>
redirect uri	<input type="text" value="http://www.example.com/unused/redirect/uri"/>
create app	

Once you are done, you should see the app information, which includes two key values: the client_id and the client_secret. Copy these so that you can use them later to run your bot.

developed applications

	class_testing_scripts This will be used to learn how to program with Reddit as part of a class
secret	client_id
name	class_testing_scripts
description	This will be used to learn how to program with Reddit as part of a class
about url	<input type="text"/>
redirect uri	<input type="text" value="http://www.example.com/unused/redirect/uri"/>
update app	delete app

Test your keys

When you get to chapter 2.3.8 ([Demo: Try Running the Reddit Bot!](#)), you can try running the code and replacing the fake special passwords with the ones from your account, and see if you can use the code to post an actual tweet to your account.

Understand Reddit Rules for Bots

Before you try doing anything too creative with reddit bots, make sure you look over the [Reddit API Terms of Use](#) and the [Reddit API Rules](#), that way you don't get yourself banned.

Making a Twitter Bot Account

In using this textbook, you will have opportunities to create and run twitter bots on your own twitter account.

While we have made a fake version of Twitter for you to test all the code in this book, we highly encourage you to make a twitter bot account and try it out for real!

Sign up for Twitter

<https://twitter.com/signup>

You might want to make a new twitter account, just for making twitter bots, since you don't want to accidentally get your main twitter account banned or labeled as a bot.

Note: If you want to make a new account and you already have one, you may need to sign out from your current account, or use a different web browser (e.g., Mozilla, Google Chrome, Microsoft Edge, Safari).

Sign up for "developer access" (bot permission)

Now that you have a twitter account, you need to get permission to use it as a bot. This is called "developer access." The fastest way of doing this is to sign up for "Essential access," so go here to sign up for essential access:

<https://developer.twitter.com/en/portal/petition/essential/basic-info>

The screenshot shows a form for applying for developer access. It includes fields for Twitter Account (@ [REDACTED]), Email ([REDACTED]), Country (United States), Use Case (Student), and a dropdown for government content. There is also a newsletter checkbox and a 'Get involved and updated' section.

Twitter Account ⓘ
@ [REDACTED]
Switch @username Create new @username

Email ⓘ
[REDACTED]
Change email

What country are you based in?
United States

What's your use case?
We need this information for data protection. [Learn more](#)
Student

Will you make Twitter content or derived information available to a government entity or a government affiliated entity? ⓘ
No

Get involved and updated
 Sign me up for the latest Twitter Dev news, tips and updates

[Need help?](#) [Let's do this](#)

Note when filling this out, that the information button on the question about sharing data with a government says that a government funded university doesn't count.

Get special "bot" passwords

Once you have developer access, you'll need a set of 5 special passwords to be able to make a fully functional Twitter bot:

- Bearer Token
- Consumer Key (aka "API Key")
- Consumer Secret (aka "API Key Secret")
- Access Token
- Access Token Secret

You'll want to get all of these and then save them somewhere so that you can find them again (e.g., send yourself an email).

In order to get these 5 special passwords, do the following:

Go to the twitter developer portal (<https://developer.twitter.com/en/portal>)

In Projects & Apps, press "Add App" (note in my screenshot I already have an app added).

The screenshot shows the Twitter Developer Portal's Overview page. On the left, a sidebar menu includes 'Dashboard', 'Projects & Apps' (which is highlighted with a red box), 'Overview', 'Teaching Demo', 'Teaching Demo (prod)', 'Products' (with a 'NEW' badge), and 'Account'. The main content area is titled 'Elevated' and shows a 'Teaching Demo' card with 'V1.1 ACCESS' and 'V2 ACCESS' buttons. Below it is a 'PRODUCTION APP' card for 'Teaching Demo (prod)'. At the bottom of the main content area, there is a button labeled '+ Add App' which is also highlighted with a red box.

For the App Environment, select production

The screenshot shows the 'Choose an App environment' step. It has three options: 'Development' (selected), 'Staging', and 'Production' (which is highlighted with a red box and marked as 'ACTIVE'). Below each option is a brief description: 'Development' is 'For new work and in progress features', 'Staging' is 'Used to test out changes', and 'Production' is 'Used for live products'.

Then choose whatever name you want for this "project," for example "testbotkylethayer"

Now save these keys somewhere on your computer. Later, when you write Twitter bots:

- "API Key" will be called "consumer_key"
- "API Key Secret" will be called "consumer_secret"
- "Bearer Token" will be called "bearer_token"

For security, this will be the last time we'll fully display these. If something happens, you can always regenerate them. [Learn more](#)



Then go to the app settings for your project:

The screenshot shows the 'Setup your App' section of the Twitter Developer Portal. It includes fields for 'API Key', 'API Key Secret', and 'Bearer Token', each with a 'Copy' button. Below these fields is a 'Setup your App' button, which is circled in blue.

Under User Authentication Settings, click "Set-Up"

The screenshot shows the 'App details' section of the Twitter Developer Portal. It includes fields for 'NAME' (Teaching Demo (prod)), 'APP ID' (22844092), and 'DESCRIPTION' (The information will be visible to people who've authorized your App. This app was created to use the Twitter API.). Below this is an 'ENVIRONMENT' section set to 'Production'. At the bottom is a 'User authentication settings' section with a note: 'Authentication not set up OAuth 2.0 and OAuth 1.0a are authentication methods that allow users to sign in to your App with Twitter. They also allow your App to make specific requests on behalf of authenticated users. You can turn on one, or both methods.' A 'Set up' button is highlighted with a red circle.

Enable both OAuth 2.0 and OAuth 1.0a and set your app type to "automated App or bot":

Note: (I am guessing you don't need OAuth 2, but we'll turn it on just in case)

User authentication settings

OAuth 2.0 and OAuth 1.0a are authentication methods that allow users to sign in to your App with Twitter. They also allow your App to make specific requests on behalf of authenticated users. You can turn on one, or both methods. [Read the docs](#)

The screenshot shows two sections: 'OAuth 2.0' and 'OAuth 1.0a'. Both sections have a green toggle switch that is turned on. Under 'OAuth 2.0', there are two bullet points: 'Can be used with the Twitter API v2 only' and 'Allows you to pick specific scopes (also known as, permissions)'. Under 'OAuth 1.0a', there are two bullet points: 'Can be used with Twitter API v1.1 and v2' and 'Uses broad authorization with coarse scopes'. Below these sections is a box labeled 'OAUTH 2.0 SETTINGS' with a dropdown menu set to 'Automated App or bot'. A note below the dropdown states: 'This type of App uses **confidential clients**, which securely authenticate with the authorization server. They keep your client secret safe.'

Then Set OAuth 1 settings to allow read and write and direct message, and if it requires "Callback URI / Redirect URL" and "Website URL", those can be anything, and just put "http://uw.edu"

The screenshot shows the 'OAUTH 1.0A SETTINGS' page. It includes a section for 'Request email from users (optional)' with a toggle switch that is off. Below this is a section for 'App permissions' with three radio button options: 'Read' (Read Tweets and profile information), 'Read and write' (Read and Post Tweets and profile information), and 'Read and write and Direct message' (Read Tweets and profile information, read and post Direct messages). The third option is selected. At the bottom, there are fields for 'Callback URI / Redirect URL' containing 'http://uw.edu' and 'Website URL' also containing 'http://uw.edu'.

Save your settings. You will be given a OAuth2.0 Client ID and Client Secret. I don't think you need these, but save them somewhere on your computer just in case

Now, in your app settings, press "Keys and tokens"

The screenshot shows the Twitter Developer Portal dashboard. On the left sidebar, there are links for 'Dashboard', 'Projects & Apps', and 'Overview'. In the main area, there is a user handle 'kthayertest' and a 'TEACHING DEMO' label. Below the handle, there are two tabs: 'Settings' and 'Keys and tokens'. The 'Keys and tokens' tab is circled in blue.

And press "Generate" for "Access Token and Secret"

TEACHING DEMO

kthayertest

Settings **Keys and tokens**

Consumer Keys

API Key and Secret ⓘ Reveal API Key hint Regenerate

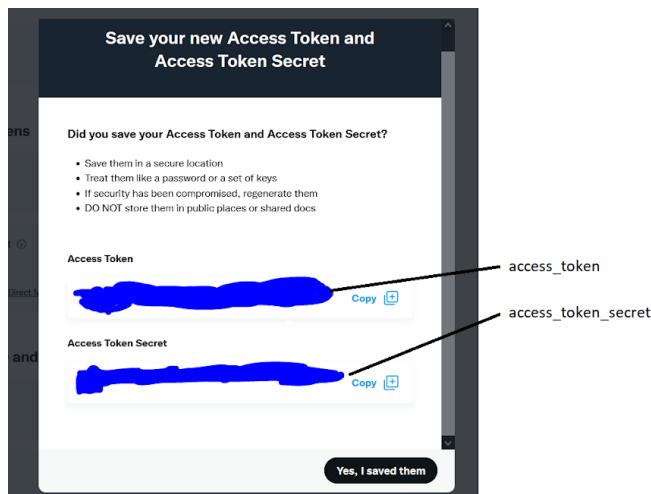
Authentication Tokens

Bearer Token ⓘ Generated January 9, 2022 Revoke Regenerate

Access Token and Secret ⓘ For @uw_class_bot00 Generate

Now save these keys, both somewhere on your computer. Later, when you write Twitter bots:

- “Access Token” will be called “access_token”
- “Access Token Secret” will be called “access_token_secret”



Note: If you ever lose these special passwords, or accidentally share them, you can regenerate them.

Test your keys

When you get to chapter 2.3.8 (), you can try running the code and replacing the fake special passwords with the ones from your account, and see if you can use the code to post an actual tweet to your account.

Understand Twitters Rules for Bots

Before you try doing anything too creative with twitter bots, make sure you look over [Twitters Policy on what you are allowed to do](#), that way you don't get yourself banned.

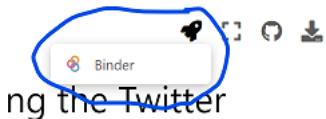
Practice Solutions

These are solutions to the practice problems in the different chapters.

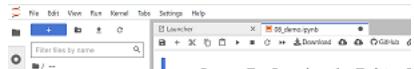
Ch 3 Practice: Statements and Variables

This Python Notebook is a chance for you to try out the programming concepts we have covered thus far.

As we mentioned previously in the first bot demo (2.3.8), in order to run the code, you can look for the rocket button at the top which will give you an option to "launch binder"



If you launch binder, it will take a while to load, but eventually show you a version of this page Jupyter Notebook in a code editor called Jupyter Lab



In Jupyter Lab you can double click any section to edit it, and you can press the triangle "run" button to run the code (or display the text).



When the code runs, the little number to the left of the code block should change. There might also be some output from your action displayed below the code block.

So now you can go through the rest of this page and try out the practice exercises for yourself!

Variables

You will first practice saving values into variables. Remember, the way we save a value into a variable is like this:

```
variable_name = value
```

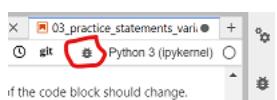
First, save the piece of text "I am writing a computer program!" into a variable called `my_progress`

```
my_progress = "I am writing a computer program!"
```

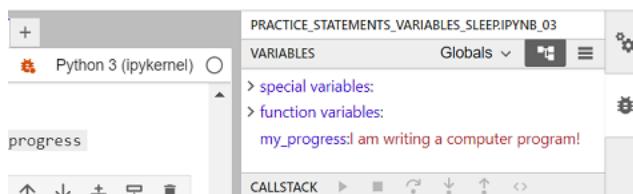
Viewing variables in the debugger

Before we continue, we are going to show you how to open the debugger so you can see what is being saved in your variables.

On the top right of this tab, press the small bug icon to "enable debugging":



Then, if you did the step above correctly, you should see the variable `my_progress` with the value "I am writing a computer program!" next to it:



Practice number variables

First, write and run a line of code to save the value 5 into a variable named `number_of_pies`

```
number_of_pies = 5
```

Now, save the value 12.5 into a variable named `cost_per_pie`

```
cost_per_pie = 12.5
```

Now make a new variable called `total_pie_cost` and save into the value of the `number_of_pies` multiplied by the `cost_per_pie`.

Note: In python (and many programming languages), the symbol for multiply is `*`

```
total_pie_cost = number_of_pies * cost_per_pie
```

Now use the `display` function to display what is saved in `total_pie_cost`

```
display(total_pie_cost)
```

```
62.5
```

More variable practice

Now, make a new variable called `first_name` and assign your first name to it

```
first_name = "Kyle"
```

Now, make a variable called `last_name` and save your last name to it

```
last_name = "Thayer"
```

Create a variable called `age` and assign your age to it.

```
age = 38
```

~ A year goes by ~

Increase the `age` variable by 1.

```
age = age + 1
```

Now write three lines of code, with each line using `display` to show what is saved in `first_name`, `last_name`, and `age`

```
display(first_name)  
display(last_name)  
display(age)
```

```
'Kyle'
```

```
'Thayer'
```

```
39
```

Sleep

In order to use sleep, we must first import it from the time library

```
from time import sleep
```

Now try displaying 5 messages of your choosing, with some pauses between each one:

```
display("message 1")
sleep(.01) #I am making these pauses small to make the book build faster
display("message 2")
sleep(.02)
display("message 3")
sleep(.01)
display("message 4")
sleep(.05)
display("message 5")
```

'message 1'

'message 2'

'message 3'

'message 4'

'message 5'

Reddit Bot Practice

Now lets try a Reddit bot with variables and sleep!

Load Praw Library

First, we need to load the praw library

```
# Load some code called "praw" that will help us work with reddit
import praw
```

(Optional) Step 1b: Make a fake praw connection with the fake_praw library

For testing purposes, we've added this line of code, which loads a fake version of praw, so it wont actually connect to reddit. **If you want to try to actually connect to reddit, don't run this line of code.**

```
%run ../../fake_apis/fake_praw.ipynb
```

Fake praw is replacing the praw library. Fake praw doesn't need real passwords, and prevents you from accessing real reddit

Step 2: Load your developer access passwords

To use this on your real Reddit account, copy your [developer access passwords](#) into the code below, replacing our fake passwords.

```
# Load all your developer access passwords into Python
# TODO: Put your reddit username, password, and special developer access passwords below:
username="fake_reddit_username"
password="sa@#4*fdf_fake_password_$%DSG#%DG"
client_id="45adf$TW_fake_client_id_JESdsg10"
client_secret="56sd_fake_client_secret_%Yh%"
```

Step 4: Give praw (or fake_praw) your developer access passwords

```
# Give the praw code your reddit account info so
# it can perform reddit actions
reddit = praw.Reddit(
    username=username, password=password,
    client_id=client_id, client_secret=client_secret,
    user_agent="a custom python script"
)
```

Fake praw is pretending to collect account info to use on reddit

Step 5: Submit a post to Reddit

Post something you learned in the class so far:

Remember, the code to post a tweet looks like this:

```
reddit.subreddit(  
    "soc_media_ethics_auto"  
)  
.submit(  
    "This is the title of the post",  
    selftext = "This is the content of the post"  
)
```

```
reddit.subreddit(  
    "soc_media_ethics_auto"  
)  
.submit(  
    "I found a way to solve the practice problem",  
    selftext = "I learned to look at the answer key!"  
)
```

Fake praw is pretending to select the subreddit: soc_media_ethics_auto

```
AttributeError  
Input In [17], in <cell line: 1>()  
    1 reddit.subreddit(  
    2     "soc_media_ethics_auto"  
----> 3 ).submit(  
    4     "I found a way to solve the practice problem",  
    5     selftext = "I learned to look at the answer key!"  
    6 )  
  
AttributeError: 'NoneType' object has no attribute 'submit'
```

Post from a variable

Now try saving a piece of text in a variable for the title, and another for the content of a post, and then submitting a post of whatever you saved in the variables.

To do this, where the code has `submit(...)`, you'll replace the quoted text with the variable name, so it will look like:

```
reddit.subreddit(  
    "soc_media_ethics_auto"  
)  
.submit(  
    title_variable,  
    selftext = content_variable  
)
```

(with whatever your variable name was instead of "title_variable" and "content_variable")

```
title_to_post = "I can use more complicated code"  
message_to_post = "by storing something in a variable"  
  
reddit.subreddit(  
    "soc_media_ethics_auto"  
)  
.submit(  
    title_to_post,  
    selftext = message_to_post  
)
```

Submit multiple posts

Next try submitting 3 posts, but use `sleep` to add pauses between each one (note that reddit might not want you to make more than 1 post every 15 minutes, so you can sleep for 15*60 seconds or more before posting again).

```

reddit subreddit(
    "soc_media_ethics_auto"
).submit(
    "Message 1",
    selftext = "This is the first message"
)

sleep(.01) #note: I am using short times since these pauses slow down compiling the
book

reddit subreddit(
    "soc_media_ethics_auto"
).submit(
    "Message 2",
    selftext = "This is the second message"
)

sleep(.02)

reddit subreddit(
    "soc_media_ethics_auto"
).submit(
    "Message 3",
    selftext = "This is the third message"
)

```

Ch 4 Practice: Python Basic Data Types

Greeting

Make a new variable called `greeting_part_1` and assign it the string: "Welcome, "

Note: There is an extra space after the word

```
greeting_part_1 = "Welcome, "
```

Make a new variable called `greeting_part_2` and assign it the string: "! It is nice to meet you!"

Note: this string starts with an exlamation mark.

```
greeting_part_2 = "! It is nice to meet you!"
```

Make a variable called `name_1` and assign it with a string of someone's name.

```
name = "Kyle"
```

Now, combine them all together into a new variable called `full_greeting`. Combine the parts together by taking `greeting_part_1` then adding `name` then adding `greeting_part_2`.

Then display the variable `full_greeting`.

```
full_greeting = greeting_part_1 + name + greeting_part_2
display(full_greeting)
```

```
'Welcome, Kyle! It is nice to meet you!'
```

Now make a variable called `name_2` with another name in it and make a variable `called_full_greeting_2` the same way you did `full_greeting`, but with `name_2` instead.

Then display the variable `full_greeting_2`

```
name_2 = "Susan"
full_greeting = greeting_part_1 + name_2 + greeting_part_2
display(full_greeting)
```

```
'Welcome, Susan! It is nice to meet you!'
```

Engagement report

Make up numbers for tweet metrics and save them into variables: `number_likes`, `number_retweets`, `number_quote_tweets`

```
number_likes = 8  
number_retweets = 3  
number_quote_tweets = 7
```

Write three different `display()` function calls, one to report on each of those variables.

Inside the parentheses first put a string like, "The number of likes is: " and then add the relevant variable to it, but remember, since the variable has a number in it, you have to put a `str()` function call around that variable name

```
display("The number of likes is: " + str(number_likes))  
display("The number of retweets is: " + str(number_retweets))  
display("The number of quote tweets is: " + str(number_quote_tweets))
```

'The number of likes is: 8'

'The number of retweets is: 3'

'The number of quote tweets is: 7'

Make a new variable called `total_engagement` and save the total number of all the likes, retweets and quote tweets.

Then display that information the way you did the other variables.

```
total_engagement = number_likes + number_retweets + number_quote_tweets  
display("The total engagement is: " + str(total_engagement))
```

'The total engagement is: 18'

Is your tweet too long

Make a variable called `tweet_1` with a string of your choosing that is fairly short

```
tweet_1 = "This is a short tweet"
```

Make a variable called `tweet_1_length`, and save the length of the string `tweet_1` into it (using the `len()` function)

```
tweet_1_length = len(tweet_1)
```

Check if the `tweet_1_length` is less than or equal to 280 characters (the max length of a tweet) using the less than or equal operator: `<=`, and save the result into a variable called

`is_tweet_1_short_enough`

```
is_tweet_1_short_enough = tweet_1_length <= 280
```

Use the `display()` function to display a string ("Is tweet 1 short enough? "), adding the variable `is_tweet_1_short_enough` to that string.

Remember, since the variable has a boolean and not a string in it, you have to put a `str()` function call around that variable name

```
display("Is tweet 1 short enough? " + str(is_tweet_1_short_enough))
```

```
'Is tweet 1 short enough? True'
```

Make a variable called `tweet_2` with a string of your choosing that is very long (over 280 characters)

```
tweet_2 = "This is a long tweet:  
sadasdsaddsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsads  
adsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsads  
adsadsadsadsadsaddsafdsadsasadassadsadsadsadsadsadsadsadsadsadsadsads  
dsadsadsadsadsasda"
```

Repeat the rest of the steps from before, but with `tweet_2`

- find `tweet_2_length`
- make a variable `is_tweet_2_short_enough`
- display the result

```
tweet_2_length = len(tweet_2)  
is_tweet_2_short_enough = tweet_2_length <= 280  
display("Is tweet 2 short enough? " + str(is_tweet_2_short_enough))
```

```
'Is tweet 2 short enough? False'
```

Ch 5 Practice: Looping through lists and dictionaries

Try out these coding problems to practice looping, lists, and dictionaries

Make a loop that displays "Are you awake yet?" 5 times

```
for i in range(5):  
    display("Are you awake yet?")
```

```
'Are you awake yet?'
```

Make a list of names (at least three), and save it in a variable called `names`

```
names = ["Kyle", "Susan", "Another person"]
```

Now loop over each of those names, and for each name display "[name] is awesome!"

```
for name in names:  
    display(name + " is awesome!")
```

```
'Kyle is awesome!'
```

```
'Susan is awesome!'
```

```
'Another person is awesome!'
```

Now, do the same thing as before, but for each name, first make a string that has “[name] is awesome!” and save it in a variable, then use the `.upper()` function on the string to make it all uppercase and save it into a variable, then display the final string.

```
for text in names:  
    sentence = text + " is awesome!"  
    upper_sentence = sentence.upper()  
    display(upper_sentence)
```

'KYLE IS AWESOME!'

'SUSAN IS AWESOME!'

'ANOTHER PERSON IS AWESOME!'

Now, we are going to make a dictionary with information on a photo

```
photo_1_info = {  
    "width": 800,  
    "height": 600,  
    "location": "that one mountain",  
    "device": "iPhone 6"  
}
```

Select and display the width of the photo

```
photo_1_info["width"]
```

800

Select and display the location of the photo

```
photo_1_info["location"]
```

'that one mountain'

Now we are going to make a list of photo info for you to go through

```
photo_info_list = [  
    {  
        "width": 800,  
        "height": 600,  
        "location": "that one mountain",  
        "device": "iPhone 6"  
    },  
    {  
        "width": 800,  
        "height": 600,  
        "location": "on the lake",  
        "device": "iPhone 5"  
    },  
    {  
        "width": 1600,  
        "height": 800,  
        "location": "The underground mines",  
        "device": "Nokia 3310"  
    }  
]
```

Now, make a for loop to go through each set of phone info in `photo_info_list`, and for each one, use `print` commands to display the width, height, location, and device

```
for photo_info in photo_info_list:  
    print(photo_info["width"])  
    print(photo_info["height"])  
    print(photo_info["location"])  
    print(photo_info["device"])  
    print()
```

```
800  
600  
that one mountain  
iPhone 6  
  
800  
600  
on the lake  
iPhone 5  
  
1600  
800  
The underground mines  
Nokia 3310
```

Ch 7 Practice: Conditionals and String Manipulation

IF ELSE Statements

Look at the following code example and try running it

```
x = 5  
  
if x < 11:  
    print('A')  
elif x >= 13:  
    print('B')  
else:  
    print('C')
```

A

Now what would happen if x was changed to 30? What would the output be?

Do Not Code. Please answer this question as a markdown block. Modify the code above to check your answer afterwards.

It would print 'B'

What value would the x variable have to be in order to get the output 'C'?

Again, Do Not Code. Please answer this question as a markdown block. Modify the code above to check your answer afterwards

If x were 12, it would print C

String Manipulation

Now, make a variable with your name in it, called `my_name`

```
my_name = "Kyle"
```

Write code to display the first letter of your name

```
display(my_name[0])
```

'K'

Write code to display the last letter of your name

```
display(my_name[-1 : ])
```

'e'

Ifs with Strings

Save a string in a variable called `message` and have it end with either a question mark `?`, an exclamation mark `!`, or a period `.`

```
message = "This is an example message!"
```

Now, make a set of if/elif/else statements which will display either:

- The message was a question
- The message was an exclamation
- The message was a statement
- The message ended unexpectedly

depending on what character the message ended in a `?`, `!`, `.`, or something else. Hint: use the `endswith` function.

```
if message.endswith("?"):
    display("The message was a question")
elif message.endswith("!"):
    display("The message was an exclamation")
elif message.endswith("."):
    display("The message was a statement")
else:
    display("The message ended unexpectedly")
```

```
'The message was an exclamation'
```

Now, go back and modify the message string to see if the different if/elif/else options all work

Ch 8 Practice: Sentiment Analysis and Loop Variables

Now it's your turn to practice sentiment analysis and loop variables

Sentiment Analyasis

First run the code to load up the Sentiment Intensity Analyzer

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\kmtthayer\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

Also, look at this example from the demo of running sentiment analysis:

```
sentence = "I love love love pizza!!!!!!"
sia.polarity_scores(sentence)["compound"]
```

```
0.941
```

Now, copy that two lines of code above, and try out your own sentences, and run the sentiment analysis on them

```
sentence = "This is an ok example"
sia.polarity_scores(sentence)["compound"]
```

```
0.296
```

Try several sentences and see how the Sentiment Intensity Analyzer handles them

```
sentence = "This is a horrible example"
sia.polarity_scores(sentence)["compound"]
```

```
-0.5423
```

Loop variables

Now let's practice with loop variables.

Below is a for loop which goes through each letter in the word "Mississipi".

```
for letter in "Mississipi":
    print(letter)
```

```
M
i
s
s
i
s
s
i
p
i
```

Make another copy of that loop, but add a variable before the loop called `num_letters` and use it count how many letters were in the word "Mississipi". At the end display the number of letters.

```
num_letters = 0

for letter in "Mississipi":
    print(letter)
    num_letters += 1

print("There were " + str(num_letters) + " letters")
```

```
M
i
s
s
i
s
s
i
p
i
There were 10 letters
```

Make another copy of what you just did, but this time also count the number of "i"s. Make a variable called `num_i` to count how many "i"s.

Hint: To see if a letter is an "i", check if `letter == "i"`

At the end print out how many of the letters were "i"s and what percentage of the word was "i"s.

```
num_letters = 0
num_i = 0

for letter in "Mississipi":
    print(letter)
    num_letters += 1

    if(letter == "i"):
        num_i += 1

print("There were " + str(num_letters) + " letters")
percent_i = num_i / num_letters * 100

print("i's made up " + str(percent_i) + " percent of the word")
```

```
M  
i  
s  
i  
s  
s  
i  
p  
i  
There were 10 letters  
i's made up 40.0 percent of the word
```

Ch 9 Practice: Functions

Create a function called `say_goodbye` which displays the text "Goodbye!"

```
def say_goodbye():  
    print("Goodbye!")
```

Write code that calls the function `say_goodbye`

```
say_goodbye()
```

```
Goodbye!
```

Redefine the function `say_goodbye` to take a parameter called `name`, and have it display "Goodbye name!" where "name" is replaced by whatever was in the `name` variable

```
def say_goodbye(name):  
    print("Goodbye "+name+"!")
```

Write code that calls the function `say_goodbye` but with your name as a parameter

```
say_goodbye("Kyle")
```

```
Goodbye Kyle!
```

Try out the code below which counts from 0 to 4 slowly:

```
import time # We need the time library for the following examples
```

```
for i in range(5):  
    print(i)  
    time.sleep(1)
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

We can put that for loop in a function like this:

```
def counter():  
    for i in range(5):  
        print(i)  
        time.sleep(1)
```

And then we can call it:

```
counter()
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

Now redefine `counter` by

1. copying the code above which defines `counter`
2. make the counter take a parameter called `max`
3. Have the `range` call use the parameter `max`

```
def counter(max):  
    for i in range(max):  
        print(i)  
        time.sleep(1)
```

Now try calling the new version of `counter` but passing it the argument 7

```
counter(7)
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

```
5
```

```
6
```

Create a function called `multiply` which takes two arguments, multiplies them together (*), and then returns the multiplied value

```
def multiply(num_1, num_2):  
    return num_1 * num_2
```

Call the `multiply` function with two numbers and save the result in a variable. Then print out the variable to see that the multiplied number was saved.

```
new_num = multiply(3, 5)  
display(new_num)
```

```
15
```

Ch 12 Solution: Dictionary Counters

Now it's your turn to practice dictionary counters

1. Copy the code from the demo that counts letters in a string. Modify the string to be something else and find the letter_counts (no need to sort)

```
# create a dictionary counter before the loop
# it has no entries, since we have seen no letters yet
letter_counts = {}

# go through each letter in the string
for letter in "your text here":
    if letter not in letter_counts: # If there is no entry for this letter yet
        letter_counts[letter] = 1 # then make an entry set to 1
    else: # otherwise, there was an entry
        letter_counts[letter] += 1 # so add one to that entry

# we now have the total number of letters
display("total letter counts are:")
display(letter_counts)
```

```
'total letter counts are:'
```

```
{'y': 1, 'o': 1, 'u': 1, 'r': 2, ' ': 2, 't': 2, 'e': 3, 'x': 1, 'h': 1}
```

Now let's try this with words.

The code below makes a string, and then splits it into words by dividing it apart at each space.

```
# Save a poem into a string (we can use """ to make a multiline string)
# Fire and Ice BY ROBERT FROST (now public domain)
poem = """Some say the world will end in fire,
Some say in ice.
From what I've tasted of desire
I hold with those who favor fire.
But if it had to perish twice,
I think I know enough of hate
To say that for destruction ice
Is also great
And would suffice."""

# split the string (all lowercase) into words
import re # import the Regular Expressions library, to help us split words

#make the poem all lowercase
lower_case_poem = poem.lower()

# split the poem into pieces at all spaces and newlines (\s), and , 's and . 's
poem_split_by_spaces_and_punctuation = re.split("[\s,.]", lower_case_poem)

# get rid of some empty strings "" that ended up in our list
split_poem = list(filter(None, poem_split_by_spaces_and_punctuation))

print(split_poem)
```

```
['some', 'say', 'the', 'world', 'will', 'end', 'in', 'fire', 'some', 'say', 'in',
'ice', 'from', 'what', 'i've', 'tasted', 'of', 'desire', 'i', 'hold', 'with',
'those', 'who', 'favor', 'fire', 'but', 'if', 'it', 'had', 'to', 'perish', 'twice',
'i', 'think', 'i', 'know', 'enough', 'of', 'hate', 'to', 'say', 'that', 'for',
'destruction', 'ice', 'is', 'also', 'great', 'and', 'would', 'suffice']
```

1. Make code that counts how often each word appears in `split_poem` (it should be very similar to the code from problem 1 above, but you should have `word_counts` instead of `letter_counts`, and you should loop over `words` instead of `letters`)

```

# create a dictionary counter before the loop
# it has no entries, since we have seen no words yet
word_counts = {}

# go through each word in the list of words
for word in split_poem:
    if word not in word_counts: # If there is no entry for this word yet
        word_counts[word] = 1 # then make an entry set to 1
    else: # otherwise, there was an entry
        word_counts[word] += 1 # so add one to that entry

# we now have the total number of words
display("total word counts are:")
display(word_counts)

```

'total word counts are:'

```

{'some': 2,
 'say': 3,
 'the': 1,
 'world': 1,
 'will': 1,
 'end': 1,
 'in': 2,
 'fire': 2,
 'ice': 2,
 'from': 1,
 'what': 1,
 'i've': 1,
 'tasted': 1,
 'of': 2,
 'desire': 1,
 'i': 3,
 'hold': 1,
 'with': 1,
 'those': 1,
 'who': 1,
 'favor': 1,
 'but': 1,
 'if': 1,
 'it': 1,
 'had': 1,
 'to': 2,
 'perish': 1,
 'twice': 1,
 'think': 1,
 'know': 1,
 'enough': 1,
 'hate': 1,
 'that': 1,
 'for': 1,
 'destruction': 1,
 'is': 1,
 'also': 1,
 'great': 1,
 'and': 1,
 'would': 1,
 'suffice': 1}

```

Ch14 Demo: recursion with real tweets

Normal Tweepy Set-Up

```

# make sure tweepy library is installed
import tweepy

```

(optional) use the fake version of tweepy, so you don't have to use real twitter developer access passwords

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

(Just Run): Helper function to display text in an indented box

```
from IPython.display import HTML, Image, display
import html
def displayIndented(text, left_margin=0, color="white"):
    display(
        HTML(
            f"<pre style='border:solid 1px;padding:3px;margin-left:{left_margin}px;background-color:{color}'>" +
            html.escape(text) +
            "</pre>"
        )
    )
```

Demo of using the display_with_left_margin function

```
displayIndented("A no indent text")
displayIndented("A 10px indent text", left_margin=10)
displayIndented("A 20px indent text \n with a newline!", left_margin=20)
displayIndented("You can change the 'color' of the box too, like make it LightCoral", color='LightCoral', left_margin=10)
```

A no indent text
A 10px indent text
A 20px indent text with a newline!
You can change the 'color' of the box too, like make it LightCoral

(Just Run): Helper code for getting a twitter conversation (that is a tweet and a bunch of its replies)

You don't need to know how this code works, but you can look through it if you want.

Also, if you want to use more includes or something, you can add them to the client.get_tweet() call and the client.search_recent_tweets() call. You might also need to do extra work to include them like I did with the author/users info

```

# Given a tweetId, create a datastructure with the tweet and replies
# Each "tweet" is dictionary with keys for:
#   "tweet_info" (from the tweet.data), "author", "replies", "previous_tweet", and
#   "first_tweet"
#
# When searching for tweets in the conversation, it looks for groups of 100
# tweets at a time. You can set how many groups of 100 tweets it looks for with
# max_conversation_searches
def get_tweets_with_replies(tweetId, max_conversation_searches=1):
    (starting_tweet, all_conversation_tweets, users_lookup) =
    get_tweet_and_conversation(tweetId, max_conversation_searches)
    tweets_by_referenced_tweet =
    organize_tweets_by_referenced_tweets(all_conversation_tweets)
    tweet_with_replies = organize_tweets_with_replies(starting_tweet,
    tweets_by_referenced_tweet, users_lookup)
    return tweet_with_replies

# the function above uses the helper functions below

# Given a tweet id, find the tweet and other tweets in the same conversation
def get_tweet_and_conversation(tweetId, max_conversation_searches=1):
    starting_tweet = client.get_tweet(tweetId, tweet_fields=['conversation_id',
    'public_metrics'], expansions=['author_id'])
    conversation_id = starting_tweet.data.conversation_id

    all_conversation_tweets = get_conversation_tweets(conversation_id,
    max_conversation_searches)
    all_users = starting_tweet.includes['users']
    for conversation_tweets in all_conversation_tweets:
        all_users += conversation_tweets.includes['users']
    users_lookup = {str(u["id"]): u for u in all_users}
    return (starting_tweet, all_conversation_tweets, users_lookup)

# Get tweets in a conversation (given the conversation id)
def get_conversation_tweets(conversation_id, max_conversation_searches):
    query = "conversation_id:" + str(conversation_id)
    all_conversation_tweets = []
    num_searches=0
    is_done = False
    next_token = None
    while not is_done and num_searches < max_conversation_searches:
        conversation_tweets = client.search_recent_tweets(query=query,
    next_token=next_token, tweet_fields = 'public_metrics', expansions=
    ['referenced_tweets.id','author_id'], max_results=100)
        num_searches += 1
        all_conversation_tweets.append(conversation_tweets)
        print("loaded a set of tweets: " + str(conversation_tweets.meta))
        if 'next_token' in conversation_tweets.meta:
            next_token = conversation_tweets.meta['next_token']
        else:
            is_done = True
    return all_conversation_tweets

# Given a list of tweets, group them all based on what tweet they are replying to
def organize_tweets_by_referenced_tweets(list_of_tweet_results):
    tweets_by_referenced_tweet = {}
    for tweets in list_of_tweet_results:
        for tweet in tweets.data:
            for referenced_tweet in tweet.referenced_tweets:
                if(referenced_tweet.type == "replied_to"):
                    referenced_tweet_id = str(referenced_tweet.id)
                    if(referenced_tweet_id not in tweets_by_referenced_tweet):
                        tweets_by_referenced_tweet[referenced_tweet_id] = []
                    tweets_by_referenced_tweet[referenced_tweet_id].append(tweet)
                    break

    return tweets_by_referenced_tweet

# organize the tweets so that author info and replies to tweets are included
# with it in a convenient data structure
def organize_tweets_with_replies(tweet, tweets_by_referenced_tweet, users_lookup,
previous_tweet=None, first_tweet=None):
    tweet_with_replies = {
        "tweet_info": tweet.data,
        "author": users_lookup[str(tweet.data["author_id"])].data,
        "replies": [],
        "previous_tweet": previous_tweet
    }
    if first_tweet == None:
        first_tweet = tweet_with_replies
    tweet_with_replies["first_tweet"] = first_tweet

    tweet_id = str(tweet.data["id"])
    if tweet_id in tweets_by_referenced_tweet:
        reply_tweets = tweets_by_referenced_tweet[tweet_id]
        for reply_tweet in reply_tweets:
            tweet_with_replies["replies"].append(

```

```

        organize_tweets_with_replies(reply_tweet,
tweets_by_referenced_tweet, users_lookup, previous_tweet=tweet_with_replies,
first_tweet=first_tweet)
    )
return tweet_with_replies

```

Recursively printing the tweets and replies

```

def print_tweet_and_replies(tweet_with_replies, num_indent=0):
    tweet_info = tweet_with_replies["tweet_info"]
    replies = tweet_with_replies["replies"]

    displayIndented(tweet_info['text'], num_indent*20)

    #print replies (and the replies of those, etc.)
    for reply in replies:
        print_tweet_and_replies(reply, num_indent + 1)

```

```
loaded_tweets_and_replies = get_tweets_with_replies(98778587)
```

Fake Tweepy is pretending to search for 'conversation_id:1234567' and is returning some fake tweets.

```
loaded a set of tweets: {}
```

```
print_tweet_and_replies(loaded_tweets_and_replies)
```

That last exam in sure was hard!

It sure was hard, what score did you get?

I got a 67% :(

I got a 73%

I didn't think it was that bad

how was that not a super hard exam?

of coure you didn't

what's that supposed to mean?

you're an overachiever

and that's bad how?

Improved recursive print tweets and replies (more info)

```

def print_tweet_and_replies(tweet_with_replies, num_indent=0):
    tweet_info = tweet_with_replies["tweet_info"]
    replies = tweet_with_replies["replies"]
    author_info = tweet_with_replies["author"]
    public_metrics = tweet_info["public_metrics"]

    display_text = (
        tweet_info['text'] + "\n" +
        "-- " + author_info["name"] + " @" + author_info["username"] + ")" + "\n" +
        str(public_metrics)
    )

    displayIndented(display_text, num_indent*20)

    #print replies (and the replies of those, etc.)
    for reply in replies:
        print_tweet_and_replies(reply, num_indent + 1)

```

```
print_tweet_and_replies(loaded_tweets_and_replies)
```

```

That last exam in sure was hard!
-- Fake User (@fake_user)
{'retweet_count': 10, 'reply_count': 2, 'like_count': 8, 'quote_count': 4}

It sure was hard, what score did you get?
-- Unreal User (@unreal_user)
{'retweet_count': 4, 'reply_count': 2, 'like_count': 3, 'quote_count': 2}

I got a 67% :(
-- Fake User (@fake_user)
{'retweet_count': 0, 'reply_count': 0, 'like_count': 2, 'quote_count': 0}

I got a 73%
-- Imaginary User (@imaginary_user)
{'retweet_count': 0, 'reply_count': 0, 'like_count': 3, 'quote_count': 0}

I didn't think it was that bad
-- Pretend User (@pretend_user)
{'retweet_count': 1, 'reply_count': 2, 'like_count': 1, 'quote_count': 6}

how was that not a super hard exam?
-- False User (@false_user)
{'retweet_count': 2, 'reply_count': 0, 'like_count': 8, 'quote_count': 2}

of coure you didn't
-- Fake User (@fake_user)
{'retweet_count': 1, 'reply_count': 1, 'like_count': 6, 'quote_count': 1}

what's that supposed to mean?
-- Pretend User (@pretend_user)
{'retweet_count': 0, 'reply_count': 1, 'like_count': 1, 'quote_count': 0}

you're an overachiever
-- Fake User (@fake_user)
{'retweet_count': 0, 'reply_count': 1, 'like_count': 3, 'quote_count': 0}

and that's bad how?
-- Pretend User (@pretend_user)
{'retweet_count': 0, 'reply_count': 0, 'like_count': 0, 'quote_count': 0}

```

```

# Note: to test for real, Look for users who get a lot of engagement,
# like the reddit Am I the Asshole:
# https://twitter.com/AITA_online
# '1496516355931217926'

```

Alternate Social Media APIs

Ch 2.3.6 A program that posts one tweet

Below is a computer program written in the Python programming language. The program will post a single tweet that says: "This tweet was posted by a computer program!". Since this is a computer program that posts on twitter, we would call this program a twitter bot.

Don't worry if you don't understand any of this Python code yet; we will build an understanding of code like this throughout the book.

```

import tweepy

bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#$$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"

client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)

client.create_tweet(text="This tweet was posted by a computer program!")

```

Though you may not understand anything in the above code yet, I want to point out a couple things:

- The code above is full of English words like "import", "key", "secret", which may help you guess the meaning of the code.

- There are also other symbols as well, though being used in a different way than in normal English, symbols like =, _, ., (, and)
- One particular piece of code gives a good hint as to what it is doing: `create_tweet`. That indeed is the part of the program where the tweet is posted.
- There are five pieces of text with random numbers and letters that include things like "fake_consumer_key" inside. These pieces of text are meant to be replaced with a set of special passwords to your actual twitter account. You can get these special passwords if you get developer access to twitter (see the page on). Once you put your special passwords in those locations then this code will post a tweet on your account.

We will go through that example code in more detail next.

Ch 2.3.7 Understanding the Twitter Bot Code

Let's look more at that program that posts one tweet.

There are a number of ways of looking at the code, but first, let's look at it as a template with a couple pieces we can change.

The program as a template

Below I've highlighted the text of the sections of the program that you might want to modify.

```
import tweepy

bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#$$"
consumer_key = "sa@#4%fdfdsa_fake_consumer_key_$%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"

client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
client.create_tweet(text="This tweet was posted by a computer program!")
```

The first five highlighted pieces of code are for the special passwords you can get when you get developer access to twitter (I've put fake values in them for now):

- bearer token
- consumer key
- consumer secret
- access token
- access token secret

These special passwords are needed for different actions on twitter. Rather than worry about which of these passwords are needed for which action, I'll just always include all of them.

The final highlighted piece of code (in the parentheses after `create_tweet`) is the text of what will be tweeted when this bot runs. You can change the text there to change what gets tweeted.

So, by changing those sections of code, you run this program to post whatever tweet you want to your twitter account. It is, of course, much easier to just open twitter and tweet, but as we get to more complicated programs, we'll start to see more of the power (and pitfalls) of automation on social media.

Note: all the highlighted sections of code are surrounded by double quotes. In the Python programming language, putting something in quotes indicates that you want the computer to think of the things inside the quotes as pieces of text, in this case passwords and tweet contents.

Adding code comments

The goal of programming language code is to be readable by both humans and computers, but sometimes the meaning of code isn't always clear to humans trying to read it. In order to aid humans reading the code, programming languages allow programmers to do things to make the code more readable, such as add extra blank lines between sections of code. Blank lines can be used to have some lines of code be visually grouped together, and some be separated, so humans can better follow the outline of the code.

Most programming languages also allow "comments," which are pieces of code that the computer will ignore. These comments allow the person writing the code to leave a note to future people reading the code, knowing that the computer won't read it (like an [aside](#) in a play).

In Python, you can add a comment by use the `#` symbol. Python will ignore everything on a line that comes after the `#`. But humans programmers will often look for the meaning of the program in these comments.

So, in order to make the program above easier for future humans to understand, let's add two comments telling these future humans where to add their special passwords and where they can change the text of the tweet:

```
import tweepy

# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#$$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_$%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j$dr_fake_consumer_key_^A5s#DR5s"

client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)

# TODO: modify the text in the quotes below to change what this bot tweets:
client.create_tweet(text="This tweet was posted by a computer program!")
```

With those, hopefully a future human reader will have a better chance of understanding how to modify the program to do what they want.

*Note: I started each comment with "TODO" to tell the future human that there is a task they have **to do** to get the program to work for them. Since this is only intended for human readers, I could have written it in any way I want, but all capital letter TODOs are commonly used like this by programmers.*

Purpose of each section of code

Now that we've looked at the code as a modifiable template, let's break the code into sections and look at what the purpose of each part is. The code is run starting at the top and going down from there, so we will go through the code in that order.

Note: It's normal if you don't understand everything here. Over the course of this book you will learn to understand more of how programs work, but also, even professional programmers often don't understand parts of the programs they are working on, they just understand enough to modify the parts they need to.

The first line of code is:

```
import tweepy
```

The purpose of this line of code that loads another set of code. The code it loads is called [tweepy](#), which is code specially written to help make programs that work with twitter.

The next section of code is five lines long:

```
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#$$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_$%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j$dr_fake_consumer_key_^A5s#DR5s"
```

This is code to store all of our twitter developer access passwords into Python so we can use them later. Again, you'll have to get your actual developer access passwords and replace the fake ones currently in the code.

The next section of code is five lines long:

```
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

The purpose of this code is to take all the developer access passwords you entered above, and give them to the tweepy code so that the tweepy code can log into your twitter account and provide the needed passwords for whatever twitter action you want to do.

The final line of code is:

```
client.create_tweet(text="This tweet was posted by a computer program!")
```

This is the line of code where a tweet is actually posted. The action is called "create_tweet" since the code is creating a tweet. Inside the double quotes is the text that is going to be tweeted.

Adding more code comments

Now that we've looked at the purpose of each section of code, we can add additional comments explaining what each section does, so that future humans reading the code are more likely to understand it.

Following the common practice of programmers, we will put the comment before the section of code that the comment is explaining. We can also make multiple comment lines as needed if our comments are long.

```
# Load some code called "tweepy" that will help us work with twitter
import tweepy

# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#$$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_$%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j$dr_fake_consumer_key_^A5s#DR5s"

# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)

# Post a tweet
# TODO: modify the text in the quotes below to change what this bot tweets:
client.create_tweet(text="This tweet was posted by a computer program!")
```

Now that we've looked over the code and commented it, let's go to the next page, where you can try running it!

Ch 2.3.8 Demo: Try Running the Twitter Bot!

Running this Jupyter Notebook

This page is called a "Jupyter Notebook" which it is a text page that has runnable Python code in it.

In order to run the code, you can look for the rocket button at the top which will give you an option to "launch binder"

2.3.8. Demo: Try Running the Twitter Bot!

This page is called a "Jupyter Notebook" which it is a text page that has runnable Python

If you launch binder, it will take a while to load, but eventually show you a version of this page Jupyter Notebook in a code editor called Jupyter Lab



In Jupyter Lab you can double click any section to edit it, and you can press the triangle "run" button to run the code (or display the text).



When the code runs, the little number to the left of the code block should change. There might also be some output from your action displayed below the code block.

So now you can go through the rest of this page and select and run each section of code.

Here is the bot code you can run!

Our demo Twitter bot code is below, broken up into different sections.

You can select each section of the code below and run it to see what it does.

By default this code uses a fake version of our twitter connection so it doesn't connect to a real twitter account.

If you want to actually connect to your twitter account, you can put your special developer access passwords in the right code section below, and then when you run the code make sure to skip the code section that makes a fake twitter connection with "fake_tweepy".

Step 1: Load Tweepy code

```
# Load some code called "tweepy" that will help us work with twitter
import tweepy
```

(Optional) Step 1b: Make a fake twitter connection with the fake_tweepy library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it won't actually connect to twitter. **If you want to try to actually connect to twitter, don't run this line of code.**

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

Step 2: Load your developer access passwords

To use this on your real twitter account, copy your developer access passwords into the code below, replacing our fake passwords.

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53$%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_$%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j$dr_fake_consumer_key_^A5s#DR5s"
```

Step 4: Give tweepy (or fake_tweepy) your developer access passwords

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Step 5: Post a tweet

```
# Post a tweet
# TODO: modify the text in the quotes below to change what this bot tweets:
client.create_tweet(text="This tweet was posted by a computer program!")
```

Fake Tweepy is pretending to post this tweet (note: real tweepy shows no output here when a tweet is posted):

```
This tweet was posted by a computer program!
```

Step 6: Modify the code above to post a different tweet

Note: If you try to post the same exact tweet twice in a row on real twitter, you will get an error message (it will be a lot of red text, which can be intimidating, but it just means you aren't allowed to post the same tweet twice in a row).

What To Do With Error Messages

If you run this code trying to connect to a real twitter account, there are different error messages you might get.

When you get an error message, there is often a lot of text and details about when and where exactly the error happened, which can look very intimidating. But we'll highlight the parts you need to pay attention to.

Unauthorized Error:

```
Unauthorized                                     Traceback (most recent call last)
/tmp/ipykernel_88/115099453.py in <module>
      1 # Post a tweet
      2 # TODO: modify the text in the quotes below to change what this bot tweets:
----> 3 client.create_tweet(text="Look at this Tweet assaa!")

/opt/conda/lib/python3.9/site-packages/tweepy/client.py in create_tweet(self, direct_message_deep_lir
io, user_settings, text, user_auth)
    822         json["text"] = text
    823
----> 824         return self._make_request(
    825             "POST", f"/2/tweets", json=json, user_auth=user_auth
    826         )

/opt/conda/lib/python3.9/site-packages/tweepy/client.py in _make_request(self, method, route, params,
    827             request_params = self._process_params(params, endpoint_parameters)
    828             json=json, user_auth=user_auth)
    829
    830             response = self.request(method, route, params=request_params,
    831             json=json, user_auth=user_auth)

/opt/conda/lib/python3.9/site-packages/tweepy/client.py in request(self, method, route, params, json,
    895                 raise BadRequest(response)
    896                 if response.status_code == 401:
----> 897                     raise Unauthorized(response)
    898                     if response.status_code == 403:
    899                         raise Forbidden(response)

Unauthorized: 401 Unauthorized
Unauthorized
```

If your special passwords in bot_keys.py aren't working, you might get a 401 unauthorized error.

To fix this:

- make sure you have all the special passwords in the bot_keys.py file (you may need to regenerate them)
- make sure the bot_keys file is saved (a dark circle on the tab means it isn't saved)
- make sure to restart the kernel on this tab.

Hopefully that fixes it, otherwise talk to your TA or the instructor

Duplicate Error:

A screenshot of a Jupyter Notebook cell showing a Python tracebacks and an error message. The error message is highlighted with a blue box and reads: "Forbidden: 403 Forbidden You are not allowed to create a Tweet with duplicate content."

```
Traceback (most recent call last)
/opt/conda/lib/python3.9/site-packages/tweepy/client.py in <module>
    1 # Post a tweet
    2 # TODO: modify the text in the quotes below to change what this bot tweets!
----> 3 client.create_tweet(text="Look at this tweet assas!")

/opt/conda/lib/python3.9/site-packages/tweepy/client.py in create(self, direct_message, _id, reply_settings, text, user_auth)
    82     json["text"] = text
    83
--> 84     return self._make_request(
    85         "POST", f"/2/tweets", json=json, user_auth=user_auth
    86     )

/opt/conda/lib/python3.9/site-packages/tweepy/client.py in request(self, method, route, params, json, user_auth)
    97     raise Unauthorized(response)
    98     if response.status_code == 403:
--> 99         if response.status_code == 403:
    100             if response.status_code == 404:
    101                 raise NotFound(response)

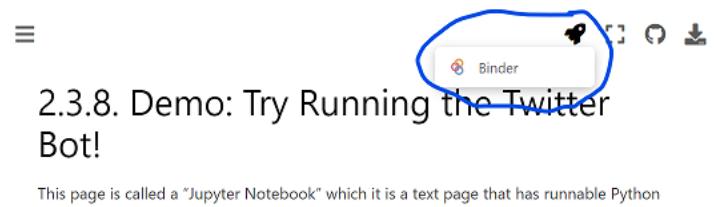
Forbidden: 403 Forbidden
You are not allowed to create a Tweet with duplicate content.
```

If you get this message, it just means you are trying to post the same tweet again, which Twitter doesn't want you to do. Change the text of the tweet you are trying to make and it should hopefully work.

Ch 3.3.3 Practice: Statements and Variables (Twitter)

This Python Notebook is a chance for you to try out the programming concepts we have covered thus far.

As we mentioned previously in the first bot demo (2.3.8), in order to run the code, you can look for the rocket button at the top which will give you an option to "launch binder"



If you launch binder, it will take a while to load, but eventually show you a version of this page in a code editor called Jupyter Lab



In Jupyter Lab you can double click any section to edit it, and you can press the triangle "run" button to run the code (or display the text).



When the code runs, the little number to the left of the code block should change. There might also be some output from your action displayed below the code block.

So now you can go through the rest of this page and try out the practice exercises for yourself!

Variables

You will first practice saving values into variables. Remember, the way we save a value into a variable is like this:

```
variable_name = value
```

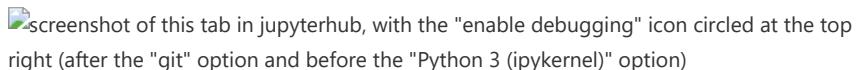
First, save the piece of text "I am writing a computer program!" into a variable called `my_progress`

```
# TODO: enter your code here
```

Viewing variables in the debugger

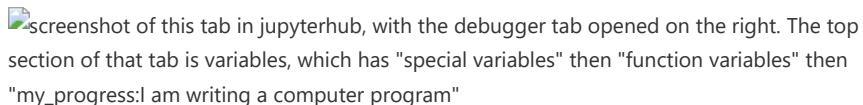
Before we continue, we are going to show you how to open the debugger so you can see what is being saved in your variables.

On the top right of this tab, press the small bug icon to "enable debugging":



A screenshot of a JupyterHub tab. At the top right, there is a small green bug icon. To its left is the text "enable debugging". Further to the right are the words "git" and "Python 3 (ipykernel)". The "enable debugging" text is circled with a red marker.

Then, if you did the step above correctly, you should see the variable `my_progress` with the value "I am writing a computer program!" next to it:



A screenshot of a JupyterHub tab with the debugger tab open. In the top section of the debugger, under "variables", there is a list item: "my_progress: I am writing a computer program".

Practice number variables

First, write and run a line of code to save the value 5 into a variable named `number_of_pies`

```
# TODO: enter your code here
```

Now, save the value 12.5 into a variable named `cost_per_pie`

```
# TODO: enter your code here
```

Now make a new variable called `total_pie_cost` and save into the value of the `number_of_pies` multiplied by the `cost_per_pie`.

Note: In python (and many programming languages), the symbol for multiply is `*`

```
# TODO: enter your code here
```

Now use the `display` function to display what is saved in `total_pie_cost`

```
# TODO: enter your code here
```

More variable practice

Now, make a new variable called `first_name` and assign your first name to it

```
# TODO: enter your code here
```

Now, make a variable called `last_name` and save your last name to it

```
# TODO: enter your code here
```

Create a variable called `age` and assign your age to it.

```
# TODO: enter your code here
```

~ A year goes by ~

Increase the `age` variable by 1.

```
# TODO: enter your code here
```

Now write three lines of code, with each line using `display` to show what is saved in `first_name`, `last_name`, and `age`

```
# TODO: enter your code here
```

Sleep

In order to use sleep, we must first import it from the time library

```
from time import sleep
```

Now try displaying 5 messages of your choosing, with some pauses between each one:

```
# TODO: enter your code here
```

Twitter Bot Practice

Now lets try a twitter bot with variables and sleep!

Load Tweepy Library

First, we need to load the tweepy library

```
# Load some code called "tweepy" that will help us work with twitter
import tweepy
```

(Optional) Make a fake twitter connection with the `fake_tweepy` library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it wont actually connect to twitter. **If you want to try to actually connect to twitter, don't run this line of code.**
%run ../../fake_tweepy/fake_tweepy.ipynb

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

Load your developer access passwords

To use this on your real twitter account, copy your developer access passwords into the code below, replacing our fake passwords.

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_$%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

Give tweepy (or fake_tweepy) your developer access passwords

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Post a tweet

Post something you learned in the class so far:

Remember, the code to post a tweet looks like this: `client.create_tweet(text="This is the tweet text")`

```
# TODO: enter your code here
```

Post from a variable

Now try saving a piece of text in a variable, and then tweeting the whatever you saved in the variable.

To do this, where the code has `client.create_tweet(text="This is the tweet text")`, you'll replace the quoted text with the variable name, so it will look like `client.create_tweet(text=variable_name)` (with whatever your variable name was instead of "variable_name")

```
# TODO: enter your code here
```

Post multiple tweets

Next try posting 5 tweets, but use `sleep` to add pauses between each one (if you make the pauses over 60 seconds, then the official "time" of the tweet should look different on the twitter interface).

```
# TODO: enter your code here
```

Ch 4.5.3 Demo: Data from a Tweet

Let's see what the data actually looks like from a Tweet!

First we need to do our normal twitter login steps (and optional fake tweepy step)

Log into tweepy (or fake tweepy)

```
# Load some code called "tweepy" that will help us work with twitter
import tweepy
```

(optional) make a fake twitter connection with the fake_tweepy library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it won't actually connect to twitter. **If you want to try to actually connect to twitter, don't run this line of code.**

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

load your developer access passwords

To use this on your real twitter account, copy your developer access passwords into the code below, replacing our fake passwords.

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#40fdfsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j+$dr_fake_consumer_key_^A5s#DRS"
```

give tweepy (or fake_tweepy) your developer access passwords

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Find a tweet

Below I have the code to find a recent tweet that has the phrase "cute cat".

Don't worry if you don't understand this part yet. We are just doing this, so we can get to the point of seeing what tweet data looks like.

Note: If you run this on real twitter, we can't guarantee anything about how offensive what you might find is. We don't know of any word search We could guarantee would be safe.

```
# Choose a search to run
query = '"cute cat"

#Run the search and request some additional info
tweets = client.search_recent_tweets(query=query, tweet_fields=["author_id",
    "created_at", "id", "lang", "public_metrics", "source", "text"])

# Find the first tweet returned
recent_tweet = tweets.data[0]
```

Fake Tweepy is pretending to search for "'cute cat'" and is returning some fake tweets.

Look at data in tweet

Now we will look at some of the data that came back!

Again, don't worry too much about the code, we want to look at the data and data types.

tweet text:

```
display("The data type of the tweet text is: " + type(recent_tweet.text).__name__)
display("The tweet text is: " + recent_tweet.text)
```

```
'The data type of the tweet text is: str'
```

```
"The tweet text is: While trying to tweet right now, I am being attacked by my cute
cat! It's so hard to tpye wihsaoae as fesadf asd fssasaf sa"
```

As you can see above, the tweet text is a string (`str`) data type. And while we can't see any indication here, we know from elsewhere that tweet text is limited to 280 characters in length.

tweet id

```
display("The data type of the tweet id is: " + type(recent_tweet.id).__name__)
display("The tweet tweet id is: " + str(recent_tweet.id))
```

```
'The data type of the tweet id is: int'
```

```
'The tweet tweet id is: 129308937494'
```

The tweet id is an integer number ([int](#)). This is how the tweet is referred to inside Twitter's computers. So if someone is replying to a tweet, Twitter just puts which tweet ID they were replying to, and then can look up that tweet if needed.

tweet author id

```
display("The data type of the author id is: " +  
type(recent_tweet.author_id).__name__)  
display("The tweet author id is: " + str(recent_tweet.author_id))
```

```
'The data type of the author id is: int'
```

```
'The tweet author id is: 239048094385'
```

The author id is an integer number ([int](#)). This is how the user who posted the tweet is referred to inside Twitter's computers. So when twitter wants to display the tweet with the user info, it uses this number to look up the information on that user.

tweet created at

```
display("The data type of the tweet created at is: " +  
type(recent_tweet.created_at).__name__)  
display("The tweet tweet created at is: " + str(recent_tweet.created_at))
```

```
'The data type of the tweet created at is: datetime'
```

```
'The tweet tweet created at is: 2022-02-22 22:22:22+00:00'
```

The created at time for the tweet is a special python datetime data type ([datetime](#)). As you can see, it has the year, month, and day, and then the time in hours, minutes and seconds. It then shows the timezone it is in, in this case: 00:00, which is in [Coordinated Universal Time](#).

tweet lang (language)

```
display("The data type of the tweet lang is: " + type(recent_tweet.lang).__name__)  
display("The tweet tweet lang is: " + str(recent_tweet.lang))
```

```
'The data type of the tweet lang is: str'
```

```
'The tweet tweet lang is: en'
```

The language the tweet is made in is a string ([str](#)). It comes from a set of [standard language abbreviations](#) and in this case it is "en" which is short for "English".

tweet source (device that made the tweet)

```
display("The data type of the tweet source is: " +  
type(recent_tweet.source).__name__)  
display("The tweet tweet source is: " + str(recent_tweet.source))
```

```
'The data type of the tweet source is: str'
```

```
'The tweet tweet source is: Twitter for Android'
```

The tweet source is a string ([str](#)). In this case it is "Twitter for Android" meaning someone posted this tweet from the Twitter App on their Android phone.

public metrics

```
display("The data type of the tweet source is: " +
type(recent_tweet.public_metrics).__name__)
display("The tweet tweet source is: " + str(recent_tweet.public_metrics))
```

'The data type of the tweet source is: dict'

"The tweet tweet source is: {'retweet_count': 7, 'reply_count': 3, 'like_count': 6, 'quote_count': 2}"

The public metrics of a tweet are saved in a dictionary ([dict](#)), which holds a group of values.

So let's look at each of those:

```
display("The data type of the retweet count is: " +
type(recent_tweet.public_metrics['retweet_count']).__name__)
display("The retweet count is: " +
str(recent_tweet.public_metrics['retweet_count']))

display("The data type of the reply count is: " +
type(recent_tweet.public_metrics['reply_count']).__name__)
display("The reply count is: " + str(recent_tweet.public_metrics['reply_count']))

display("The data type of the like count is: " +
type(recent_tweet.public_metrics['like_count']).__name__)
display("The like count is: " + str(recent_tweet.public_metrics['like_count']))

display("The data type of the quote count is: " +
type(recent_tweet.public_metrics['quote_count']).__name__)
display("The quote count is: " + str(recent_tweet.public_metrics['quote_count']))
```

'The data type of the retweet count is: int'

'The retweet count is: 7'

'The data type of the reply count is: int'

'The reply count is: 3'

'The data type of the like count is: int'

'The like count is: 6'

'The data type of the quote count is: int'

'The quote count is: 2'

The counts for retweets, replies, likes, and quotes are each integer numbers ([int](#)), indicating how many times the tweet has been retweeted, replied to, liked, or quoted.

Still more!

In addition to the data we looked at above, there are even more options for tweets such as:

- conversation_id: For tracking which tweets are in the same conversation, like replies and threads)
- geo: For the location where a tweet was posted (I think default privacy settings now leave this blank)
- organic_metrics: For the account that made the tweet, they can see how many people looked at it, or clicked on the user profile

You can read more about all this data and more in the [official twitter API documentation](#) (which is admittedly, a little hard to read and make sense of).

Ch 5.4.2 Demo: Dictionaries (Twitter)

We've talked about lists, but the other data organization we need to work with social media data is **dictionaries**.

As we mentioned in chapter 4, dictionaries allow us to combine pieces of information by naming them (sort of like variables).

So for example, the information about a user might have the following pieces of data:

- Username
- Twitter handle
- Profile Picture:
- Follows

Python has two ways of doing these types of dictionaries: **dict** and objects

Dictionaries (**dict**)

We can create dictionaries in Python by storing values into **keys** inside of curly braces **{ }**, like this:

```
user_1 = {  
    "username": "kylethayer",  
    "twitter_handle": "@kylethayer",  
    "profile_picture": "kylethayer.jpg",  
    "follows": ["@SusanNotess", "@UW", "@UW_iSchool", "@ajlunited"]  
}
```

In the code above, inside of the curly braces are a set of lines. Each line has a string (the **key**, or name of the value), followed by a colon (:), followed by a value that is to be saved for the key. At the end of all but the last line is a comma (,) which indicates that another **key** and value will come next.

Now that we've saved some values for some keys in the dictionary now saved in `user_1`, we can look up the values by using square brackets ([,]) with the key name inside, like this:

```
user_1_username = user_1["username"]  
display(user_1_username)
```

```
'kylethayer'
```

```
user_1_handle = user_1["twitter_handle"]  
display(user_1_handle)
```

```
'@kylethayer'
```

```
user_1_picture = user_1["profile_picture"]  
display(user_1_picture)
```

```
'kylethayer.jpg'
```

```
user_1_follows = user_1["follows"]  
display(user_1_follows)
```

```
['@SusanNotess', '@UW', '@UW_iSchool', '@ajlunited']
```

Objects

The other way of saving information that works similarly in Python is through an object. We won't be creating any in this book, but we will have to get data from some.

The main difference from what we will need is that while in dictionaries we use square brackets and put the key name in quotes as a string (e.g., `user_1["profile_picture"]`), in an object you use a period (.) and don't put the key name (called a **field**) in quotes (e.g., `user_1.profile_picture`)

We have already seen code that used this period to get something from an object a few times, specifically getting functions from them, like:

- `client.create_tweet(...)`
- `normal_message.upper()`

When we go through data from twitter, sometimes we will need to use `.` to get parts of the information out of objects, and sometimes we will need to use `[" "]` to get information out of dictionaries.

Looping through lists of dictionaries

Now that we've seen loops, lists, and dictionaries, we can go back to Twitter, run a search and look through multiple tweets:

load tweepy library

```
# Load some code called "tweepy" that will help us work with twitter
import tweepy
```

(optional) make a fake twitter connection with the `fake_tweepy` library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it won't actually connect to twitter. **If you want to try to actually connect to twitter, don't run this line of code.**

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

load your developer access passwords

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

give tweepy (or fake_tweepy) your developer access passwords

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

find a list of tweets

We can now do a search and find a list of tweets.

Note: If you run this on real twitter, we can't guarantee anything about how offensive what you might find is. We don't know of any word search we could guarantee would be safe.

```

# Choose a search to run
query = '"cute cat"'

#Run the search and request some additional info
tweets_info = client.search_recent_tweets(query=query, tweet_fields=["author_id",
"created_at", "id", "lang", "public_metrics", "source", "text"])

# Get the actual List of tweets out of the data field (tweets_info also has
# metadata about our search)
tweets_list = tweets_info.data

```

Fake Tweepy is pretending to search for "cute cat" and is returning some fake tweets.

Loop through the list of tweets

The variable `tweets_list` now has a list of tweet. So we can use a for loop to go through each tweet, and then use `.` to access info from each tweet (other pieces of information would need `[" "]` to access).

For each of the tweets, we will use `print` to display information about the tweet

```

for tweet in tweets_list:
    print("Info for tweet with id: " + str(tweet.id))
    print(" author_id: " + str(tweet.author_id))
    print(" created_at: " + str(tweet.created_at))
    print(" source: " + str(tweet.source))
    print(" text: " + str(tweet.text))
    print()

```

```

Info for tweet with id: 129308937494
author_id: 239048094385
created_at: 2022-02-22 22:22:22+00:00
source: Twitter for Android
text: While trying to tweet right now, I am being attacked by my cute cat! It's
so hard to tpye wihsaoae as fesadf asd fssasaf sa

Info for tweet with id: 93298432
author_id: 23409023
created_at: 2022-02-22 02:02:02+00:00
source: Twitter for iPhone
text: I wish I could be sleeping now like my cute cat is!

Info for tweet with id: 321923
author_id: 32892394
created_at: 2022-02-22 03:03:03+00:00
source: Twitter for iPhone
text: Why won't my cute cat stop scratching my face in the morning!

```

Ch 6.2.2 Demo & Practice: Tweet Sources

Let's now try out some code to see what device people are using to post their Tweets. We can't look at Donald Trump's Tweets, since his account was [suspended in January 2021 for inciting violence](#), but we can look at other accounts and think about authenticity might mean for different types of accounts.

Log into Twitter

These are our normal steps get Tweepy loaded and logged into Twitter

```
import tweepy
```

(optional) make a fake twitter connection with the fake_tweepy library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it wont actually connect to twitter. If you want to try to actually connect to twitter, don't run this line of code.

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd55s4tsea_fake_access_token_%YEkhDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Load tweets with the source (what device they were posted on)

The code below searches for recent tweets from an account, and then does a loop though all the tweets, printing out the source device of the Tweet and then the tweet itself. Hopefully most of the code looks familiar from last chapter when we covered loops over social media data.

Try searching for recent tweets from different types of accounts, like:

- News organizations and other corporations, like: cnn
- Politicians, like: BarackObama, JoeBiden,
- Other celebrities, like MarkRuffalo, selenagomez

To do this:

- put in your special Twitter bot passwords
- skip the fake_tweepy step above
- take the first line of the code below and replace '`from:fake_celebrity`' with something like '`from:cnn`'

```
# choose account to search from (save in query variable)
query = 'from:fake_celebrity'

# search tweets with the query, also include the "source" info, and allow up to 20
# results
# note: "search_recent_tweets" searches tweets from the last 7 days
tweets = client.search_recent_tweets(query=query, tweet_fields=["source"],
max_results=20)

# Loop through each of the tweets (saved in tweets.data)
for tweet in tweets.data:
    print("Tweet Source: " + tweet.source) # print the source publishing the tweet
    print(" Tweet: " + tweet.text) # print the text of the tweet
    print() # print a blank line
```

Fake Tweepy is pretending to search for '`from:fake_celebrity`' and is returning some fake tweets.

```
Tweet Source: Twitter for iPhone
Tweet: Why is the line at the grocery store taking so long???
```

```
Tweet Source: Fake Social Media Manager
Tweet: Remember, my show tonight starts at 7:00pm!
```

```
Tweet Source: Fake Social Media Manager
Tweet: Hope all my followers are having a lovely day!
```

Reflecting on what you find

In our fake_celebrity example, you will see that some of the tweets are posted from a Social Media Manager, a program that helps people schedule posts and otherwise manage their social media accounts.

Reflect on what you feel that social media manager means for authenticity for different types of accounts.

Demo: Trolling a Reply Bot

We are later going to build a bot that, if you tweet at it:

- "Hi @mybotname, please __" (where the __ is some action)
- then the bot will reply, "I will now __" (where the __ is that same action).

Then we will try trolling it, and fixing it, and trolling it again.

First though we need to do our tweepy setup:

Tweepy set-up

```
import tweepy
```

(optional) make a fake twitter connection with the fake_tweepy library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it won't actually connect to twitter. If you want to try to actually connect to twitter, don't run this line of code.

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgafs_fake_bearer_token_isa53$%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_$%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsd"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Finding my twitter bot name

We are going to be looking for people tweeting at us "Hi @mybotname, please __", except we will need to get our actual twitter handle instead of "@mybotname". We'll need our twitter id number as well to find tweets that mention us.

We do this by asking twitter for our user info, then getting the id and username from it:

```

# Ask twitter for my user info
my_user_info = client.get_user(id="me", user_auth=True)

# Get my id number and username from the user info
my_id = my_user_info.data.id
my_username = my_user_info.data.username

display("my user id number is: " + str(my_id))
display("my username is: " + my_username)

```

'my user id number is: 123456789'

'my username is: fake_user'

Bot 1: do whatever we are told

our first bot will find our latest mention, and then do whatever it is told

find my latest mention

Next we need to find the latest tweet that mentioned us.

We do this by asking twitter for tweets that mention our user id, then pulling the first thing out of the list (index 0).

Then we get the tweet id and the text of the tweet.

Note: This code will crash, showing error messages if there are no recent tweets mentioning us

```

# Ask twitter for tweets that mention my id
my_mentions = client.get_users_mentions(id=my_id)

# Get the first tweet from the list (latest tweet)
latest_mention = my_mentions.data[0]

latest_mention_id = latest_mention.id
latest_mention_text = latest_mention.text

display("the latest mention of us is tweet id: " + str(latest_mention_id))
display("the text of latest mention of us is: " + latest_mention_text)

```

'the latest mention of us is tweet id: 232434'

'the text of latest mention of us is: Hi @fake_user, please jump'

If tweet matches our pattern, reply

We will now see if our tweet matches our pattern of "Hi @mybotname, please __" and then we will reply.

First we will create a string with the correct pattern, but with our actual bot name

```
expected_pattern = "Hi @" + my_username + ", please "
```

Now, if the mention text starts with that expected pattern, then we will find the action from the end of the mention text (based on the expected_pattern length), and reply using that action:

```

# check if the mention text starts with our set phrase
if latest_mention_text.startswith(expected_pattern):
    # get the action, which should be the end of the string after the expected
    # pattern
    action = latest_mention_text[len(expected_pattern) :]

    # make a new tweet message which says we will do the action
    message = "I will now " + action

    # tweet our message in reply to the mention tweet
    client.create_tweet(
        text=message,
        in_reply_to_tweet_id=latest_mention_id
    )

```

Fake Tweepy is pretending to post this tweet (note: real tweepy shows no output here when a tweet is posted):

```
I will now jump
Tweet in reply to: 232434
```

Yay! It worked! But there is a problem!

Trolling bot 1

This bot is really easy to troll, so if I repeat my steps and get a new mention:

```

# Ask twitter for tweets that mention my id
my_mentions = client.get_users_mentions(id=my_id)

# Get the first tweet from the list (latest tweet)
latest_mention = my_mentions.data[0]

latest_mention_id = latest_mention.id
latest_mention_text = latest_mention.text

display("the latest mention of us is tweet id: " + str(latest_mention_id))
display("the thext of latest mention of us is: " + latest_mention_text)

expected_pattern = "Hi @" + my_username + ", please "

# check if the mention text starts with our set phrase
if latest_mention_text.startswith(expected_pattern):
    # get the action, which should be the end of the string after the expected
    # pattern
    action = latest_mention_text[len(expected_pattern) :]

    # make a new tweet message which says we will do the action
    message = "I will now " + action

    # tweet our message in reply to the mention tweet
    client.create_tweet(
        text=message,
        in_reply_to_tweet_id=latest_mention_id
    )

```

```
'the latest mention of us is tweet id: 234356'
```

```
'the thext of latest mention of us is: Hi @fake_user, please do something
horrible!'
```

Fake Tweepy is pretending to post this tweet (note: real tweepy shows no output here when a tweet is posted):

```
I will now do something horrible!
Tweet in reply to: 234356
```

Someone tweeted at us: Hi @fake_user, please do something horrible!, and we replied I will now do something horrible!.

They could have made us tweet much worse!

Bot 2: Trying to limit actions

Let's try this again, but limit the actions we will do.

- If someone asks us to "run", "jump", or "fly", we will do it
- If someone asks us to do something else we will say:
 - "I do not recognize the command __" (with __ being whatever they said)

So, to go back through our steps:

find my latest mention

```
# Ask twitter for tweets that mention my id
my_mentions = client.get_users_mentions(id=my_id)

# Get the first tweet from the list (latest tweet)
latest_mention = my_mentions.data[0]

latest_mention_id = latest_mention.id
latest_mention_text = latest_mention.text

display("the latest mention of us is tweet id: " + str(latest_mention_id))
display("the text of latest mention of us is: " + latest_mention_text)
```

'the latest mention of us is tweet id: 245454'

'the text of latest mention of us is: Hi @fake_user, please fly'

If tweet matches our pattern, reply

We do the same code for this as before, but after we get the action, we have another `if/else` to tweet back our two options.

We will use `in` to see if the action is in our list of allowed actions (called an `allow_list`)

```
expected_pattern = "Hi @" + my_username + ", please "

actions_allow_list = ["run", "jump", "fly"]

# check if the mention text starts with our set phrase
if latest_mention_text.startswith(expected_pattern):
    # get the action, which should be the end of the string after the expected
    # pattern
    action = latest_mention_text[len(expected_pattern) :]

    # See if it is one of our recognized actions
    if(action in actions_allow_list):
        # make a new tweet message which says we will do the action
        message = "I will now " + action

        # tweet our message in reply to the mention tweet
        client.create_tweet(
            text=message,
            in_reply_to_tweet_id=latest_mention_id
        )
    else: # we didn't recognize the action
        # make a new tweet message which says we will do the action
        message = "I do not recognize the command " + action

        # tweet our message in reply to the mention tweet
        client.create_tweet(
            text=message,
            in_reply_to_tweet_id=latest_mention_id
        )
```

Fake Tweepy is pretending to post this tweet (note: real tweepy shows no output here when a tweet is posted):

I will now fly
Tweet in reply to: 245454

That one was in our allow list so it worked. Let's do it all again, with the tweet that caused us problems last time

Note: the code below is just copied from the code sections above

```
# Ask twitter for tweets that mention my id
my_mentions = client.get_users_mentions(id=my_id)

# Get the first tweet from the list (latest tweet)
latest_mention = my_mentions.data[0]

latest_mention_id = latest_mention.id
latest_mention_text = latest_mention.text

display("the latest mention of us is tweet id: " + str(latest_mention_id))
display("the text of latest mention of us is: " + latest_mention_text)

expected_pattern = "Hi @" + my_username + ", please "

actions_allow_list = ["run", "jump", "fly"]

# check if the mention text starts with our set phrase
if latest_mention_text.startswith(expected_pattern):
    # get the action, which should be the end of the string after the expected
    # pattern
    action = latest_mention_text[len(expected_pattern) :]

    # See if it is one of our recognized actions
    if action in actions_allow_list:
        # make a new tweet message which says we will do the action
        message = "I will now " + action

        # tweet our message in reply to the mention tweet
        client.create_tweet(
            text=message,
            in_reply_to_tweet_id=latest_mention_id
        )
    else: # we didn't recognize the action
        # make a new tweet message which says we will do the action
        message = "I do not recognize the command " + action

        # tweet our message in reply to the mention tweet
        client.create_tweet(
            text=message,
            in_reply_to_tweet_id=latest_mention_id
        )
```

'the latest mention of us is tweet id: 245454'

'the text of latest mention of us is: Hi @fake_user, please do something horrible!'

Fake Tweepy is pretending to post this tweet (note: real tweepy shows no output here when a tweet is posted):

I do not recognize the command do something horrible!
Tweet in reply to: 245454

Ok, this time we said I do not recognize the command do something horrible!.

That looks a little better! Are we safe now?

Trolling bot 2

No, it turns out we are not safe.

Let's find the latest mention again and see what happens

```

# Ask twitter for tweets that mention my id
my_mentions = client.get_users_mentions(id=my_id)

# Get the first tweet from the list (latest tweet)
latest_mention = my_mentions.data[0]

latest_mention_id = latest_mention.id
latest_mention_text = latest_mention.text

display("the latest mention of us is tweet id: " + str(latest_mention_id))
display("the text of latest mention of us is: " + latest_mention_text)

expected_pattern = "Hi @" + my_username + ", please "

actions_allow_list = ["run", "jump", "fly"]

# check if the mention text starts with our set phrase
if latest_mention_text.startswith(expected_pattern):
    # get the action, which should be the end of the string after the expected
    # pattern
    action = latest_mention_text[len(expected_pattern) :]

    # See if it is one of our recognized actions
    if(action in actions_allow_list):
        # make a new tweet message which says we will do the action
        message = "I will now " + action

        # tweet our message in reply to the mention tweet
        client.create_tweet(
            text=message,
            in_reply_to_tweet_id=latest_mention_id
        )
    else: # we didn't recognize the action
        # make a new tweet message which says we will do the action
        message = "I do not recognize the command " + action

        # tweet our message in reply to the mention tweet
        client.create_tweet(
            text=message,
            in_reply_to_tweet_id=latest_mention_id
        )

```

'the latest mention of us is tweet id: 245454'

"the text of latest mention of us is: Hi @fake_user, please stop talking. But that doesn't mean I won't say horrible things like: I hate everybody!"

Fake Tweepy is pretending to post this tweet (note: real tweepy shows no output here when a tweet is posted):

I do not recognize the command stop talking. But that doesn't mean I won't say horrible things like: I hate everybody!
Tweet in reply to: 245454

Oh no! Someone tweeted at us:

- Hi @fake_user, please stop talking. But that doesn't mean I won't say horrible things like: I hate everybody!

And we replied:

- I do not recognize the command stop talking. But that doesn't mean I won't say horrible things like: I hate everybody!

Making a bot that is troll proof is very difficult! You either need to severely limit how your bot engages with people, or do a ton of work trying to prevent trolling and fix problems when people find a new way of trolling you.

If you want to learn more, you can revisit the story of what went wrong with the Microsoft Tay bot: [How to Make a Bot That Isn't Racist](#)

Data From the Twitter API

When we've been accessing Twitter through Python and the "tweepy" code library. The tweepy code library works by sending requests across the internet to twitter, using what is called an "[application programming interface](#)" or API for short. APIs have a set of rules for what requests you can make, what happens when you make the request, and what information you can get back.

If you are interested in learning more about what you can do with tweepy and what information you can get back, you can look at the official documentation for those. But be warned they are not organized in a friendly way for newcomers and take some getting used to figure out what these documentation pages are talking about.

So, if you are interested, you can look at [the tweepy library documentation](#) to see what tweepy functions you can run and what requests they make of the twitter API.

You can also look at information on the data that you can get from the Twitter API by looking at the Twitter API Documentation. For example, you can look at [the documentation for getting a Tweet](#), and see that you can get public metrics of a Tweet (likes, replies, etc.), and if you are the owner of the tweet you can get private "organic" metrics (how many people saw the tweet, how many clicked the to see the profile of the person who made the tweet, etc.).

The Twitter API lets you access just some of the data that Twitter tracks, but Twitter and other social media platforms track much more than they let you have access to.

Demo: Sentiment Analysis on Twitter

Now let's try using sentiment analysis (and loop variables) on Twitter:

We'll start by doing our normal steps to load tweepy (or fake tweepy)

Tweepy Setup

```
import tweepy
```

(optional) make a fake twitter connection with the fake_tweepy library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it won't actually connect to twitter. If you want to try to actually connect to twitter, don't run this line of code.

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Sentiment Analysis

load sentiment analysis library and make analyzer

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\kmthayer\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

loop through tweets, finding average sentiment

We can now combine our previous examples of looping through tweets with what we just learned of sentiment analysis and looping variables to find the average sentiment of a set of tweets.

```
query = '"cute cat"'
tweets = client.search_recent_tweets(query=query, max_results=10)

num_tweets = 0
total_sentiment = 0

# go through each tweet
for tweet in tweets.data:

    #calculate sentiment
    tweet_sentiment = sia.polarity_scores(tweet.text)["compound"]
    num_tweets += 1
    total_sentiment += tweet_sentiment

    print("Sentiment: " + str(tweet_sentiment))
    print("  Tweet: " + tweet.text)
    print()

average_sentiment = total_sentiment / num_tweets
print("Average sentiment was " + str(average_sentiment))
```

Fake Tweepy is pretending to search for '"cute cat"' and is returning some fake tweets.

```
Sentiment: -0.2865
Tweet: While trying to tweet right now, I am being attacked by my cute cat! It's so hard to tpye wihsaoae as fesadf asd fssasaf sa

Sentiment: 0.8172
Tweet: I wish I could be sleeping now like my cute cat is!

Sentiment: -0.6088
Tweet: Why won't my cute cat stop scratching my face in the morning!

Average sentiment was -0.02603333333333315
```

We can now see the average sentiment of a set of tweets based on our search of twitter!

If you use your twitter bot keys, you can change the `query` to be whatever twitter search you want and see whether people are tweeting positively or negatively about it.

note: You can change `max_results=10` to go up to 100 to get more tweets at a time to find the average of

Ch10.5.2: Demo: Extra Data From Twitter

In order to get alt-text data from images in Tweets, we're going to have to look at how to get extra data from Twitter.

Note: You don't really need to understand this whole process, you can just take the final code pieces and copy/paste them to use them yourself. We are including this explanation in case you want to know how it is working.

The examples here are based on examples from [this website](#)

But first let's do our normal tweepy set-up

Normal Tweepy Set-Up

```
import tweepy
```

(optional) use the fake version of tweepy, so you don't have to use real twitter developer access passwords

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4t0ssfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Get media (including image) data

If we want to get media (including image) data from tweets, when we are using search_recent_tweets, then we have to include:

- `expansions='attachments.media_keys'` which tells Tweepy to get the media information for the tweet
- `media_fields=['preview_image_url', 'height', 'width']` which tells Tweepy which information to get for each piece of media.

Let's do a search for tweets that include the word dog, and have an image, and are not retweets (so we don't just get the same tweet for all the times it was retweeted):

```
query = "dog -is:retweet has:image"

tweet_search_results = client.search_recent_tweets(
    query=query,
    expansions='attachments.media_keys', #tell
    # twitter to download the media related to this tweet
    media_fields=['preview_image_url', 'height',
    'width'] # when getting the media, make sure to include this info
)
```

Fake Tweepy is pretending to search for 'dog -is:retweet has:image' and is returning some fake tweets.

Now, when our search comes back, it has both the Tweet information and the information about media (including images) in those Tweets.

Unfortunately the Tweet info and the media info come back in two separate parts of the `tweet_search_results`:

- `tweet_search_results.data` has the list of tweets
- `tweet_search_results.includes['media']` has a list of the pieces of media in the tweets

```
display(tweet_search_results.data)
```

```
[namespace(text='Look at my cute dog!',  
         id=2342352355,  
         author_id=213412413,  
         data={'attachments': {'media_keys': ['7_4353463']}},  
namespace(text='check out these dog photos',  
         id=93298432,  
         author_id=309453565,  
         data={'attachments': {'media_keys': ['4_354354', '4_324654']}},  
namespace(text='lol silly dog!',  
         id=43954354,  
         author_id=309453565,  
         data={'attachments': {'media_keys': ['5_45353']}})]
```

```
display(tweet_search_results.includes['media'])
```

```
[namespace(media_key='7_4353463',  
         type='photo',  
         height=600,  
         width=800,  
         alt_text='Photo of a small dog lying flat on floor, looking exhausted',  
         url='fake_website_photo1.jpg'),  
namespace(media_key='4_354354',  
         type='photo',  
         height=300,  
         width=400,  
         alt_text=None,  
         url='fake_website_photo2.jpg'),  
namespace(media_key='4_324654',  
         type='photo',  
         height=300,  
         width=400,  
         alt_text=None,  
         url='fake_website_photo3.jpg'),  
namespace(media_key='5_45353',  
         type='photo',  
         height=1200,  
         width=1024,  
         alt_text='photo taken by fake user 2',  
         url='fake_website_photo4.jpg')]
```

The way this comes back doesn't directly tell us which piece of media is part of which tweet. Instead, for each piece of media, there is a special id number called the `media_key`, and for each tweet there is a list of `media_keys` that are part of the tweet.

- for a `tweet` in `tweets.data`, the `media_keys` are in
`tweet.data['attachments']['media_keys']`
- for a piece of `media` in the `tweets.includes['media']`, the `media_id` is in
`media['media_key']`

So, if we are looking at a tweet, and look at the media keys, we will want to look up the media information that goes with that key. Looking up something based on a key is easiest to do with a dictionary in Python. So, what we will do is make a dictionary where the keys are `media_keys`, and the values are the media information. It will look something like this:

Below is the code to do this (using several Python short hand tricks at once):

```
media_lookup = {m.media_key: m for m in tweet_search_results.includes['media']}
```

```

{'7_4353463': namespace(media_key='7_4353463',
    type='photo',
    height=600,
    width=800,
    alt_text='Photo of a small dog lying flat on floor, looking exhausted',
    url='fake_website_photo1.jpg'),
'4_354354': namespace(media_key='4_354354',
    type='photo',
    height=300,
    width=400,
    alt_text=None,
    url='fake_website_photo2.jpg'),
'4_324654': namespace(media_key='4_324654',
    type='photo',
    height=300,
    width=400,
    alt_text=None,
    url='fake_website_photo3.jpg'),
'5_45353': namespace(media_key='5_45353',
    type='photo',
    height=1200,
    width=1024,
    alt_text='photo taken by fake user 2',
    url='fake_website_photo4.jpg')}

```

Now we can choose a tweet, find the media_keys for that tweet, and then look up the media information on each of those tweets

```

# get the first tweet
first_tweet = tweet_search_results.data[0]

print("displaying info for tweet: " + first_tweet.text)

# get the media keys for the first tweet
first_tweet_media_keys = first_tweet.data['attachments'][0]['media_keys']

# Loop through the media keys
for media_key in first_tweet_media_keys:
    # Lookup the info about this particular media key
    media_info = media_lookup[media_key]

    # print out some info about this piece of media
    print("  type: " + media_info.type)
    print("  height: " + str(media_info.height))
    print("  width: " + str(media_info.width))
    print()

```

```

displaying info for tweet: Look at my cute dog!
  type: photo
  height: 600
  width: 800

```

Get user information

User information works the same way that media information did, though there will only be one author per tweet. We have to set an expansion and tell what user fields to download:

```

query = "dog -is:retweet has:images"

tweet_search_results = client.search_recent_tweets(
    query=query,
    expansions='author_id', # tell twitter to
download the author related to this tweet
    user_fields=['profile_image_url'] # when
    getting the author, make sure to include this info
)

```

Fake Tweepy is pretending to search for 'dog -is:retweet has:images' and is returning some fake tweets.

Then we make a lookup dictionary for the user information

```

user_lookup = {u.id: u for u in tweet_search_results.includes['users']}
display(user_lookup)

```

```
{213412413: namespace(id=213412413,
    name='Fake User 1',
    username='fakeuser1',
    profile_image_url='fake_profile_image1.jpg'),
309453565: namespace(id=309453565,
    name='Fake User 2',
    username='fakeuser2',
    profile_image_url='fake_profile_image2.jpg')}
```

Then we can find the `author_id` of a tweet in `tweet.author_id`, and look it up in the `user_lookup` dictionary

```
first_tweet = tweet_search_results.data[0]
print("displaying info for tweet: " + first_tweet.text)

# get the author id for the first tweet
first_tweet_author_id = first_tweet.author_id

author = user_lookup[first_tweet_author_id]

# Look up info about the author:
print(" author name: " + author.name)
print(" author username: " + author.username)
print(" author profile image: " + author.profile_image_url)
```

```
displaying info for tweet: Look at my cute dog!
author name: Fake User 1
author username: fakeuser1
author profile image: fake_profile_image1.jpg
```

Ch10.5.2: Demo: Alt-text From Twitter

Now that we've seen how to select additional information about Tweet images and data, let's search for images and look up some alt-text:

Normal Tweepy Set-Up

```
import tweepy
```

(optional) use the fake version of tweepy, so you don't have to use real twitter developer access passwords

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#$$"
consumer_key = "sa@#4fdfdsa_fake_consumer_key_%%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YEkhDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Do a search for tweets, loop through the tweets and display the alt-text information

```

query = "dog -is:retweet has:images"

tweet_search_results = client.search_recent_tweets(
    query=query,
    expansions='attachments.media_keys', #tell
    twitter to download the media related to this tweet
    media_fields=['alt_text', 'url'], # when
    getting the media, make sure to include this info
    max_results=100
)

# make media_lookup dictionary
media_lookup = {m.media_key: m for m in tweet_search_results.includes['media']}

# go through each tweet
for tweet in tweet_search_results.data:

    # use the tweet id to make a link to this specific tweet
    print('https://twitter.com/twitter/statuses/' + str(tweet.id))

    # print the text content of the tweet
    print(tweet.text)

    # print the info on "attachments" for this tweet
    # in this case, it will be the media_keys

    #get the media keys for this tweet
    media_keys = tweet.data['attachments']['media_keys']

    for media_key in media_keys:
        # lookup the info about this particular media_key
        media_info = media_lookup[media_key]

        # print out some info about this piece of media
        print(" type: " + media_info.type)
        print(" alt_text: " + str(media_info.alt_text))
        print(" url: " + str(media_info.url))
        print()

    # display a clear divider so we can more easily see each tweet
    print("-----")
    print()

```

Fake Tweepy is pretending to search for 'dog -is:retweet has:images' and is returning some fake tweets.

```

https://twitter.com/twitter/statuses/2342352355
Look at my cute dog!
type: photo
alt_text: Photo of a small dog lying flat on floor, looking exhausted
url: fake_website_photo1.jpg
-----

https://twitter.com/twitter/statuses/93298432
check out these dog photos
type: photo
alt_text: None
url: fake_website_photo2.jpg

type: photo
alt_text: None
url: fake_website_photo3.jpg
-----

https://twitter.com/twitter/statuses/43954354
lol silly dog!
type: photo
alt_text: photo taken by fake user 2
url: fake_website_photo4.jpg
-----
```

What alt-texts do you find helpful?

In the above output, you are in a position where you can read the alt-text of the image, but you can't see the image (unless you open up the actual tweets, which if you are looking at the fake_tweepy output, there are no actual tweets).

Without seeing the images you can hopefully see what makes alt-text useful or not. Posts without alt-text will be hard to make sense of, and some alt text on photos might tell you information about the photo, but not the information you need.

Ch 11.4.3: Demo: Recommend a User to Follow

Now let's look at a recommendation algorithm for a new person to friend or follow. Our algorithm will be

For a given user:

1. Look at the people this user follows
2. For each of those follows, look at who they follow
3. While doing this, keep track of what accounts showed up most
4. Recommend the accounts that showed up the most (the users most followed by people followed by our given user)

Normal Tweepy Set-Up

```
# make sure tweepy library is installed
import tweepy
```

(optional) use the fake version of tweepy, so you don't have to use real twitter developer access passwords

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```
# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"
```

```
# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)
```

Fake Tweepy is pretending to log in to twitter

Make a helper function (id_from_username)

Now that we've learned functions, we will be putting much of our code in functions.

So in order to simplify our code later, we will make a function that, when given a username, looks up the user and gets their id number (since we'll need to use that id later)

```
def id_from_username(username):
    user_info = client.get_user(username=username)
    user_id = user_info.data.id
    return user_id
```

Make a function to get follow suggestions

Now we make a function that will generate follow suggestions.

The function takes a username (who we are making suggestions for), and a num_followers_to_check, which limits how many follows of our user we check (since Twitter limits how many requests we can make)

We then get a list of the follows for our user, and we create a dictionary counter (`possible_suggestion_counts`).

For each of our user's follows, we get a list of who they follow (the follow-follows). Then for each of the follow_follows, we see if that user is in the `possible_suggestion_counts` dictionary, and add it if it wasn't there (starting with 1), or add 1 to it if it was already there.

After the for loop we have counts for our possible suggestions (how often the follow-follows appeared). So we sort the list to put the most common ones at the top, and we return the results.

```
def get_followSuggestions(username, numFollowersToCheck=3):
    # for a given user, I need to user id
    user_id = id_from_username(username)

    # find the people that user currently follows
    follow_users = client.get_users_following(id=user_id,
                                                max_results=numFollowersToCheck)

    # dictionary to track who my follow follows are, as possible suggestions
    # The keys will be the username, and the values will be how often they
    # appeared as follow follows
    possibleSuggestionCounts = {}

    # for each of those people, see who they follow
    for follow_user in follow_users.data:
        print("looking for followings of user: " + follow_user.username)
        followFollowUsers = client.get_users_following(id=follow_user.id)

        # print out the follow-follows (using some python tricks to make it display
        # nicer)
        print(" the follow-follows are: " + str(list(map(lambda x: x.username,
                                                       followFollowUsers.data)))

        for followFollowUser in followFollowUsers.data:
            possibleSuggestion = followFollowUser.username

            # If this possible suggestion is not yet in the dictionary,
            # add it with a count of one
            if possibleSuggestion not in possibleSuggestionCounts:
                possibleSuggestionCounts[possibleSuggestion] = 1
            else: #otherwise, update the count in the dictionary
                possibleSuggestionCounts[possibleSuggestion] += 1

    print()

    # sort the suggestions by who appeared the most
    orderedSuggestions = sorted(possibleSuggestionCounts.items(), key=lambda x:
                                -x[1])
    # recommend that I follow the people who those people follow most
    return orderedSuggestions
```

Test our function (suggest follows)

Now that our function is ready, we can test it out and see who we suggest our "fake_user" should follow (if you skip fake_tweepy and log into real twitter, you can do this for real users)

```
suggestions = getFollowSuggestions("fake_user", numFollowersToCheck=5)
display(suggestions)
```

```

looking for followings of user: unreal_user
the follow-follows are: ['great_user', 'awesome_user']

looking for followings of user: imaginary_user
the follow-follows are: ['ok_user', 'awesome_user']

looking for followings of user: false_user
the follow-follows are: ['great_user', 'awesome_user', 'mediocre_user',
'another_user']

```

```

[('awesome_user', 3),
 ('great_user', 2),
 ('ok_user', 1),
 ('mediocre_user', 1),
 ('another_user', 1)]

```

If you skip the fake_tweepy step and run this on real Twitter, you might see some issues with the suggestions that we haven't accounted for, such as:

- it might suggest the user follow themselves, or someone they already follow
- the follow lists can be very long and you might not be getting the whole list in the `client.get_users_following()` function call (you could use [pagination](#) to get more)

We could of course add more code to deal with those issues, but hopefully you can at least get the idea of how this recommendation algorithm works :)

Demo: Only positive news

Let's look at something we could try to do to improve the mental health for our users: Only show positive news!

We'll use sentiment analysis again, but this time we'll do a search for news from a news account, but only display the tweets with a positive sentiment.

Would this actually improve someone's mental health? It's hard to say! But we can see something that we might try out if we wanted to improve mental health of our users.

Normal Tweepy Set-Up

```

# make sure tweepy library is installed
import tweepy

```

(optional) use the fake version of tweepy, so you don't have to use real twitter developer access passwords

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

Fake tweepy is replacing the tweepy library. Fake Tweepy doesn't need real passwords, and prevents you from accessing real twitter

```

# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#$%"
consumer_key = "sa@#40fdfdsa_fake_consumer_key_#$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd55s4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"

```

```

# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)

```

Fake Tweepy is pretending to log in to twitter

Load sentiment analysis code

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\kmthayer\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

Code to search and display news tweets

Now let's make code that will do a search for news tweets (tweets from a fake_news_site), and display all of them. We will then make a modified version below to compare the results.

```
query = 'from:fake_news_site'
tweets = client.search_recent_tweets(query=query, max_results=10)

# go through each tweet
for tweet in tweets.data:
    print(tweet.text)
    print()
```

Fake Tweepy is pretending to search for 'from:fake_news_site' and is returning some fake tweets.

```
Breaking news: A lovely cat took a nice long nap today!
Breaking news: Someone said a really mean thing on the internet today!
Breaking news: Some grandparents made some yummy cookies for all the kids to share!
Breaking news: All the horrors of the universe revealed at last!
```

Search through tweets and only display good news

Now we will make a different version of the code that computes the sentiment of each tweet and only displays the ones with positive sentiment.

```
query = 'from:fake_news_site'
tweets = client.search_recent_tweets(query=query, max_results=20)

# go through each tweet
for tweet in tweets.data:

    #calculate sentiment
    tweet_sentiment = sia.polarity_scores(tweet.text)["compound"]

    if(tweet_sentiment > 0):
        print(tweet.text)
        print()
```

Fake Tweepy is pretending to search for 'from:fake_news_site' and is returning some fake tweets.

```
Breaking news: A lovely cat took a nice long nap today!
Breaking news: Some grandparents made some yummy cookies for all the kids to share!
```

Try it out on real twitter

If you want, you can skip the fake_tweepy step and try it out on real twitter with a query like "from:npr", "from:msnbc", "from:cnn", etc.

Did it work like you expected?

You can also only show negative sentiment tweets (sentiment < 0) if you want to see only bad news.

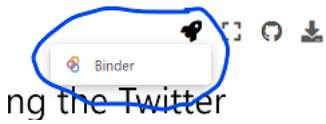
Practice Solutions (Twitter)

These are solutions to the practice problems in the different chapters.

Ch 3 (Twitter) Practice: Statements and Variables

This Python Notebook is a chance for you to try out the programming concepts we have covered thus far.

As we mentioned previously in the first bot demo (2.3.8), in order to run the code, you can look for the rocket button at the top which will give you an option to "launch binder"



If you launch binder, it will take a while to load, but eventually show you a version of this page Jupyter Notebook in a code editor called Jupyter Lab



In Jupyter Lab you can double click any section to edit it, and you can press the triangle "run" button to run the code (or display the text).



When the code runs, the little number to the left of the code block should change. There might also be some output from your action displayed below the code block.

So now you can go through the rest of this page and try out the practice exercises for yourself!

Variables

You will first practice saving values into variables. Remember, the way we save a value into a variable is like this:

```
variable_name = value
```

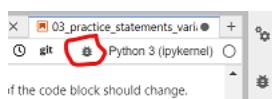
First, save the piece of text "I am writing a computer program!" into a variable called `my_progress`

```
my_progress = "I am writing a computer program!"
```

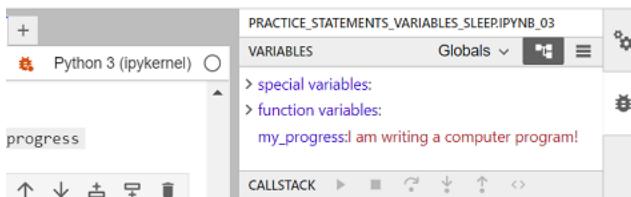
Viewing variables in the debugger

Before we continue, we are going to show you how to open the debugger so you can see what is being saved in your variables.

On the top right of this tab, press the small bug icon to "enable debugging":



Then, if you did the step above correctly, you should see the variable `my_progress` with the value "I am writing a computer program!" next to it:



Practice number variables

First, write and run a line of code to save the value 5 into a variable named `number_of_pies`

```
number_of_pies = 5
```

Now, save the value 12.5 into a variable named `cost_per_pie`

```
cost_per_pie = 12.5
```

Now make a new variable called `total_pie_cost` and save into the value of the `number_of_pies` multiplied by the `cost_per_pie`.

Note: In python (and many programming languages), the symbol for multiply is *

```
total_pie_cost = number_of_pies * cost_per_pie
```

Now use the `display` function to display what is saved in `total_pie_cost`

```
display(total_pie_cost)
```

```
62.5
```

More variable practice

Now, make a new variable called `first_name` and assign your first name to it

```
first_name = "Kyle"
```

Now, make a variable called `last_name` and save your last name to it

```
last_name = "Thayer"
```

Create a variable called `age` and assign your age to it.

```
age = 38
```

~ A year goes by ~

Increase the `age` variable by 1.

```
age = age + 1
```

Now write three lines of code, with each line using `display` to show what is saved in `first_name`, `last_name`, and `age`

```
display(first_name)
display(last_name)
display(age)
```

'Kyle'

'Thayer'

39

Sleep

In order to use sleep, we must first import it from the time library

```
from time import sleep
```

Now try displaying 5 messages of your choosing, with some pauses between each one:

```
display("message 1")
sleep(.01) #I am making these pauses small to make the book build faster
display("message 2")
sleep(.02)
display("message 3")
sleep(.01)
display("message 4")
sleep(0.05)
display("message 5")
```

'message 1'

'message 2'

'message 3'

'message 4'

'message 5'

Twitter Bot Practice

Now lets try a twitter bot with variables and sleep!

Load Tweepy Library

First, we need to load the tweepy library

```
# Load some code called "tweepy" that will help us work with twitter
import tweepy
```

(Optional) Make a fake twitter connection with the fake_tweepy library

For testing purposes, we've added this line of code, which loads a fake version of tweepy, so it wont actually connect to twitter. **If you want to try to actually connect to twitter, don't run this line of code.**%run ../../fake_tweepy/fake_tweepy.ipynb

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

```

-----
OSError                                     Traceback (most recent call last)
File C:\Python310\lib\site-packages\IPython\core\magics\execution.py:696, in
ExecutionMagics.run(self, parameter_s, runner, file_finder)
    695     fpath = arg_lst[0]
--> 696     filename = file_finder(fpath)
    697 except IndexError as e:

File C:\Python310\lib\site-packages\IPython\utils\path.py:91, in
get_py_filename(name)
    90 else:
--> 91     raise IOError('File `%r` not found.' % name)

OSError: File `'../../fake_tweepy/fake_tweepy.ipynb.py` not found.

The above exception was the direct cause of the following exception:

Exception                               Traceback (most recent call last)
Input In [14], in <cell line: 1>()
----> 1 get_ipython().run_line_magic('run', '../../fake_tweepy/fake_tweepy.ipynb')

File C:\Python310\lib\site-packages\IPython\core\interactiveshell.py:2305, in
InteractiveShell.run_line_magic(self, magic_name, line, _stack_depth)
    2303     kwargs['local_ns'] = self.get_local_scope(stack_depth)
    2304     with self.builtin_trap:
-> 2305         result = fn(*args, **kwargs)
    2306     return result

File C:\Python310\lib\site-packages\IPython\core\magics\execution.py:707, in
ExecutionMagics.run(self, parameter_s, runner, file_finder)
    705     if os.name == 'nt' and re.match(r"^\.*'$", fpath):
    706         warn('For Windows, use double quotes to wrap a filename: %run
"mypath\\myfile.py"')
--> 707     raise Exception(msg) from e
    708 except TypeError:
    709     if fpath in sys.meta_path:

Exception: File `'../../fake_tweepy/fake_tweepy.ipynb.py` not found.

```

Load your developer access passwords

To use this on your real twitter account, copy your developer access passwords into the code below, replacing our fake passwords.

```

# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_%DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j^$dr_fake_consumer_key_^A5s#DR5s"

```

Give tweepy (or fake_tweepy) your developer access passwords

```

# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)

```

Fake Tweepy is pretending to log in to twitter

Post a tweet

Post something you learned in the class so far:

Remember, the code to post a tweet looks like this: `client.create_tweet(text="This is the tweet text")`

```
client.create_tweet(text="I learned to look at the answer key!")
```

Post from a variable

Now try saving a piece of text in a variable, and then tweeting the whatever you saved in the variable.

To do this, where the code has `client.create_tweet(text="This is the tweet text")`, you'll replace the quoted text with the variable name, so it will look like `client.create_tweet(text=variable_name)` (with whatever your variable name was instead of "variable_name")

```
message_to_tweet = "something in a variable"
client.create_tweet(text=message_to_tweet)
```

Post multiple tweets

Next try posting 5 tweets, but use `sleep` to add pauses between each one (if you make the pauses over 60 seconds, then the official "time" of the tweet should look different on the twitter interface).

```
client.create_tweet(text="message 1")
sleep(.01) #note: I am using short times since these pauses slow down compiling the
book
client.create_tweet(text="message 2")
sleep(.02)
client.create_tweet(text="message 3")
sleep(.01)
client.create_tweet(text="message 4")
sleep(.05)
client.create_tweet(text="message 5")
```

Ch 4 (Twitter) Practice: Python Basic Data Types

Greeting

Make a new variable called `greeting_part_1` and assign it the string: "Welcome, "

Note: There is an extra space after the word

```
greeting_part_1 = "Welcome, "
```

Make a new variable called `greeting_part_2` and assign it the string: "! It is nice to meet you!"

Note: this string starts with an exclamation mark.

```
greeting_part_2 = "! It is nice to meet you!"
```

Make a variable called `name_1` and assign it with a string of someone's name.

```
name = "Kyle"
```

Now, combine them all together into a new variable called `full_greeting`. Combine the parts together by taking `greeting_part_1` then adding `name` then adding `greeting_part_2`.

Then display the variable `full_greeting`.

```
full_greeting = greeting_part_1 + name + greeting_part_2
display(full_greeting)
```

```
'Welcome, Kyle! It is nice to meet you!'
```

Now make a variable called `name_2` with another name in it and make a variable `called_full_greeting_2` the same way you did `full_greeting`, but with `name_2` instead.

Then display the variable `full_greeting_2`

```
name_2 = "Susan"
full_greeting = greeting_part_1 + name_2 + greeting_part_2
display(full_greeting)
```

```
'Welcome, Susan! It is nice to meet you!'
```

Engagement report

Make up numbers for tweet metrics and save them into variables: `number_likes`, `number_retweets`, `number_quote_tweets`

```
number_likes = 8  
number_retweets = 3  
number_quote_tweets = 7
```

Write three different `display()` function calls, one to report on each of those variables.

Inside the parentheses first put a string like, "The number of likes is: " and then add the relevant variable to it, but remember, since the variable has a number in it, you have to put a `str()` function call around that variable name

```
display("The number of likes is: " + str(number_likes))  
display("The number of retweets is: " + str(number_retweets))  
display("The number of quote tweets is: " + str(number_quote_tweets))
```

```
'The number of likes is: 8'
```

```
'The number of retweets is: 3'
```

```
'The number of quote tweets is: 7'
```

Make a new variable called `total_engagement` and save the total number of all the likes, retweets and quote tweets.

Then display that information the way you did the other variables.

```
total_engagement = number_likes + number_retweets + number_quote_tweets  
display("The total engagement is: " + str(total_engagement))
```

```
'The total engagement is: 18'
```

Is your tweet too long

Make a variable called `tweet_1` with a string of your choosing that is fairly short

```
tweet_1 = "This is a short tweet"
```

Make a variable called `tweet_1_length`, and save the length of the string `tweet_1` into it (using the `len()` function)

```
tweet_1_length = len(tweet_1)
```

Check if the `tweet_1_length` is less than or equal to 280 characters (the max length of a tweet) using the less than or equal operator: `<=`, and save the result into a variable called `is_tweet_1_short_enough`

```
is_tweet_1_short_enough = tweet_1_length <= 280
```

Use the `display()` function to display a string ("Is tweet 1 short enough? "), adding the variable `is_tweet_1_short_enough` to that string.

Remember, since the variable has a boolean and not a string in it, you have to put a `str()` function call around that variable name

```
display("Is tweet 1 short enough? " + str(is_tweet_1_short_enough))
```

```
'Is tweet 1 short enough? True'
```

Make a variable called `tweet_2` with a string of your choosing that is very long (over 280 characters)

```
tweet_2 = "This is a long tweet:  
sadasdsaddsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsads  
adsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsadsads  
adsadsadsadsadsaddsafdsadsasadadssadsadsadsadsadsadsadsadsads  
adsadsadsadsasda"
```

Repeat the rest of the steps from before, but with `tweet_2`

- find `tweet_2_length`
- make a variable `is_tweet_2_short_enough`
- display the result

```
tweet_2_length = len(tweet_2)  
is_tweet_2_short_enough = tweet_2_length <= 280  
display("Is tweet 2 short enough? " + str(is_tweet_2_short_enough))
```

```
'Is tweet 2 short enough? False'
```

Ch 5 (Twitter) Practice: Looping through lists and dictionaries

Try out these coding problems to practice looping, lists, and dictionaries

Make a loop that displays "Are you awake yet?" 5 times

```
for i in range(5):  
    display("Are you awake yet?")
```

```
'Are you awake yet?'
```

Make a list of names (at least three), and save it in a variable called `names`

```
names = ["Kyle", "Susan", "Another person"]
```

Now loop over each of those names, and for each name display "[name] is awesome!"

```
for name in names:  
    display(name + " is awesome!")
```

```
'Kyle is awesome!'
```

```
'Susan is awesome!'
```

```
'Another person is awesome!'
```

Now, do the same thing as before, but for each name, first make a string that has “[name] is awesome!” and save it in a variable, then use the `.upper()` function on the string to make it all uppercase and save it into a variable, then display the final string.

```
for text in names:  
    sentence = text + " is awesome!"  
    upper_sentence = sentence.upper()  
    display(upper_sentence)
```

'KYLE IS AWESOME!'

'SUSAN IS AWESOME!'

'ANOTHER PERSON IS AWESOME!'

Now, we are going to make a dictionary with information on a photo

```
photo_1_info = {  
    "width": 800,  
    "height": 600,  
    "location": "that one mountain",  
    "device": "iPhone 6"  
}
```

Select and display the width of the photo

```
photo_1_info["width"]
```

800

Select and display the location of the photo

```
photo_1_info["location"]
```

'that one mountain'

Now we are going to make a list of photo info for you to go through

```
photo_info_list = [  
    {  
        "width": 800,  
        "height": 600,  
        "location": "that one mountain",  
        "device": "iPhone 6"  
    },  
    {  
        "width": 800,  
        "height": 600,  
        "location": "on the lake",  
        "device": "iPhone 5"  
    },  
    {  
        "width": 1600,  
        "height": 800,  
        "location": "The underground mines",  
        "device": "Nokia 3310"  
    }  
]
```

Now, make a for loop to go through each set of phone info in `photo_info_list`, and for each one, use `print` commands to display the width, height, location, and device

```
for photo_info in photo_info_list:  
    print(photo_info["width"])  
    print(photo_info["height"])  
    print(photo_info["location"])  
    print(photo_info["device"])  
    print()
```

```
800  
600  
that one mountain  
iPhone 6  
  
800  
600  
on the lake  
iPhone 5  
  
1600  
800  
The underground mines  
Nokia 3310
```

Ch 7 (Twitter) Practice: Conditionals and String Manipulation

IF ELSE Statements

Look at the following code example and try running it

```
x = 5  
  
if x < 11:  
    print('A')  
elif x >= 13:  
    print('B')  
else:  
    print('C')
```

A

Now what would happen if x was changed to 30? What would the output be?

Do Not Code. Please answer this question as a markdown block. Modify the code above to check your answer afterwards.

It would print 'B'

What value would the x variable have to be in order to get the output 'C'?

Again, Do Not Code. Please answer this question as a markdown block. Modify the code above to check your answer afterwards

If x were 12, it would print C

String Manipulation

Now, make a variable with your name in it, called my_name

```
my_name = "Kyle"
```

Write code to display the first letter of your name

```
display(my_name[0])
```

'K'

Write code to display the last letter of your name

```
display(my_name[-1 : ])
```

'e'

Ifs with Strings

Save a string in a variable called `message` and have it end with either a question mark `?`, an exclamation mark `!`, or a period `.`

```
message = "This is an example message!"
```

Now, make a set of if/elif/else statements which will display either:

- The message was a question
- The message was an exclamation
- The message was a statement
- The message ended unexpectedly

depending on what character the message ended in a `?`, `!`, `.`, or something else. Hint: use the `endswith` function.

```
if message.endswith("?"):
    display("The message was a question")
elif message.endswith("!"):
    display("The message was an exclamation")
elif message.endswith("."):
    display("The message was a statement")
else:
    display("The message ended unexpectedly")
```

```
'The message was an exclamation'
```

Now, go back and modify the message string to see if the different if/elif/else options all work

Ch 8 (Twitter) Practice: Sentiment Analysis and Loop Variables

Now it's your turn to practice sentiment analysis and loop variables

Sentiment Analysis

First run the code to load up the Sentiment Intensity Analyzer

```
import nltk
nltk.download(["vader_lexicon"])
from nltk.sentiment import SentimentIntensityAnalyzer
sia = SentimentIntensityAnalyzer()
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]   C:\Users\kmthayer\AppData\Roaming\nltk_data...
[nltk_data]   Package vader_lexicon is already up-to-date!
```

Also, look at this example from the demo of running sentiment analysis:

```
sentence = "I love love love pizza!!!!!!"
sia.polarity_scores(sentence)["compound"]
```

```
0.941
```

Now, copy that two lines of code above, and try out your own sentences, and run the sentiment analysis on them

```
sentence = "This is an ok example"
sia.polarity_scores(sentence)["compound"]
```

```
0.296
```

Try several sentences and see how the Sentiment Intensity Analyzer handles them

```
sentence = "This is a horrible example"
sia.polarity_scores(sentence)["compound"]
```

-0.5423

Loop variables

Now let's practice with loop variables.

Below is a for loop which goes through each letter in the word "Mississippi".

```
for letter in "Mississippi":  
    print(letter)
```

```
M  
i  
s  
s  
i  
s  
s  
i  
p  
i
```

Make another copy of that loop, but add a variable before the loop called `num_letters` and use it count how many letters were in the word "Mississippi". At the end display the number of letters.

```
num_letters = 0  
  
for letter in "Mississippi":  
    print(letter)  
    num_letters += 1  
  
print("There were " + str(num_letters) + " letters")
```

```
M  
i  
s  
s  
i  
s  
s  
i  
p  
i  
There were 10 letters
```

Make another copy of what you just did, but this time also count the number of "i"s. Make a variable called `num_i` to count how many "i"s.

Hint: To see if a letter is an "i", check if `letter == "i"`

At the end print out how many of the letters were "i"s and what percentage of the word was "i"s.

```
num_letters = 0  
num_i = 0  
  
for letter in "Mississippi":  
    print(letter)  
    num_letters += 1  
  
    if(letter == "i"):  
        num_i += 1  
  
print("There were " + str(num_letters) + " letters")  
  
percent_i = num_i / num_letters * 100  
  
print("i's made up " + str(percent_i) + " percent of the word")
```

```
M  
i  
s  
i  
s  
s  
i  
p  
i  
There were 10 letters  
i's made up 40.0 percent of the word
```

Ch 9 (Twitter) Practice: Functions

Create a function called `say_goodbye` which displays the text "Goodbye!"

```
def say_goodbye():  
    print("Goodbye!")
```

Write code that calls the function `say_goodbye`

```
say_goodbye()
```

```
Goodbye!
```

Redefine the function `say_goodbye` to take a parameter called `name`, and have it display "Goodbye name!" where "name" is replaced by whatever was in the `name` variable

```
def say_goodbye(name):  
    print("Goodbye "+name+"!")
```

Write code that calls the function `say_goodbye` but with your name as a parameter

```
say_goodbye("Kyle")
```

```
Goodbye Kyle!
```

Try out the code below which counts from 0 to 4 slowly:

```
import time # We need the time library for the following examples
```

```
for i in range(5):  
    print(i)  
    time.sleep(1)
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

We can put that for loop in a function like this:

```
def counter():  
    for i in range(5):  
        print(i)  
        time.sleep(1)
```

And then we can call it:

```
counter()
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

Now redefine `counter` by

1. copying the code above which defines `counter`
2. make the counter take a parameter called `max`
3. Have the `range` call use the parameter `max`

```
def counter(max):  
    for i in range(max):  
        print(i)  
        time.sleep(1)
```

Now try calling the new version of `counter` but passing it the argument 7

```
counter(7)
```

```
0
```

```
1
```

```
2
```

```
3
```

```
4
```

```
5
```

```
6
```

Create a function called `multiply` which takes two arguments, multiplies them together (*), and then returns the multiplied value

```
def multiply(num_1, num_2):  
    return num_1 * num_2
```

Call the `multiply` function with two numbers and save the result in a variable. Then print out the variable to see that the multiplied number was saved.

```
new_num = multiply(3, 5)  
display(new_num)
```

```
15
```

Ch 12 Solution: Dictionary Counters

Now it's your turn to practice dictionary counters

1. Copy the code from the demo that counts letters in a string. Modify the string to be something else and find the letter_counts (no need to sort)

```
# create a dictionary counter before the loop
# it has no entries, since we have seen no letters yet
letter_counts = {}

# go through each letter in the string
for letter in "your text here":
    if letter not in letter_counts: # If there is no entry for this letter yet
        letter_counts[letter] = 1 # then make an entry set to 1
    else: # otherwise, there was an entry
        letter_counts[letter] += 1 # so add one to that entry

# we now have the total number of letters
display("total letter counts are:")
display(letter_counts)
```

```
'total letter counts are:'
```

```
{'y': 1, 'o': 1, 'u': 1, 'r': 2, ' ': 2, 't': 2, 'e': 3, 'x': 1, 'h': 1}
```

Now let's try this with words.

The code below makes a string, and then splits it into words by dividing it apart at each space.

```
# Save a poem into a string (we can use """ to make a multiline string)
# Fire and Ice BY ROBERT FROST (now public domain)
poem = """Some say the world will end in fire,
Some say in ice.
From what I've tasted of desire
I hold with those who favor fire.
But if it had to perish twice,
I think I know enough of hate
To say that for destruction ice
Is also great
And would suffice."""

# split the string (all Lowercase) into words
import re # import the Regular Expressions library, to help us split words

#make the poem all Lowercase
lower_case_poem = poem.lower()

# split the poem into pieces at all spaces and newlines (\s), and ,s and .'s
poem_split_by_spaces_and_punctuation = re.split("[\s,.]", lower_case_poem)

# get rid of some empty strings "" that ended up in our list
split_poem = list(filter(None, poem_split_by_spaces_and_punctuation))

print(split_poem)
```

```
['some', 'say', 'the', 'world', 'will', 'end', 'in', 'fire', 'some', 'say', 'in',
'ice', 'from', 'what', 'i've', 'tasted', 'of', 'desire', 'i', 'hold', 'with',
'those', 'who', 'favor', 'fire', 'but', 'if', 'it', 'had', 'to', 'perish', 'twice',
'i', 'think', 'i', 'know', 'enough', 'of', 'hate', 'to', 'say', 'that', 'for',
'destruction', 'ice', 'is', 'also', 'great', 'and', 'would', 'suffice']
```

1. Make code that counts how often each word appears in `split_poem` (it should be very similar to the code from problem 1 above, but you should have `word_counts` instead of `letter_counts`, and you should loop over `words` instead of `letters`)

```

# create a dictionary counter before the loop
# it has no entries, since we have seen no words yet
word_counts = {}

# go through each word in the list of words
for word in split_poem:
    if word not in word_counts: # If there is no entry for this word yet
        word_counts[word] = 1 # then make an entry set to 1
    else: # otherwise, there was an entry
        word_counts[word] += 1 # so add one to that entry

# we now have the total number of words
display("total word counts are:")
display(word_counts)

```

'total word counts are:'

```

{'some': 2,
 'say': 3,
 'the': 1,
 'world': 1,
 'will': 1,
 'end': 1,
 'in': 2,
 'fire': 2,
 'ice': 2,
 'from': 1,
 'what': 1,
 'i've': 1,
 'tasted': 1,
 'of': 2,
 'desire': 1,
 'i': 3,
 'hold': 1,
 'with': 1,
 'those': 1,
 'who': 1,
 'favor': 1,
 'but': 1,
 'if': 1,
 'it': 1,
 'had': 1,
 'to': 2,
 'perish': 1,
 'twice': 1,
 'think': 1,
 'know': 1,
 'enough': 1,
 'hate': 1,
 'that': 1,
 'for': 1,
 'destruction': 1,
 'is': 1,
 'also': 1,
 'great': 1,
 'and': 1,
 'would': 1,
 'suffice': 1}

```

Ch14 Demo: recursion with real tweets

Normal Tweepy Set-Up

```

# make sure tweepy library is installed
import tweepy

```

(optional) use the fake version of tweepy, so you don't have to use real twitter developer access passwords

```
%run ../../fake_tweepy/fake_tweepy.ipynb
```

```

-----
OSErrr                                     Traceback (most recent call last)
File C:\Python310\lib\site-packages\IPython\core\magics\execution.py:696, in
ExecutionMagics.run(self, parameter_s, runner, file_finder)
    695     fpath = arg_lst[0]
--> 696     filename = file_finder(fpath)
    697 except IndexError as e:

File C:\Python310\lib\site-packages\IPython\utils\path.py:91, in
get_py_filename(name)
    90 else:
--> 91     raise IOError('File `%r` not found.' % name)

OSError: File `'../../fake_tweepy/fake_tweepy.ipynb.py` not found.

The above exception was the direct cause of the following exception:

Exception                                     Traceback (most recent call last)
Input In [2], in <cell line: 1>()
----> 1 get_ipython().run_line_magic('run', '../../fake_tweepy/fake_tweepy.ipynb')

File C:\Python310\lib\site-packages\IPython\core\interactiveshell.py:2305, in
InteractiveShell.run_line_magic(self, magic_name, line, _stack_depth)
    2303     kwargs['local_ns'] = self.get_local_scope(stack_depth)
    2304     with self.builtin_trap:
-> 2305         result = fn(*args, **kwargs)
    2306     return result

File C:\Python310\lib\site-packages\IPython\core\magics\execution.py:707, in
ExecutionMagics.run(self, parameter_s, runner, file_finder)
    705     if os.name == 'nt' and re.match(r"^\.*'$", fpath):
    706         warn('For Windows, use double quotes to wrap a filename: %run
"mypath\\myfile.py"')
--> 707     raise Exception(msg) from e
    708 except TypeError:
    709     if fpath in sys.meta_path:

Exception: File `'../../fake_tweepy/fake_tweepy.ipynb.py` not found.

```

```

# Load all your developer access passwords into Python
# TODO: Put your twitter account's special developer access passwords below:
bearer_token = "n4tossfgsafs_fake_bearer_token_isa53#%$"
consumer_key = "sa@#4@fdfdsa_fake_consumer_key_$DSG#%DG"
consumer_secret = "45adf$T$A_fake_consumer_secret_JESdsg"
access_token = "56sd5Ss4tsea_fake_access_token_%YE%hDsdr"
access_token_secret = "j$dr_fake_consumer_key_^A5s#DR5s"

```

```

# Give the tweepy code your developer access passwords so
# it can perform twitter actions
client = tweepy.Client(
    bearer_token=bearer_token,
    consumer_key=consumer_key, consumer_secret=consumer_secret,
    access_token=access_token, access_token_secret=access_token_secret
)

```

Fake Tweepy is pretending to log in to twitter

(Just Run): Helper function to display text in an indented box

```

from IPython.display import HTML, Image, display
import html
def displayIndented(text, left_margin=0, color="white"):
    display(
        HTML(
            "<pre style='border:solid 1px;padding:3px;margin-left:" + str(left_margin) + "px;background-color:" + color + "'>" +
            html.escape(text) +
            "</pre>"
        )
    )

```

Demo of using the display_with_left_margin function

```

displayIndented("A no indent text")
displayIndented("A 10px indent text", left_margin=10)
displayIndented("A 20px indent text \n with a newline!", left_margin=20)
displayIndented("You can change the 'color' of the box too, like make it
LightCoral", color='LightCoral', left_margin=10)

```

A no indent text

A 10px indent text

A 20px indent text
with a newline!

You can change the 'color' of the box too, like make it LightCoral

(Just Run): Helper code for getting a twitter conversation (that is a tweet and a bunch of its replies)

You don't need to know how this code works, but you can look through it if you want.

Also, if you want to use more includes or something, you can add them to the client.get_tweet() call and the client.search_recent_tweets() call. You might also need to do extra work to include them like I did with the author/users info

```

# Given a tweetId, create a datastructure with the tweet and replies
# Each "tweet" is dictionary with keys for:
#   "tweet_info" (from the tweet.data), "author", "replies", "previous_tweet", and
#   "first_tweet"
#
# When searching for tweets in the conversation, it looks for groups of 100
# tweets at a time. You can set how many groups of 100 tweets it looks for with
# max_conversation_searches
def get_tweets_with_replies(tweetId, max_conversation_searches=1):
    (starting_tweet, all_conversation_tweets, users_lookup) =
    get_tweet_and_conversation(tweetId, max_conversation_searches)
    tweets_by_referenced_tweet =
    organize_tweets_by_referenced_tweets(all_conversation_tweets)
    tweet_with_replies = organize_tweets_with_replies(starting_tweet,
    tweets_by_referenced_tweet, users_lookup)
    return tweet_with_replies

# the function above uses the helper functions below

# Given a tweet id, find the tweet and other tweets in the same conversation
def get_tweet_and_conversation(tweetId, max_conversation_searches=1):
    starting_tweet = client.get_tweet(tweetId, tweet_fields=['conversation_id',
    'public_metrics'], expansions=['author_id'])
    conversation_id = starting_tweet.data.conversation_id

    all_conversation_tweets = get_conversation_tweets(conversation_id,
    max_conversation_searches)
    all_users = starting_tweet.includes['users']
    for conversation_tweets in all_conversation_tweets:
        all_users += conversation_tweets.includes['users']
    users_lookup = {str(u["id"]): u for u in all_users}
    return (starting_tweet, all_conversation_tweets, users_lookup)

# Get tweets in a conversation (given the conversation id)
def get_conversation_tweets(conversation_id, max_conversation_searches):
    query = "conversation_id:" + str(conversation_id)
    all_conversation_tweets = []
    num_searches=0
    is_done = False
    next_token = None
    while not is_done and num_searches < max_conversation_searches:
        conversation_tweets = client.search_recent_tweets(query=query,
    next_token=next_token, tweet_fields = 'public_metrics', expansions=
    ['referenced_tweets.id','author_id'], max_results=100)
        num_searches += 1
        all_conversation_tweets.append(conversation_tweets)
        print("loaded a set of tweets: " + str(conversation_tweets.meta))
        if 'next_token' in conversation_tweets.meta:
            next_token = conversation_tweets.meta['next_token']
        else:
            is_done = True
    return all_conversation_tweets

# Given a list of tweets, group them all based on what tweet they are replying to
def organize_tweets_by_referenced_tweets(list_of_tweet_results):
    tweets_by_referenced_tweet = {}
    for tweets in list_of_tweet_results:
        for tweet in tweets.data:
            for referenced_tweet in tweet.referenced_tweets:
                if(referenced_tweet.type == "replied_to"):
                    referenced_tweet_id = str(referenced_tweet.id)
                    if(referenced_tweet_id not in tweets_by_referenced_tweet):
                        tweets_by_referenced_tweet[referenced_tweet_id] = []
                    tweets_by_referenced_tweet[referenced_tweet_id].append(tweet)
                    break

    return tweets_by_referenced_tweet

# organize the tweets so that author info and replies to tweets are included
# with it in a convenient data structure
def organize_tweets_with_replies(tweet, tweets_by_referenced_tweet, users_lookup,
previous_tweet=None, first_tweet=None):
    tweet_with_replies = {
        "tweet_info": tweet.data,
        "author": users_lookup[str(tweet.data["author_id"])].data,
        "replies": [],
        "previous_tweet": previous_tweet
    }
    if first_tweet == None:
        first_tweet = tweet_with_replies
    tweet_with_replies["first_tweet"] = first_tweet

    tweet_id = str(tweet.data["id"])
    if tweet_id in tweets_by_referenced_tweet:
        reply_tweets = tweets_by_referenced_tweet[tweet_id]
        for reply_tweet in reply_tweets:
            tweet_with_replies["replies"].append(

```

```

        organize_tweets_with_replies(reply_tweet,
tweets_by_referenced_tweet, users_lookup, previous_tweet=tweet_with_replies,
first_tweet=first_tweet)
    )
return tweet_with_replies

```

Recursively printing the tweets and replies

```

def print_tweet_and_replies(tweet_with_replies, num_indent=0):
    tweet_info = tweet_with_replies["tweet_info"]
    replies = tweet_with_replies["replies"]

    displayIndented(tweet_info['text'], num_indent*20)

    #print replies (and the replies of those, etc.)
    for reply in replies:
        print_tweet_and_replies(reply, num_indent + 1)

```

```
loaded_tweets_and_replies = get_tweets_with_replies(98778587)
```

Fake Tweepy is pretending to search for 'conversation_id:1234567' and is returning some fake tweets.

```
loaded a set of tweets: {}
```

```
print_tweet_and_replies(loaded_tweets_and_replies)
```

That last exam in sure was hard!

It sure was hard, what score did you get?

I got a 67% :(

I got a 73%

I didn't think it was that bad

how was that not a super hard exam?

of course you didn't

what's that supposed to mean?

you're an overachiever

and that's bad how?

Improved recursive print tweets and replies (more info)

```

def print_tweet_and_replies(tweet_with_replies, num_indent=0):
    tweet_info = tweet_with_replies["tweet_info"]
    replies = tweet_with_replies["replies"]
    author_info = tweet_with_replies["author"]
    public_metrics = tweet_info["public_metrics"]

    display_text = (
        tweet_info['text'] + "\n"
        "-- " + author_info["name"] + " (@" + author_info["username"] + ")" + "\n"
+
        str(public_metrics)
    )

    displayIndented(display_text, num_indent*20)

    #print replies (and the replies of those, etc.)
    for reply in replies:
        print_tweet_and_replies(reply, num_indent + 1)

```

```
print_tweet_and_replies(loaded_tweets_and_replies)
```

```
That last exam in sure was hard!
-- Fake User (@fake_user)
{'retweet_count': 10, 'reply_count': 2, 'like_count': 8, 'quote_count': 4}
```

```
It sure was hard, what score did you get?
-- Unreal User (@unreal_user)
{'retweet_count': 4, 'reply_count': 2, 'like_count': 3, 'quote_count': 2}
```

```
I got a 67% :(
-- Fake User (@fake_user)
{'retweet_count': 0, 'reply_count': 0, 'like_count': 2, 'quote_count': 0}
```

```
I got a 73%
-- Imaginary User (@imaginary_user)
{'retweet_count': 0, 'reply_count': 0, 'like_count': 3, 'quote_count': 0}
```

```
I didn't think it was that bad
-- Pretend User (@pretend_user)
{'retweet_count': 1, 'reply_count': 2, 'like_count': 1, 'quote_count': 6}
```

```
how was that not a super hard exam?
-- False User (@false_user)
{'retweet_count': 2, 'reply_count': 0, 'like_count': 8, 'quote_count': 2}
```

```
of coure you didn't
-- Fake User (@fake_user)
{'retweet_count': 1, 'reply_count': 1, 'like_count': 6, 'quote_count': 1}
```

```
what's that supposed to mean?
-- Pretend User (@pretend_user)
{'retweet_count': 0, 'reply_count': 1, 'like_count': 1, 'quote_count': 0}
```

```
you're an overachiever
-- Fake User (@fake_user)
{'retweet_count': 0, 'reply_count': 1, 'like_count': 3, 'quote_count': 0}
```

```
and that's bad how?
-- Pretend User (@pretend_user)
{'retweet_count': 0, 'reply_count': 0, 'like_count': 0, 'quote_count': 0}
```

```
# Note: to test for real, Look for users who get a lot of engagement,
# like the reddit Am I the Asshole:
# https://twitter.com/AITA_online
# '1496516355931217926'
```

(Incomplete) Teaching With This Book

By Kyle Thayer and Susan Notess

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