#ForYou:
A Game About Algorithms

Discussion Guide

#ForYou: A Game About Algorithms *was made possible by a financial contribution from the Office of the Privacy Commissioner of Canada.*

#ForYou: A Game About Algorithms

AGES 13 and up **PLAYERS** 3-5 **PLAYING TIME** Around 1 1/2 hours

Hey! Want to play a quick game before you read this? Watch the gameplay video at https://www.youtube.com/watch?v=EycdGcL_qtk and then check out the Rules for Quick Play. Then come back here to find out how to set up a workshop session.

If you want a better theoretical background on what the game is about, read the article *Algorithms and Artificial Intelligence: What We (Don't) Know*. There's also a Glossary with definitions of important words at the end of this guide. You may want to make copies of the Glossary for your players to use during the discussions. Every word in this guide that is in *italics* is in the Glossary (except the word "italics".)

Discussion Guide

#ForYou is a card-based pattern-matching game that helps youth aged 13 to 18 understand the role that algorithms play in their online and offline lives, and the value of their personal information to companies that use those algorithms.

The game will focus on *recommendation algorithms* as these are what youth most often encounter, but players will also be introduced to other forms of sorting and predictive algorithms - such as those used by Google and Amazon.

Workshop Overview

This is an educational game. But you won't learn that much just by playing it.

Instead, the purpose of the game is to **introduce** key ideas about algorithms and use them as prompts to get people talking. To do that, there is a **pre-brief** before each round of the gameplay and a **debrief** after it.

Think of each round of gameplay as a "game sandwich." The pre-brief and debrief topics are found in Running a Workshop below.

Gameplay Overview

The game can be played by three to five people.

One player takes the role of a fictional video-sharing app called VidYou, which is similar to YouTube or TikTok. You may want to play as VidYou the first time your group plays. This player controls the *algorithm* that decides which videos (and ads) are shown and recommended to which people. The VidYou player also deals the Video, Ad and Data cards to the other players.

Other players take the role of video makers who are trying to make their videos reach the most people and successfully *monetize* (make money from) those videos. To do this they need to make deductions about the VidYou algorithm and publish videos that match it – as well as drawing on data collected about users and using certain tricks and strategies to "game" the algorithm.

It's up to the players whether to play collaboratively (all the video makers against the algorithm) or competitively (to see which video maker can get the highest score.) Either way they will find some collaboration is positive in the last round!

The game takes place over three **rounds***:*

- The **Popularity** round: players try to guess the Optimization algorithm so their video will be seen by as many people as possible
- The **Advertising** round: players try to solve the Audience algorithm so their ads will be seen by the *right* audience; and
- The ***Machine Learning*** round, where players solve a new Audience algorithm with the help of *proxy* data that lets them *infer* extra information about users.

At the beginning of each round, the VidYou player secretly chooses three Algorithm cards (in the Popularity round) or three Audience cards (in the other two rounds). They decide which of the three cards will be first, second, and third priority and place them face down.

Within each round are two *turns:*

- The purpose of the first turn is to give the players information they can use to deduce the algorithm. Each player plays *one* card (a Video card in the Popularity round, and an Ad card in the other two rounds.) The VidYou player then scores each video according to the rules under "Scoring" below. These scores are told to all the players *but are not recorded.* They're only there for the players to find out what the algorithm is *optimizing* for.
- Between the two turns, the players try to deduce what the algorithm is optimizing for by looking at what scores were given to different videos. By comparing what score each video got, they can make educated guesses about what the algorithm "wants."
    - In the second turn, players each play **three cards**: **Video** cards in the Popularity round, and **Ad** cards in the other two rounds. In each round there are also bonus cards they can play: **Boost** cards in the Popularity round, and **Data** cards in the other two rounds. These are played on specific Video or Ad cards and increase how many points they're worth if they match the algorithm. In the second turn of the Machine Learning round, players are also allowed to act as *data brokers* and trade Data cards with each other.
    - At the end of the second turn, the VidYou player turns over the Algorithm or Audience cards and the players are given a final score according to how closely their cards matched it.

If players want to play more than two turns in a round, they start over with a new algorithm. You might do this if players didn't quite understand how gameplay worked the first time or if something that's important to the discussion, like the Boost cards or data brokerage, didn't come up due to what cards were dealt.

Running a Workshop

Things you will need:

- A copy of the game cards, the *Rules for Quick Play*, and this guide. (If you're reading this, you probably already have those.)
- A table large enough for your group to sit around. (Round tables work best.)

- A data projector and screen, or digital whiteboard, and internet access. **If you don't have these, you can also send participants the link to the gameplay video or write it on a chalkboard or chart paper: https://www.youtube.com/watch?v=EycdGcL_qtk**
- At least three young people interested in learning about algorithms!

Things you might want:

- Extra copies of the *Rules for Quick Play* – one for each player or team. (Feel free to print or photocopy more.)
- Extra copies of the game cards (you can order more hard copies, or download them and cut them out – or have participants do it for you, at https://mediasmarts.ca/digital-media-literacy/educational-games/foryou-game-about-algorithms.)
- A document camera and screen (so you can project the game table if you're playing with a larger group.)
- To deliver this lesson as a fully online activity, see additional instructions here: https://mediasmarts.ca/digital-media-literacy/educational-games/foryou-game-about-algorithms
- For a more in-depth background on the topic, review the backgrounder *Algorithms: What We (Don't) Know*.

For larger groups

This game is designed to be played by 3-5 people, including the facilitator. If you are running a workshop with a larger group, you can do one of the following:

Fishbowl: Select 3-4 participants to play the game and have the others watch, observe and comment. If you have one available, you can use a phone, tablet or document camera to project the gameplay onto a screen. Make sure that you include the larger group when you are explaining the game rules and leading the discussion.

> It is recommended that you run the first session in this format, even if you have multiple copies of the game, so that you can teach the participants how to play the game and guide the discussion.

Teams: Divide the group into four teams. Each team will act as a single "player" in the game. It is up to you (and them) whether to have one member of each team represent them in each turn, or have the whole team decide what cards to play together.

Special teams: To make smaller groups, you can create additional teams with different responsibilities. (These will make more sense once you understand the gameplay.)

- Have one team act as Referee, watching to make sure that plays are legal (for instance, the Boost cards are only played on matching Video cards) and scoring the cards that are played.
- In the Popularity round, create an extra Dirty Tricks team. Sort the Boost cards out of the Video deck and give them to the Dirty Tricks team. Have this team watch for ways they can play their cards on the other teams' Video cards.
- In the Monetization round, create an extra Ad Targeting team. Deal 12-16 of the Data cards to the Ad Targeting team (4 cards for each other team playing). Have this team watch for ways they can play their cards.

- In the Machine Learning round, create an extra Data Brokering team. Deal the Data cards to the other teams as usual, but then have the Data Brokering team look for connections and negotiate trades rather than have each team doing it themselves.

You can rotate teams during each round, so that a different team is the Referee or special team each time.

Multiple sets: You can also either order more copies of the game at https://mediasmarts.ca/digital-media-literacy/educational-games/foryou-game-about-algorithms or download and print additional copies of the cards for free at https://mediasmarts.ca/digital-media-literacy/educational-games/foryou-game-about-algorithms and then cut them out (or have participants do it for you). We recommend that you play the first time in Fishbowl format even if you do have multiple copies, so that you can teach the participants how to play the game and guide the discussion.

Introducing algorithms

Start by asking the participants:

- Can you give an example of an algorithm?
- Can you think of one that you've encountered in the past week?
- What do you think the word "algorithm" means?

Distribute the **Glossary** and make sure that participants understand this definition:

An algorithm is a set of step-by-step instructions for solving a problem or completing a mathematical or computational task. Algorithms sort data in order to find patterns and make predictions or recommendations. A recipe and an airplane flight pre-check are both examples of algorithms, but more often today we encounter algorithms that are computer programs.

Here are some examples of things computer algorithms are used for:

- Autocompleting text
- Planning school bus routes and travel times
- Determining what school you'll attend
- Predicting when students may 'skip' class or drop out entirely
- Predicting whether someone will misbehave in school
- Tracking student performance in class and suggesting lessons for the teacher accordingly
- Helping managers and coaches determine the hiring, firing, and fielding of baseball players on a World-Series winning team
- Sorting the resumes of job candidates to decide which ones to interview
- Calculating student grades if the school year is interrupted

Tell participants that this workshop will focus on *recommendation* algorithms, which present or suggest content online. Ask them if they can think of any examples: make sure that the YouTube Up Next bar, the TikTok For You page, and the Instagram Explore tab are all mentioned.

Now ask participants if they know anything about how algorithms use *data* or personally identifiable information about you. Thinking of the examples that were just discussed, do they have any concerns about their privacy or about how their personal information might be used? Would they prefer to use a search engine that took their past search history and other personal information into account (like Google) or one that only based its results on each specific search (like DuckDuckGo)?

Explain that you are going to play a game together that will help them think about and discuss some of these questions. Make it clear that it doesn't really matter who "wins" the game, and that they can choose to play co-operatively if they like.

Show the gameplay video and then take any questions about the gameplay. (You may choose either to show the full video now or only show one segment before playing each round of the game.)

Popularity round pre-brief

Tell the participants that in the first round they are going to pretend to be video makers who want their videos to be seen by as many people as possible. You are going to play the role of VidYou, the video site where they are going to post their videos.

Explain that any algorithm is *optimized* to try to achieve a particular result. Show them the six Optimization cards and explain that these are examples of different things a video site's algorithm might optimize for:

- Watch time: Getting users to watch as much of each video as possible
- Stickiness: Making sure users keep watching videos instead of going somewhere else
- Virality: Making users share the videos they watch with as many people as possible
- Engagement: Getting users to Like, comment on or reply to as many videos as possible
- Daily use: Making sure that users come back to your site often

Make sure participants understand that these are just examples: there are many other things an algorithm could be optimized for.

Ask if they can think of any ways that optimizing for one of the above-mentioned examples could backfire. Make sure the following come up:

- YouTube optimizing for watch time led to videos getting longer and longer
- Snapchat optimizing for daily use made people spend an hour every day sending blank pictures just to keep up their Streaks
- Different sites optimizing for virality made "fake news" stories spread more widely than true ones
- Other sites optimizing for engagement made extreme, offensive and harassing posts get recommended over more civil ones.

Now, choose **one Optimization card** and place it face-up for participants to see.

Explain that algorithms achieve the goal they're optimized for by **sorting** data in different ways. Show them the six Algorithm cards and explain that each of these stands for a way of "scoring" a video:

- Views: How many people have watched the video already
- Freshness: How many people have watched the video **recently** (explain that this is sometimes used so that the same super-popular videos don't always dominate the recommendations)
- Likes: How many people have Liked, upvoted or replied to the video
- Links: How many people have linked to the video from other sites
- Shares: How many people have shared the video with their friends
- Subscribers: How many subscribers the video maker has (and therefore how many people will see it as soon as it is posted.)

Explain that an algorithm's designers will choose certain things for the algorithm to look for and then **weight** them from the most to the least important. Explain that in the game you will be choosing three Algorithm cards and sorting them from the most to the least important, but in real life an algorithm might consider dozens or even hundreds of different things.

Choose **three Algorithm cards** that you think would help to reach the Optimization goal and then lay them **face-down**, with the top one at your far left and the third one to far right.

Draw a Video card and show it to the participants. Point out that each Video card matches two Algorithm cards. If the Video card has Views and Likes, for example, that means the algorithm will score it more highly if it is looking for either of those, and even more highly if it is looking for both.

Shuffle that card back into the deck and then deal each player **five Video cards**.

Play through the two turns of the Popularity round.

When scoring the first turn, make sure the participants understand that they can use the scores they and other players' videos got to figure out what the algorithm is "looking for." Point out that **this is exactly what video makers on platforms like YouTube or TikTok do** to try to get their videos recommended.

When scoring the second turn, point out any Boost cards that were played and read the text out to the participants.

Popularity round de-brief

After the second turn has been scored, ask the participants:

- Do the choices made in designing the algorithm affect things such as how much time we spend on a platform, or whether we "surf" it (viewing recommendations or promoted posts) instead of searching?
    - Remind players that when an algorithm shows something to one audience, it is hiding other content: what are we seeing or not seeing because of algorithmic recommendations?
- How might content creators change what they make based on their understanding of platforms' algorithms? Do they think this changes the quality of the content when it is focused on factors favored by the algorithm rather than accuracy or quality?

- How might matching topics lead to a *recommendation spiral* where users see a narrower range of videos? Liking a video also makes the algorithm recommend more videos like it, and you Like those videos too, which leads to you being shown even more, so the videos you're recommended will get more and more alike.
- How might the ways of manipulating algorithms represented by the Boost cards affect the VidYou app's goals? How might this affect the experiences of people using these platforms? Does learning about these ways of manipulating algorithms change your views about the platforms?
- Can anyone think of a video that they've seen recommended but was about something ethically troubling (misinformation, dangerous stunts, etc.) Why might content like this be promoted by an algorithm? What responsibility do platforms have to moderate content like this?
    - Consider this together with the "spiral" just discussed - if someone watches and engages with a video like this, should the algorithm recommend more like it? If not, how can you prevent that?

Monetization round pre-brief

Congratulate the participants: they have succeeded in making videos that are popular enough to *monetize* by including ads. However, this comes with a new wrinkle: to earn ad money, it's important not just that the videos reach and resonate with the most people, but also the **right** people. The reason why online ads are considered so valuable is because it's possible to match the ad with the viewers that are most likely to respond to it. That's why in this round, there are no Optimization cards or Algorithm cards. Instead, you will choose three Audience cards that stand for what's important about the audience you want to reach.

Show participants the six Audience cards and explain that each one stands for something an advertiser might be looking for in a viewer:

- Age: How old the viewer is. Older and younger people like and buy different things, so they see different ads. As well, which brands you like is mostly set when you're young, so older people are more likely to see "reminder ads" instead of ones that introduce a new product.
- Intent to buy: Whether or not a viewer is looking to buy this type of product right now. Viewers with intent to buy will be shown "hard sell" ads that focus on the features of the product; those without it will be shown "brand building" ads that make them more aware of the product or develop positive feelings about it.
- Interests: What the viewer is interested in. If advertisers know you're interested in video games, for example, they will show you video game ads.
- Location: Where you are. For some advertisers, like restaurants, it's important to only show ads to people who live near them. Other advertisers might show different versions of an ad to people in different places (with prices in different currency, for example.)
- Brand loyalty: Your feelings about a brand. People who are loyal to a particular brand are more likely to respond to an ad about that brand. But most of the time, they won't respond to ads for a competing brand: it would be a waste of money to show Coke ads to a die-hard Pepsi fan, for instance.
- Personality: What kind of person you are. This lets advertisers target people based on how worried they are about different things, how much they like to take risks, and so on.
- Income: How much money you have. This keeps advertisers from wasting money showing ads to people who can't afford the product, and also lets them target bargains to budget-conscious consumers.

Explain that just with algorithms, audience sorting is **weighted**, with some factors being more important than others. Draw **three Audience cards** and place them **face-down** in front of you, in a row from left to right. (There is no equivalent to the Optimization card in this round; any three Audience cards in any order is fine.) When you score each turn, the one at far left will be the most important, the middle one second-most, and the one at far right will be least important.

Draw an Ad card and show it to the participants. Point out how each Ad card matches two Audience cards, just like in the first round each Video card matched two Algorithm cards.

Shuffle the Ad card back into the deck. Deal each participant **five Ad cards** and play the first turn.

Play through the first turn of the Monetization round. When scoring the first turn, make sure the participants understand that as in the first round, they can use the scores they and other players' ads got to figure out what the algorithm is "looking for."

Now explain that unlike video makers, advertisers don't rely just on those deductions to target their ads. They also can use data that was collected about users to get a better match between ads and viewers.

Draw a Data card and show it to the participants. Explain that each Data card represents a source of information about users (such as their search history, their interactions on the platform, their IP address, and so on) that tells the advertisers something about them. For example, your search history can tell them about your brand loyalty (since searching for a brand probably means you have an interest in it.)

Show students the different Data cards and ask students where they think an algorithm might get that information:

- *Profile:* A social media profile, or an account you make on an app or website
- *Views:* What videos you have watched in the past
- *Cookies:* Files that are saved by your browser when you visit a website. When you go back to the same website, the cookies tell it what was recorded on your last visit.
- *Search history:* What you have looked for (not just search engine searches but any time you've used a search box, like on a video or e-commerce site)
- *GPS:* Mobile devices send global positioning system data unless you switch it off.
- *Shopping history:* E-commerce sites record what you browse and buy.
- *Interactions:* Any site or app that lets you Like, share or reply to posts or videos records when you do it.
- *IP address:* Your device automatically sends its Internet Protocol address any time it connects with a website or app.
- *Loyalty program:* If you sign up for a loyalty program, you're asking it to track what you buy.
- *Other sites:* What you've done on other apps or websites is another source of personal information.

Point out that like the Boost cards in the first round, each Data card matches one Audience card and can be played on any ad that matches the same card (so search history, which targets brand loyalty, could be played on any ad that also targets brand loyalty.)

Now ask participants how they feel about a video site having access to personal information like their search history, their shopping history and what they've done on websites. Does it feel like an invasion of privacy? If so, why? How do they feel about their personal information being used to target them with ads?

Shuffle the Data card back into the deck and deal each player **four Data cards**.

Play through the second turn. Point out any Data cards that were played and read the text out to the participants.

Re-shuffle the Audience, Ad and Data decks.

Monetization round de-brief

After the second turn has been scored, ask the participants:

- Why do you think behavioral and demographic data (based on data collected about you) are seen as more valuable than contextual data (based on what you're doing or have just done - for example, showing ads linked to your most recent search, purchase or videos similar to the one you just watched)?
- How accurate a picture do you think platforms have about you? Can you think of any cases where you were shown a video or ad that was clearly not meant for you?
- Is it fair to base a recommendation on what the algorithm thinks it knows about you personally?
- Is it fair for a platform to use what it knows about you (your data profile) to target content to your friends, and vice versa?
- Platforms don't just target users with data they collected themselves: they also buy profiles from data brokers, scrape publicly available information, and acquire data from other social networks if you use those to sign up for your account. An app or website's Privacy Policy explains what the company will do with personal information it collects about you; look for references to "third parties" to see if they sell it to data brokers. You can look up the privacy policy at https://tosdr.org/ to get a plain-language explanation.

As well, many different platforms – such as Facebook and Instagram, or Google and YouTube – are owned by the same company and share data across the platforms within the same company, and some platforms such as Facebook sell access to their data profiles without selling the data itself. Is it fair that what you do in one place might affect what you're shown on other platforms?

Machine learning round pre-brief

Explain to participants that algorithms don't rely just on data they've collected about you: they also use that data to *infer* (guess) other things that they don't know directly. These inferences are called *proxies* and are often identified through *machine learning*, or "artificial intelligence", in which an algorithm works backwards from data to find patterns that might not otherwise have been apparent.

Tell participants that machine learning algorithms are not actually programmed by their designers: instead, they are *trained* on sets of existing data - so a video site might look at all of the people who liked or shared a video, identify what they have in common, and promote the next video based on that.

Machine learning algorithms are designed to modify themselves each time they run, based on how well they succeeded in their goal, so after one has been running for any length of time **even the people who originally designed the**

algorithm may not be able to say how it's making decisions any longer or may only have a fraction of an idea about how it's currently operating.

Draw **two Data cards** where the proxy text matches on the left and right sides. Lay them side-by-side so that players can see how the proxies match. Explain that these represent how directly collected data, such as age and search history, can be used to infer things that they might not otherwise know about you, such as your race or your sexual orientation. Once they know (or think they know) this, they can infer more things that will allow them to target ads more closely. For example, your search history might let them infer your gender, which they might use to infer your interests and use that to determine what ads to show (or not show) you – such as ads for hockey equipment not being shown to girls because of the assumption that they were not interested in hockey. In the game, this lets you link multiple data cards together, so you can play more than one on the same Ad card. Now shuffle the two Data cards back into the deck.

Like in the Monetization round, draw **three Audience cards** and place them **face-down** in front of you, in a row from left to right. (There is no equivalent to the Optimization card in this round; any three Audience cards in any order is fine.) When you score each turn, the one at far left will be the most important, the middle one second-most, and the one at far right will be least important.

Deal each participant **five Ad cards**. Play through the first turn the same as in the Monetization round.

After scoring the Ad cards at the end of the first turn, deal each participant **four Data cards** and tell participants that advertisers have one more trick up their sleeves: they can use *data brokers* to buy and sell the data they have collected. In the game, this means that after players have tried to deduce what Audience that VidYou is looking for, they can trade Data cards with other players to try to make as long a chain as possible.

Have participants trade Data cards with one another. It is up to them whether they want to play collaboratively or competitively, but you might recommend they play collaboratively the first time through.

Next have participants each play two Ad cards and as many Data cards as they are able to chain together through Proxies.

Turn the Audience cards over and score each Ad card. **Give points for each Data card that matches one of your Audience cards, even if the Ad card it was played on did not match it.** Compare the scores in this round to those in the second turn of the Monetization round and point out how advertisers are able to target you more accurately the more they know about you.

Machine learning round de-brief

After the second turn has been scored, ask the participants:

- How do you feel about linking ads through Proxies such as sexual orientation, race or disability?
    - Point out that some jurisdictions and platforms don't allow you to target some kinds of ads (such as job or housing ads), or sometimes all ads, based on some characteristics (for example, job ads cannot be restricted by age, gender, or race in many countries, including Canada.) However, sometimes videos or ads are targeted based on these traits anyway -- intentionally or unintentionally -- as a result of targeting the Proxies that players learned about in the most recent round.
- All kinds of algorithms, but especially machine learning algorithms, are made to *recognize and reinforce patterns*. What should be done if the pattern is unfair/biased?

- Point out that machine learning algorithms are trained on existing data sets, and often reproduce biases in those sets, sometimes in ways that the algorithm's makers could not predict.
    - For example, one algorithm designed to scan resumes concluded that people were most likely to be hired if they were named Jared and played high school lacrosse – both *proxies* of being male and, to a lesser extent, white. How do participants feel about that?
- What obligations should platforms have to make sure their algorithms do no harm? How can platforms fulfil this obligation if, in many cases, they themselves do not fully know how their algorithms work?
- How does machine learning make it harder to manage your privacy online? What can we do about that?
    - (For example, you might be careful not to let data brokers know you have a health condition such as diabetes, but your shopping history might be used as a proxy for it if you have bought test strips or other things connected to diabetes.) That makes it especially important to manage the things that connect the different parts of your online activity, like your IP address.

Final de-brief

Ask participants if **they** have any questions about algorithms or machine learning.

Close with the following questions:

- Would they want to know why they were recommended something?
- Would they want to be able to flag or report biased results to a platform?
- Do they think there should be laws or regulations that are more specifically about how algorithms work? If so, what should they be?
- Is this something that concerns them or that they'd like to take action about?
- How you think the VidYou algorithm could be changed so that its outcomes would be more fair and it would handle personal information more responsibly?

  Encourage participants to consider:

    - The purposes it can be optimized for
    - The algorithm factors it considers and how they are weighed
    - The manipulation techniques represented by the Boost cards
    - How audiences are targeted for particular ads
    - How personal information is collected and used to target ads
    - The role of data brokers
    - The use of machine learning
    - Users' choices and control over how the algorithm works for them

Give participants each a copy of the handouts *Take Control Over the Role of Algorithms* and *Protecting Your Privacy* and encourage them to think about and investigate different ways they can **educate** themselves about algorithms and how they're used, **act** to limit the ways that algorithms affect them, and **advocate** as citizens and consumers for fair and transparent algorithms.

GLOSSARY

Algorithm: A set of step-by-step instructions for solving a problem or completing a mathematical or computational task. Algorithms sort data in order to find patterns and make predictions or recommendations. The term is most often used to refer specifically to computer programs that have been designed or trained do this.

Artificial intelligence: Refers to the simulation of human intelligence (for example: learning or problem solving) in machines that are programmed to think like humans and mimic their actions. Most applications described as "artificial intelligence" are examples of *machine learning*.

Autocomplete: A feature that predicts and suggests the rest of a word or phrase a user is typing into a search engine, text, or other application, based on what they or other users have typed in that situation in the past. An example of a prediction and suggestion algorithm.

Behavioural advertising: A technique used by online advertisers to present targeted ads to consumers by collecting information about their browsing behaviour and using a sorting and recommendation algorithm to match ads with consumers who are most likely to respond to them. Behavioural advertising means that two people who look at the same video or website may see completely different ads based on their *data profile.*

Bias: In this context, bias means when an algorithm delivers a result that is unfair or that is based on assumptions that are not accurate. This can come as a result of the designer's decisions: for example, an algorithm used to guess the final grades of students unable to finish the semester based its conclusions partly on how well students from their school typically did. Because students from schools in poor communities typically got lower grades, the algorithm lowered the grades of students in those schools. effectively punishing them for being poor. Bias can also occur when a *machine learning* algorithm is trained on biased data: an algorithm that decides whether or not to grant mortgages that is based on past mortgage applications would, unless specifically corrected, be *biased* by the past racist practice of "redlining," or denying mortgages to Black people.

Behavioural data: Information about a user's past behaviour that is used to inform behavioural advertising, such as: the pages browsed on a website or the time spent on a website, app, or game. For example, a user who has watched many videos about games in the past would be more likely to be shown an ad for games.

Contextual advertising: A technique used by online advertisers to present targeted ads to consumers based on what they are currently *doing* or have *recently done*, such as what videos they are currently watching or the search they have just done. Because it does not draw on the user's data profile or behavioural data it is generally considered less intrusive than behavioural advertising. For instance, a search engine that recommended ads based on *contextual* data would show you ads based on what you just searched for, while one that used *behavioural data* would show you ads based on all of your past searches.

Data broker: Companies or entities that buy or otherwise collect information (data) about users and sell that information to interested companies, individuals or other data brokers for the purpose of establishing data profiles on people. Some data brokers also provide services which allow them to collect data (such as search engines or video sites) while others simply buy information collected by others.

Data profile: Your online data profile is the sum of all of the personal data a platform or data broker has collected about you. This profile is typically used to inform algorithmic decision-making, which may range from a platform's decision about what content to show or recommend to you, to an employer's decision about whether to interview or hire you.

Data scraping: Also known as web scraping, the process of collecting publicly available data from across the internet so it can be added to a data profile for research or marketing purposes. Data scraping requires the use of software or bots.

Demographic data: Information about the characteristics of a population such as age, gender, income, race, marital status, education level, or employment status.

Engagement: Features such as *likes*, *comments*, and *shares* measure engagement with a specific piece of content (video, image, article) online. Most recommendation algorithms are *optimized* to favour highly engaging content.

Infer: To guess something based on other information. For instance, a search engine might be able to infer your language, your interests or your gender based on things you have searched. Inferences are not always correct!

IP address: Or Internet Protocol address, is a numerical label assigned to each device connected to a computer network. This identifying number allows the computer to send and receive information.

Machine learning: An application of artificial intelligence that provides systems the ability to automatically learn and improve from experience. Instead of being designed to do a particular task, machine learning algorithms are given a goal and then *trained* on large amounts of data to find patterns in them. When more data is added, the algorithm continues to evolve. While this can be faster and less expensive than engineered algorithms, there is also a large potential for *bias* that is not visible even to the designers if the data it is trained on is biased. For example, an algorithm trained on fifty years of job applications might notice that men's were more successful than women's and sort them accordingly—with men's applications being considered first.

Monetization: Earning money from online content, such as a video or social network post. Most often this is done through advertising before, during, after or on top of the content. Advertisers will usually pay more if they believe their ads are going to be shown to people who are more likely to respond to them.

Optimization: The goals or priorities of an algorithm. These goals can sometimes be in conflict: for example, a search engine's algorithm might be optimized both to deliver accurate results and to deliver relevant ads. Optimization can lead to unintended results: for example, optimizing for engagement can lead to offensive or shocking videos being recommended. Algorithms can also be "gamed" or manipulated by content creators who have deduced how they are optimized: producing many short videos if the algorithm is optimized for clicks, for example, or longer ones if it's optimized for watch time.

Personal data: Any information that relates to an identified or identifiable living individual, such as: name, phone number, address, social insurance number, credit card number, license plate, etc.

Platform: Any environment in which a piece of software is executed, such as: an operating system, a web browser, a social media website, or an application.

Preference bubble: Preference bubbles, or filter bubbles, refer to situations where the algorithm shows users only what it thinks the user will like and filters out anything it thinks the user dislikes.

Proxy data: Information about a user that can be inferred from other data. For example, a user's search history can be a proxy for age based on known patterns of what users search for at different ages. Proxy data can allow recommendation algorithms to deliver content in ways that can be particularly intrusive or, in some cases, even prohibited by law (for example, selecting job ads based on a user's race.) *Machine learning* algorithms work primarily by

finding proxy data that human developers would not be able to see: one resume-scanning algorithm found that the best proxies for whether an applicant would be successful were if their name was Jared and if they played lacrosse in high school. (A human, but not an algorithm, would recognize that both of these are very likely *proxies* for being male.)

Recommendation algorithm: Also called recommendation systems, these algorithms filter and prioritize data to provide users with personalized content and services.

Recommendation spiral: A cycle where engaging with something online (such as by watching or Liking a video) makes the algorithm recommend similar content, which leads to you engaging with the new content, which leads to the algorithm recommending even more of that content, so that you're shown more and more of that content and less and less of anything else.

Retweet room: Private spaces on Twitter (or other platforms) that allow users to coordinate messages and retweet each other. Because many recommendation algorithms are optimized to favour content that is quickly becoming popular (such as "trending topics"), rather than the content that is most popular overall, retweet rooms can manipulate the algorithms into recommending their content.

Search history: A record of what terms a user has searched for on search engines such as Google. Many search engines record users' search history as part of the user's data profile. Other forms of user behaviour that contribute to their data profile include their viewing history, their browsing history (which websites they have visited), their shopping history, etc.

Training set: In machine learning, algorithms rely on multiple data sets, or training data, that help make predictions and strengthen recommendations. For example, an algorithm designed to predict how likely someone convicted of a crime was to re-offend would be trained on the records of other convicts who had been paroled, in order to find patterns that were associated with re-offending.

Virality: The tendency of an image, video, or piece of information to be circulated rapidly and widely from one internet user to another.

Protecting Your Privacy

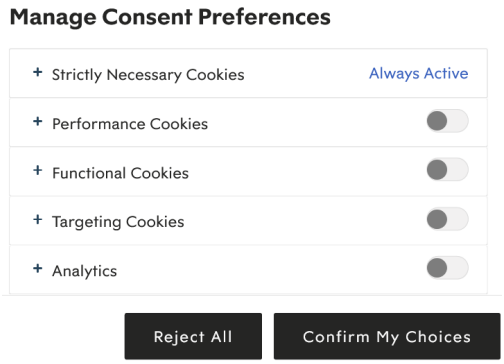
App permissions: During installation, verify that the permissions being sought by the app match not only what the privacy policy says but also what you would expect the app to require. (Permissions within mobile apps allow the app access to your device's data and capabilities in order to run. These permissions could include location, identity, email and contacts.) Also pay attention to the app description in the app store as well as any "in-app" notices which may explain the app's collection and use of personal information.

Ask questions: Get in the habit of reading privacy policies associated with the websites and apps you use. Companies should be able to answer any questions you have about what personal information they are collecting, and how your information will be used and protected. If they can't, or you don't like what you hear, this should raise red flags. You can look up the privacy policy at https://tosdr.org/ to get a plain-language explanation of apps' privacy policies. If there is no privacy policy or you think it is unfair, look into making a complaint to the Privacy Commissioner: https://www.priv.gc.ca/en/report-a-concern/file-a-formal-privacy-complaint/file-a-complaint-about-a-business/

Choose apps, tools and platforms that don't track you or target you algorithmically. Some platforms, like the search engine DuckDuckGo, don't track you at all, and don't use algorithms to decide what to show you. Others track less than their competitors. Keep data collection in mind when you're choosing search engines, shopping sites, social networks, and so on. You can also use them in ways the don't rely on what algorithms have chosen for you, like searching for specific videos or channels instead of just choosing from the Up Next bar or For You page.

Do Not Track: Some browsers allow you to send a message to websites asking them not to track your activities while you're using them. This is usually found in the "Privacy" section of the "Settings" menu (sometimes you have to click on "Advanced Settings".) You can also visit the http://donottrack.us website for more information on how you can prevent tracking. Keep in mind that this is a partial solution, since not all third parties respect the "do not track" header.

Privacy settings: Mobile devices, browsers, sites/apps and other web-enabled items such as video games and cameras often have adjustable privacy settings. For devices, this may include the ability to control everything from location tracking to screen locks. For browsers, users can often control things like cookies and pop-ups, while apps and websites such as social media sites generally allow users to control what personal information others can see about them. Be sure to review and adjust privacy settings regularly and never rely on default settings. Many websites now also ask you which cookies they can use to track you with. This is usually a pop-up window that appears when you first open the page. This option will be called "Cookies settings," "Manage my choices" or something similar. Always choose "Reject all" or "Strictly necessary only."

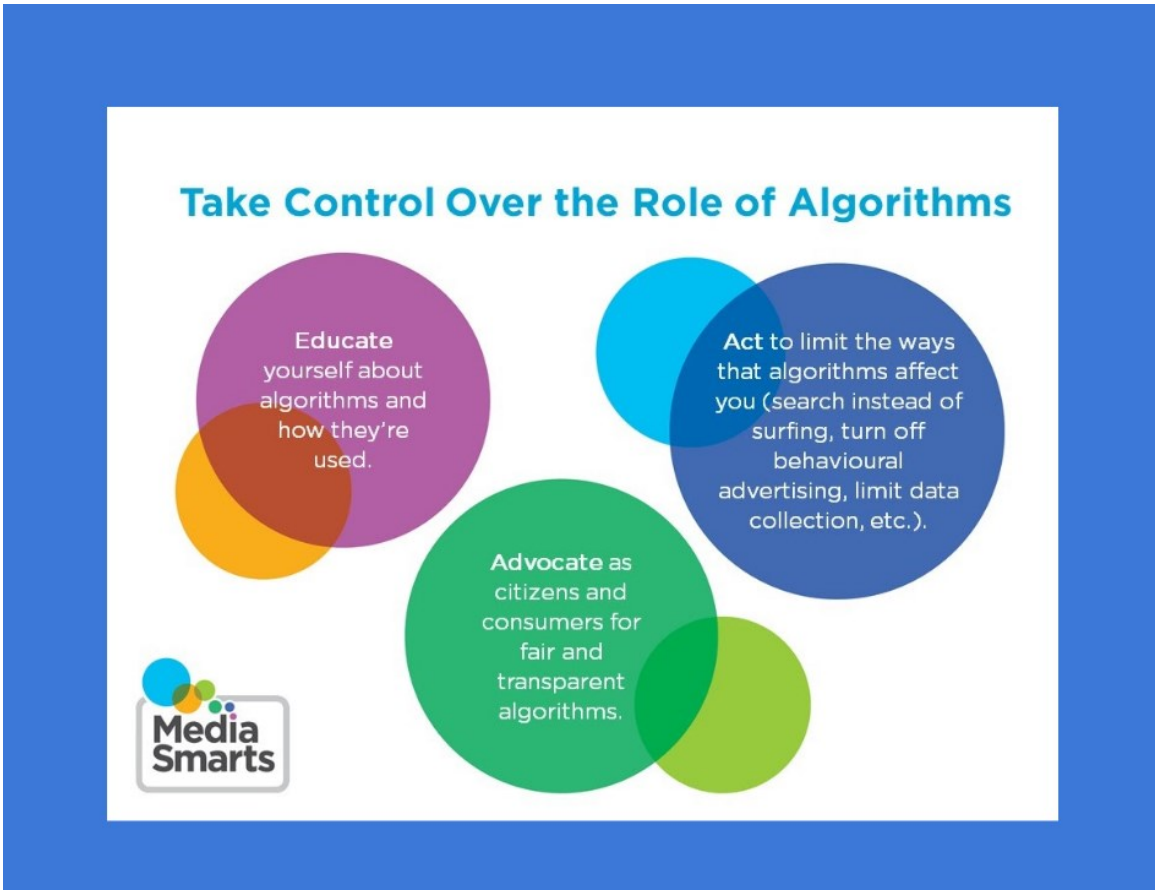


Tracking blockers. Tracking blockers like Privacy Badger (a browser plugin) and Do Not Track (an app) stop websites and apps from collecting information about you.

Turn off GPS when you don't need it: A lot of apps collect your GPS (global positioning system) information, which shows where you are, and it's also automatically included in photos you take with your phone. You can avoid this by turning off GPS when you're not using it. You can also go into your device's settings and turn off "Geotagging", which means photos (but not other apps) don't have your location info.

Use a VPN. VNPs (Virtual Private Networks) like Hotspot Shield allow you to hide or change your Internet Protocol (IP) address. Your IP address is the information you send to any app or website about which device you are using and where you are, and it's one of the things that is used to connect different parts of your online identity. Most VPNs have a free version but charge money if you use a certain amount of data, so you might want to only use them for some things (like shopping and using search engines) and not for things that use a lot of data, like watching videos.

Take Control over the Role of Algorithms



Part A

Answer **two** of the questions below in paragraph form. Make sure to back up your opinion with specific examples drawn from the game, class discussion and your own personal experience.

1) All kinds of algorithms, but especially machine learning algorithms, are made to recognize and reinforce patterns. What should be done if the pattern is unfair/biased?

2) What obligations should platforms have to make sure their algorithms do no harm? How can platforms fulfil this obligation if, in many cases, they themselves do not fully know how their algorithms work?

3) Do you think there should be laws or regulations that are more specifically about how algorithms work? If so, what should they be? If not, why is it better not to regulate algorithms?

4) Why might unhealthy or dangerous content (stunts and challenges, hate content, misinformation, etc.) be promoted by an algorithm? What responsibility do platforms have to moderate content like this?

5) What are some steps can you take to prevent your personal data from being collected?

6) Do you think it is fair for your personal information to be shared within a company, or sold by data brokers, and used to customize your online experience? Explain why or why not.

7) In some parts of the world, people have a right to get an explanation of how an algorithm made a decision. (For instance, how VidYou decided which videos to recommend and which ads to show you.) Do you think Canada should have a similar law? Why or why not?

Part B

Now that you have learned and thought about algorithms, write a short essay (2-4 paragraphs) that explains how you think the VidYou algorithm could be changed so that its outcomes would be more fair and it would handle personal information more responsibly.

While you do not have to change every element of the algorithm, make sure to consider:

- The purposes it can be optimized for
- The algorithm factors it considers and how they are weighed
- The manipulation techniques represented by the Boost cards
- How audiences are targeted for particular ads
- How personal information is collected and used to target ads
- The role of data brokers
- The use of machine learning
- Users' choices and control over how the algorithm works for them

#ForYou:

Rules for Quick Play

AGES:
13 and up

PLAYERS:
3-5

PLAYING TIME:
Around 1 hour

#ForYou:
Rules for Quick Play

Want to see it in action? Check out the gameplay video at
www.bit.ly/ForYouRules
Or you can read this and then come back to watch it.

AGES: 13 and up
PLAYERS: 3-5
PLAYING TIME: Around 1 hour

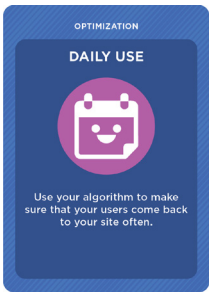
Summary

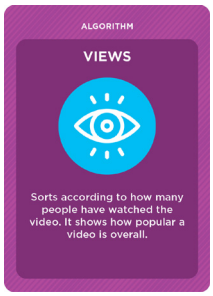
You and all but one of your fellow players are creators for VidYou, a fictional video site similar to TikTok or YouTube. One of you will play as VidYou.

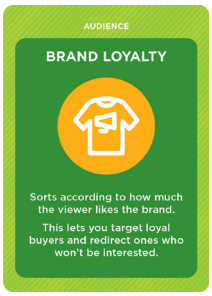
The creators want to make videos that lots of people see, and to make lots of money from the ads that run before, during or after the videos. To do that, you will have to try to figure out the algorithm that VidYou is using to decide who sees which ads and videos and which ones are recommended to which people.

VidYou also wants to make money! It does that by deciding how to optimize the algorithm and deciding which audience it wants to target with the player's ads.

There are three card decks that only the VidYou player uses: the Optimization, Algorithm and Audience cards.





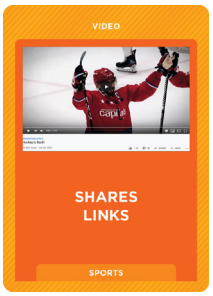


Optimization cards give the VidYou player an idea of what they want the algorithm to do, and give the other players a hint about that algorithm.

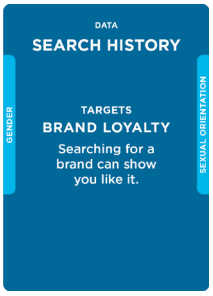
Algorithm and Audience cards decide how successful each video and ad is. That means the closer the players get to guessing what Algorithm and Audience cards that VidYou played, and in what order, the more views they get and the more money they make.

There are three decks that the players use: the Video cards, Ad cards and Data cards.

Video cards are used in the Popularity round. Each one has a topic like “Sports” and “Comedy” and matches two Algorithm cards. The Video deck also include six **Boost** cards. Each of these matches one Algorithm card and can be played on top of any Video card that matches the same one.



Ad cards are used in the Monetization and Machine Learning rounds. Each one matches two Audience cards.



Data cards are used in the Monetization and Machine Learning rounds. Each one also has one or two inferences that can be used to link it with other Data cards during the Machine Learning round.

There are three rounds of play: the Popularity round, the Monetization round and the Machine Learning round.

In each round, the VidYou player programs an algorithm of three cards. The players then try to figure out what cards were played and in what order, and play cards that match as many of the cards in the algorithm as possible.

In the Popularity round, players play Video cards and try to get their videos seen by as many people as possible. They can also use Boost cards to “game” the algorithm in different ways.

In the Monetization round, players play Ad cards to try to show ads to the audience that VidYou wants to reach. They also play Data cards to target those ads more accurately. In the Machine learning round, players once again play Ad and Data cards but can play extra Data cards by linking them through proxies.

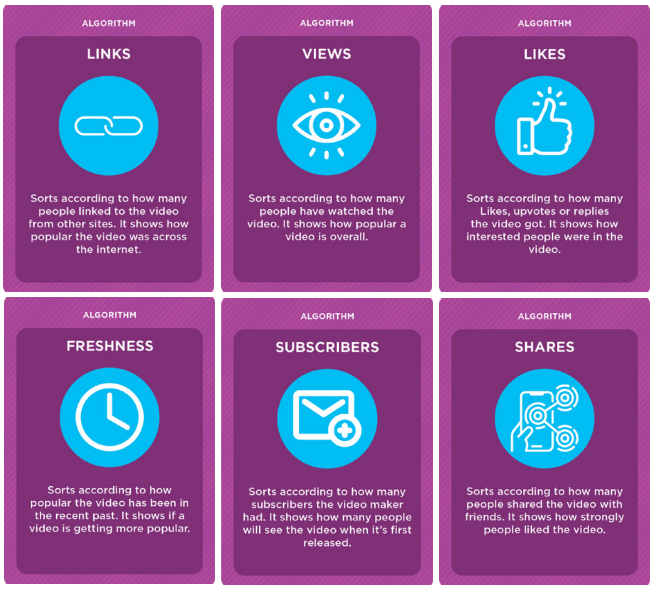
Quickstart

Separate the decks and shuffle the Video, Ad and Data cards. Make sure the Boost cards are shuffled in with the Video cards.

Popularity Round

The Popularity round is about getting your videos seen by as many people as possible.

At the beginning of the Popularity round the VidYou player draws an Optimization card and places it face-up, so the players can see it. They then draw three Algorithm cards of their choice to try to accomplish the goal on the Optimization card. They play the three Algorithm cards face-down, sorting them from left to right from the one that's most important in meeting the goal to the least important. Example: The VidYou player draws Virality from the Optimization deck. That means the algorithm will favour videos that users are likely to spread widely. To do that, the VidYou player chooses three Algorithm cards. They might choose these three:

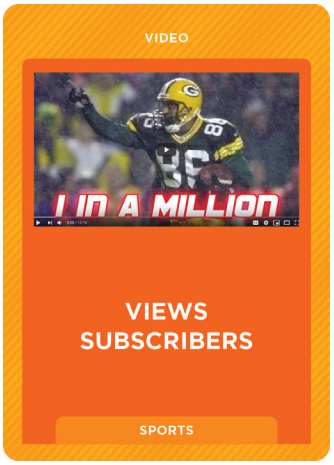


- Links (to recommend videos that people are already sharing)
- Shares (so that videos that users are sharing with one another will be more likely to be recommended)
- Subscribers (so that videos that have already been seen by many people will be recommended)

(They might choose other Algorithm cards for the same purpose, or sort them in a different order.)

First Turn: Testing the Algorithm

Next, the VidYou player deals five Video cards to each player. Each Player then plays one Video card of their choice. (Players should not play Boost cards in the first turn.)



Now the VidYou player uses the Score tokens to score the Video cards according to the algorithm factors on each card:

- If the card matches the top-ranked algorithm card, it scores three points.
- If it matches the second-ranked card, it scores two points.
- If it matches the third-ranked card, it scores one point.

In this example, the first Video card matches the top-ranked and second-ranked Algorithm cards, Links and Shares, so it scores a total of five points (three for the top-ranked card and two for the second-ranked card.) The second Video card matches only the third-ranked Algorithm card, Subscribers, so it scores one point.

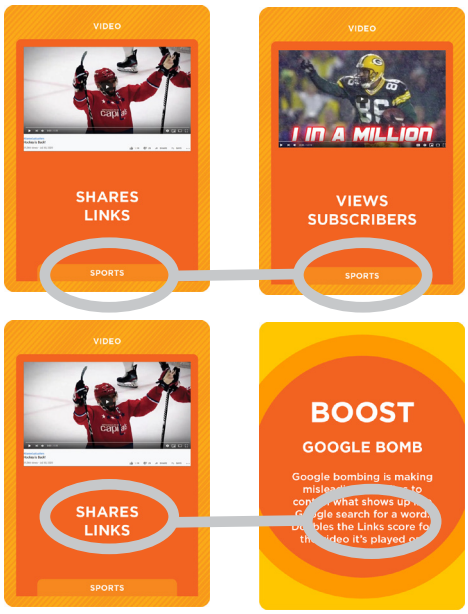
The VidYou player does not yet turn over the Algorithm cards or tell players how they scored each video – only the total score each Video card got.

Based on that, the players try to figure out which Algorithm cards that VidYou played and in what order. In the example above, for instance, they could figure out that either Shares was the top-ranked Algorithm card and Links was second or vice-versa, and that either Views or Subscribers was ranked third.

All of the scores are visible to all of the players, but it is up to the players whether they want to try to work together to figure out the algorithm or each try to do it on their own.

Second Turn: Gaming the Algorithm

In the second turn, each player now plays two of their remaining Video cards. They choose based on which ones best match the Algorithm cards they think that VidYou has played.



Each player can also play up to two extra Video cards if they have one or more with a matching topic. The topic is listed at the bottom of each Video card. Here, for example, playing the hockey video allows them to play another video with a Sports topic. Only one extra card can be played per topic.

Some players may also have gotten Boost cards mixed in with their Video cards. Each Boost card matches one Algorithm card and can only be played on top of a card that matches the same Algorithm card. It doubles the value of that match: for example, if Links were the top-ranked Algorithm card this Video card would be worth six points instead of three.

(With matching topics and Boost cards, each player can play anywhere between two and five cards.)

When all cards have been played, the VidYou player turns over the Algorithm cards and calculates the score for each Video card. These scores can be recorded if players are playing competitively but don't have to be displayed with Score tokens.

When the second turn is over, you can either play the Popularity Round again or move on to the Monetization round.

Monetization Round

Advertising isn't just about reaching the most people: it's about reaching the right people who are likely to respond to your ads. The Monetization round is about getting your ads seen by the people that VidYou wants to reach.

Play is similar to the first round, except with Ad cards instead of Video cards and Audience cards instead of Algorithm cards.

At the beginning of the Monetization round the VidYou player draws three Audience cards of their choice. Each card stands for something about the audience that the platform wants the ads to reach: how old they are, where they live, their interests. VidYou plays the three Audience cards face-down, sorting them from most to least important.

First Turn: Finding the Audience

Next, the VidYou player deals five Ad cards to each player. Each Player then plays one Ad card of their choice.

Now the VidYou player uses the Score tokens to score the Ad cards according to the Audience factors on each card:

- If the card matches the top-ranked Audience card, it scores three points.
- If it matches the second-ranked card, it scores two points.
- If it matches the third-ranked card, it scores one point.

In this example, the Ad card matches the first and third Audience cards, so it scores a total of four points (three for the first card and one for the third.)

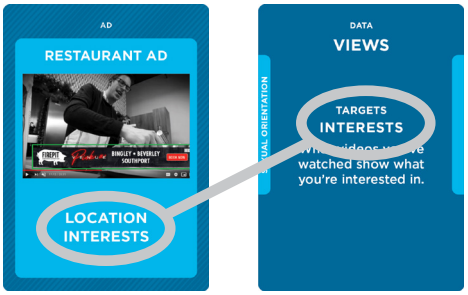
The VidYou player does not yet turn over the Audience cards or tell players how they scored each ad – only the total score each Ad card got.

Based on that, the players try to figure out which Audience cards that VidYou played and in what order. In the example above, for instance, they can deduce that either Location is the top card and Interests the third, or vice-versa, since only those two combinations could score four points.

All of the scores are visible to all of the players, but it is up to the players whether they want to try to work together to figure out which audience that VidYou wants to reach or each try to do it on their own.

Second Turn: Targeting the Audience

Next, the VidYou player deals each player four Data cards. Data cards stand for information that's been collected about users that will help you target the ads. They work like the Boost cards in the Popularity round: you can play one on top of any Ad card that matches the same Audience card.



Each player now plays two of their remaining Ad cards and up to two Data cards. They choose based on which ones best match the Audience cards they think VidYou has played.

When all cards have been played, the VidYou player turns over the Audience cards and calculates the score for each Ad card. These scores can be recorded if players are playing competitively but don't have to be displayed with Score tokens.

When the second turn is over, you can either play the Monetization Round again or move on to the Machine Learning round.

Machine Learning Round

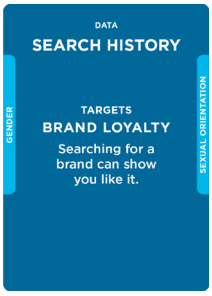
Algorithms don't rely just on data they've collected about you: they use that data to infer other things through machine learning, or "artificial intelligence." The Machine Learning round is about getting new ways of targeting users by finding unexpected connections in their data.

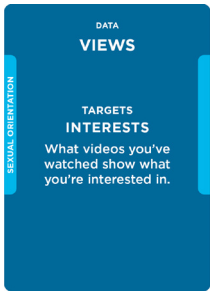
First Turn: Finding the Audience

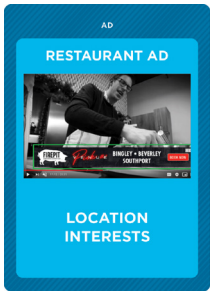
Play is the same as the first turn of the Monetization round: the VidYou player draws three Audience cards of their choice and plays them face-down, sorting them from most to least important. They then deal each player five Ad cards. Each player plays one Ad card and the VidYou player scores it based on how well it matched the Audience cards.

Interlude: Data Brokerage

Once again, the VidYou player deals four Data cards to the players. However, in this round players can play more than one Data card on each Ad card by linking them together. To link two Data cards together, they must have matching Proxies. Proxies are something that the algorithm guesses about a user and they are marked on the sides of the cards.

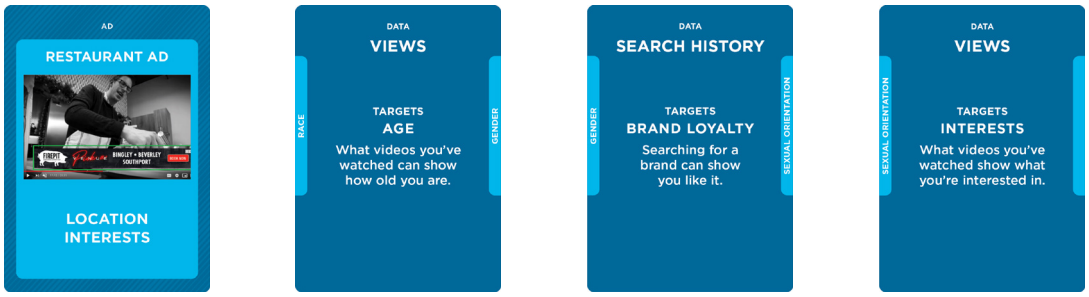






The **first** Data card still has to match the Ad card it's played on, but the ones linked to that first Data card do not. Proxy text on the left side of a card has to match with the same text on the right side of another card, and vice-versa.

If a Data card has Proxy text on both sides, players can link another one to the other side. This chain can include as many cards as the player is able to match.



Before playing their Ad and Data cards, players have a chance to act as data brokers and trade Data cards with one another. Because Proxies have to match on facing sides it is likely that most players will have a Data card that another player will be able to use to match a Proxy.

It is up to the players whether they wish to trade collaboratively or competitively.

Second Turn: Targeting the Audience

Players now place down two Ad cards and as many Data cards as they are able to link together. The VidYou player then scores each Ad card depending on how well it and the Data cards played on it match the Audience cards. **The Data cards in a chain are counted even if the Ad card they were played on does not match any of the Audience cards**. In the example above, for instance, if VidYou had played Age as the first priority and Brand Loyalty as the second, the Ad card would score five points (3+2) even though the original ad didn't target either Age or Brand Loyalty.

These scores can be recorded if players are playing competitively but don't have to be displayed with Score tokens. When the second turn is over, you can either play the Machine Learning Round again, start another game with the Popularity Round, or tally total scores to see which video maker reached the largest audience and made the most money.