THE ECONOMICS OF NETWORKS
TODAY

Networks: a very brief introduction.

Lecture 1: The life of a platform.

Syllabus, first assignment
Platforms organize and mediate economic interactions. Want to use platform others are using.

Owner of a platform can typically take a share of the value it creates.

What determines which platforms take hold?
MOST VALUE NOWADAYS IN PLATFORM, NOT IN STUFF

Uber, the world's largest taxi company, owns no vehicles.

Facebook, the world's most popular media outlet, creates no content.

Alibaba, the most valuable retailer, has no inventory.

Airbnb, the world's largest accommodation provider, owns no real estate.
SPREAD OF A NEW TECHNOLOGY/IDEA/PRACTICE

How does it get traction?

What determines whether and how fast it grows after that?

What determines its equilibrium market share, how much money it can make, whether it can keep out competitors?
THE S-CURVE OF ADOPTION

- Initial traction
- Viral growth
- Network effect
- Virality
- Saturation
- Total addressable market
- Competition

million users
THREE PHASES OF CONTAGION

Initial traction
- Targeting “right” early adopters
- Coordinated adoption among them

Viral growth
- Autonomous, decentralized
- Tipping points

Equilibrium
- Equilibrium market share
- Who gets the surplus?
- Competition, antitrust.
Platform different from ordinary product.
- Matters who else is using it.

Network is important:
- Mediates learning about platform.
- Natural “partners” will affect each other’s adoption.

So we will think about platforms from a **network** contagion perspective
DISRUPTION

Classical economic theory: equilibrium, business as usual.

But economy often shaped by sudden changes — disequilibrium.

Innovation, creative destruction.

J. Schumpeter
CONCEPTUALLY VERY DIFFERENT

Initial traction
• Targeting “right” early adopters
• **Coordinated** adoption among them

Viral growth
• **Autonomous**, decentralized
• Tipping points and the magic number

Equilibrium
• Equilibrium market share
• Who gets the surplus?
• Competition, antitrust.
INITITAL TRACTION:
EARLY ADOPTERS
GETTING TRACTION

Two issues:

• **Starting** with the right people.

• **Coordination** among the early adopters.
PATIENT ZERO

In epidemiology:

The case that is responsible for all the others – the first ancestor.

In HIV/AIDS epidemic:

widely but falsely believed to be a single flight attendant.
CENTRALITY

Theory: network centrality.

• Who has **direct** and **indirect** influence over the most others?

Key idea: you are **central** if you:

• influence **many** others;
• influence **influential** others.

Examples: influence of **websites** (PageRank), of **patents**, of **scholars**.
EXAMPLE OF STARTING CENTRALLY

Background
Hundreds of millions of active users, valuation ~$2B

Initial population (“patient zero”)
Top Silicon Valley talent in software engineering, management, VC, private equity

Second ring
Everybody else in Silicon Valley

Third ring
India

adam d'angelo
COORDINATION

Theory: coordination games.
• How do you convince early adopters that it’s worth the trouble?

Key idea: thinking how others are thinking.
• Upstart political candidate: a dilemma for early staff. Will other people eventually support her?
• Political dissent: will enough other people join so that we can change a policy?
1. Name "heads" or "tails." If you and your partner name the same, you both win a prize.

2. Circle one of the numbers listed in the line below. You win if you all succeed in circling the same number.
   7  100  13  261  99  555

3. Put a check mark in one of the sixteen squares. You win if you all succeed in checking the same square.
   ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

4. You are to meet somebody in New York City. You have not been instructed where to meet; you have no prior understanding with the person on where to meet; and you cannot communicate with each other. You are simply told that you will have to guess where to meet and that he is being told the same thing and that you will just have to try to make your guesses coincide.

5. You were told the date but not the hour of the meeting in No. 4; the two of you must guess the exact minute of the day for meeting. At what time will you appear at the meeting place that you elected in No. 4?

6. Write some positive number. If you all write the same number, you win.

7. Name an amount of money. If you all name the same amount, you can have as much as you named.

8. You are to divide $100 into two piles, labeled A and B. If you allot the same amounts to A and B, respectively, that your partner does, each of you gets $100; if your amounts differ from his, neither of you gets anything.

9. On the first ballot, candidates polled as follows:

<table>
<thead>
<tr>
<th>Smith</th>
<th>Robinson</th>
<th>Jones</th>
<th>White</th>
<th>Brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>29</td>
<td>28</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

The second ballot is about to be taken. You have no interest in the outcome, except that you will be rewarded if someone gets a majority on the second ballot and you vote for the one who does. Similarly, all voters are interested only in voting with the majority, and everybody knows that this is everybody's interest. For whom do you vote on the second ballot?
MOHAMED BOUAZIZI
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 17, 2010</td>
<td>Bouazizi sets himself on fire</td>
</tr>
<tr>
<td>within hours</td>
<td>protests spread in his hometown</td>
</tr>
<tr>
<td>10 days later</td>
<td>protests spread to Tunis, involve tens of thousands</td>
</tr>
<tr>
<td>Jan 14, 2011</td>
<td>Tunisian government falls</td>
</tr>
<tr>
<td>within months</td>
<td>insurgencies and protests erupt in Egypt, Yemen, Libya, Morocco, Syria (Arab Spring)</td>
</tr>
</tbody>
</table>
Rebelling against a regime is a coordination problem: each person is more willing to show up at a demonstration if many others do, perhaps because success is more likely and getting arrested is less likely. Regimes in their censorship thus target public communications such as mass meetings, publications, flags, and even graffiti, by which people not only get a message but know that others get it also.
COORDINATION DEVICES

For nearly thirty years, the price of a loaf of bread in Egypt was held constant; Anwar el-Sadat’s attempt in 1977 to raise the price was met with major riots. Since then, one government tactic has been to make the loaves smaller gradually; another has been to replace quietly a fraction of the wheat flour with cheaper corn flour.
COORDINATION DEVICES

These tactics are more than just a matter of individual deception: each person could notice that their own loaf was smaller or tasted different but be unsure about how many other people also noticed. Changing the size or taste of the loaves is not the same public event as raising its price.
Even relatively mundane calls for change have been stamped out. Censors recently deleted an online petition calling on Peking University to offer seminars on improper conduct and create committees to investigate abuse reports. And a top social media platform has intermittently blocked the use of the “MeToo China” hashtag.

“Spontaneously organized movements are not appreciated,” said Zheng Xi, a doctoral student at Zhejiang University who is leading a campaign to persuade city governments to post signs against harassment.
CLOSING THOUGHTS ON INITIAL TRACTION

Central individuals provide a good starting point: not trivial how to measure/define most central.

Often people need to adopt together: then game theory, higher-order beliefs will matter.
CONCEPTUALLY VERY DIFFERENT

Initial traction
- Targeting “right” early adopters
- Coordinated buy-in among them

Viral growth
- Autonomous, decentralized
- Tipping points and the magic number

Saturation
- Maintaining barriers to entry
- Network negatives
viral growth
CONTAGION
CONTAGION
CONTAGION
CONTAGION
CONTAGION
CLOSING THOUGHTS ON VIRAL GROWTH

Insight into why so much is spent on small details of viral marketing.

A/B testing:

• Extremely important because you can fine tune **virality** “in real time”
• Huge advantage to scale – big data – causal identification.
CONCEPTUALLY VERY DIFFERENT

Initial traction
- Targeting “right” early adopters
- Coordinated buy-in among them

Viral growth
- Autonomous, decentralized
- Tipping points and the magic number

Equilibrium
- Equilibrium market share
- Who gets the surplus?
- Competition, antitrust.
In intermediate micro, monopolistic market has unique equilibrium

• with “network effects,” the market can suddenly collapse when a change occurs.

But while it remains popular, even a terrible monopolist can extract huge rents.
DISRUPTION

Classical economic theory: equilibrium, business as usual.

But economy often shaped by sudden changes — disequilibrium.

Innovation, creative destruction.

J. Schumpeter
PLAT FORMS AND ENTRY

Advantage: huge power to fine-tune product using your existing scale.

Many new social media companies can easily be made a feature in someone else’s product. FourSquare, etc.

So how can a small platform get started?
You can look at Facebook as this bundle of so many different things, but it turns out that people just like photos more than anything else.

So if you specialize in photos and do photos really well, that’s in some way more powerful than this bundle of everything else.

Adam D’Angelo