Lecture 14:
CS 5306 / INFO 5306:
Crowdsourcing and
Human Computation

Course Project: Milestones

1.	Fr 3/18:	Initial proposal ideas	(nothing to submit in CMS)
2.	Tu 3/22:	Comments on classmates' ideas	(nothing to submit in CMS)
		Submit as follow-ups, not as replies to others' follow-ups	
3.	Th 3/24:	Revise your ideas	(nothing to submit in CMS)
4.	Th 4/7:	Project proposal	**(submit using CMS)**
5.	Th 4/21:	Status report 1	(submit to TA)
6.	Th 5/5:	Status report 2	(submit to TA)
7.	Tu 5/17:	Project report (group)	**(submit using CMS)**
		Project report (individual)	**(submit using CMS)**

Revised handout on website

Homework 1

- Galaxy Zoo task for those who couldn’t get Amazon Mechanical Turk accounts
- Those who did get AMT accounts do assignment as planned

- Revised assignment will go out tomorrow

Types of Crowdsourcing

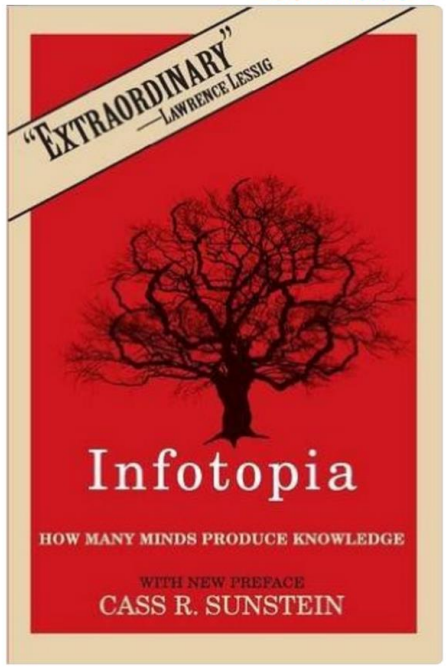
- "Overt" vs "Covert": Are human participants explicitly participating to achieve the collective outcomes, or is some form of mining of human activity achieving the collective outcomes
  - Overt: Amazon reviews, Wikipedia
  - Covert ("Crowd Mining"): Google, Amazon recommendations
  - (Subvert: reCAPTCHA, Duolingo)

Types of Crowdsourcing

- Overt
  - Collecting

You purchased this item on February 17, 2010.
View this order

Look inside



Infotopia: How Many Minds Produce Knowledge

Paperback – July 7, 2008

by Cass R. Sunstein (Author)

★★★★☆ 18 customer reviews

See all 6 formats and editions

Kindle	Hardcover	Paperback
$7.79	$36.95 Prime	$13.83 Prime
Read with Our Free App	40 Used from $0.01 29 New from $2.88 3 Collectible from $4.75	49 Used from $0.48 35 New from $4.99

The rise of the "information society" offers not only considerable peril but also great promise. Beset from all sides by a never-ending barrage of media, how can we ensure that the most accurate information emerges and is heeded? In this book, Cass R. Sunstein develops a deeply optimistic understanding of the human potential to pool information, and to use that knowledge to improve our lives.

Share <Embed>

Buy New $13.83

Qty: 1

List Price: ~~$17.95~~
Save: $4.12 (23%)

Free Prime shipping once available
Details

In Stock.
Ships from and sold by Amazon.com.
Gift-wrap available.

Add to Cart

Turn on 1-Click ordering for this browser

Want it tomorrow, March 18? Order within **2 hrs 20 mins** and choose **One-Day Shipping** at checkout. Details

Browsing Ithaca, NY Businesses

Showing 1-10 of 3481

Active Life | Arts & Entertainment | Automotive | Beauty & Spas | Education | Event Planning & Servi… | Financial Services | Food | Health & Medical | Home Services | Hotels & Travel | Local Services | Nightlife | Pets | Professional Services | Real Estate | Restaurants | Shopping

More categories

Filters

$ | $$ | $$$ | $$$$ | Open Now | Order Pickup or Delivery | All Filters

1. Saigon Kitchen

318 reviews

$$ · Vietnamese, Asian Fusion

2. Just A Taste

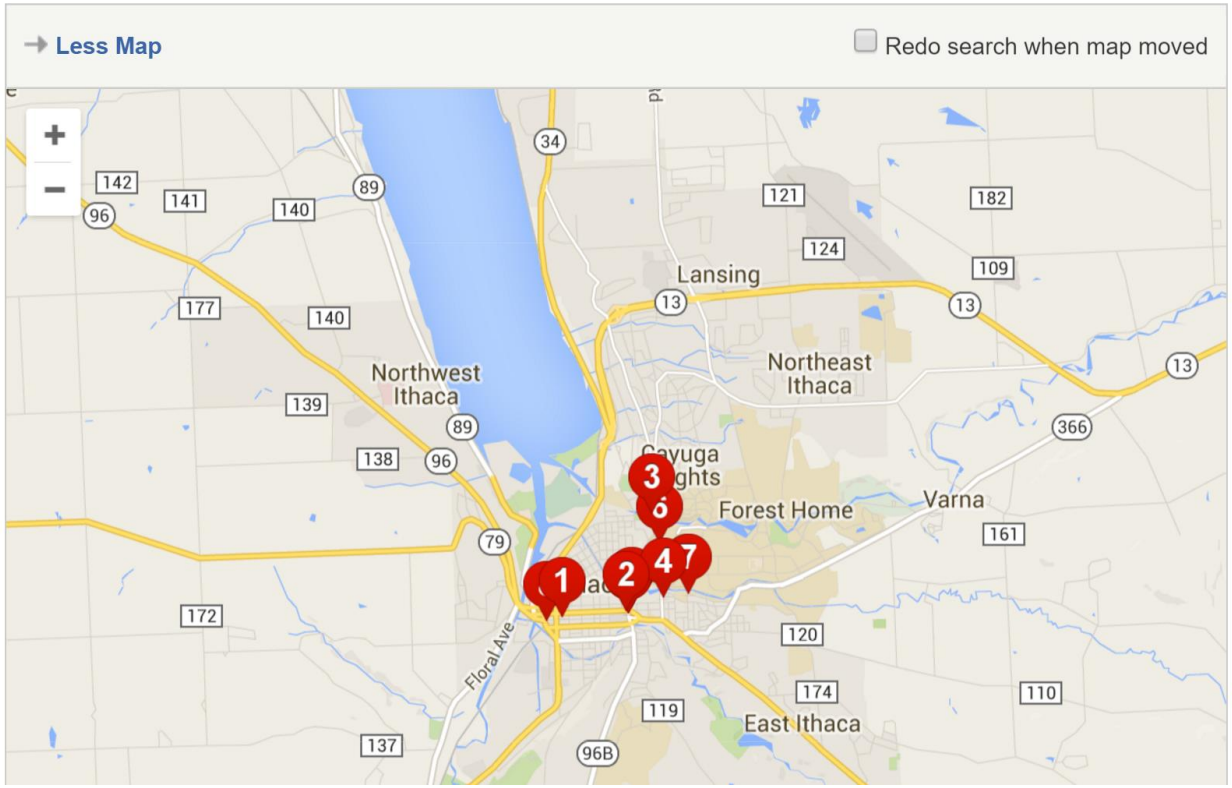
242 reviews

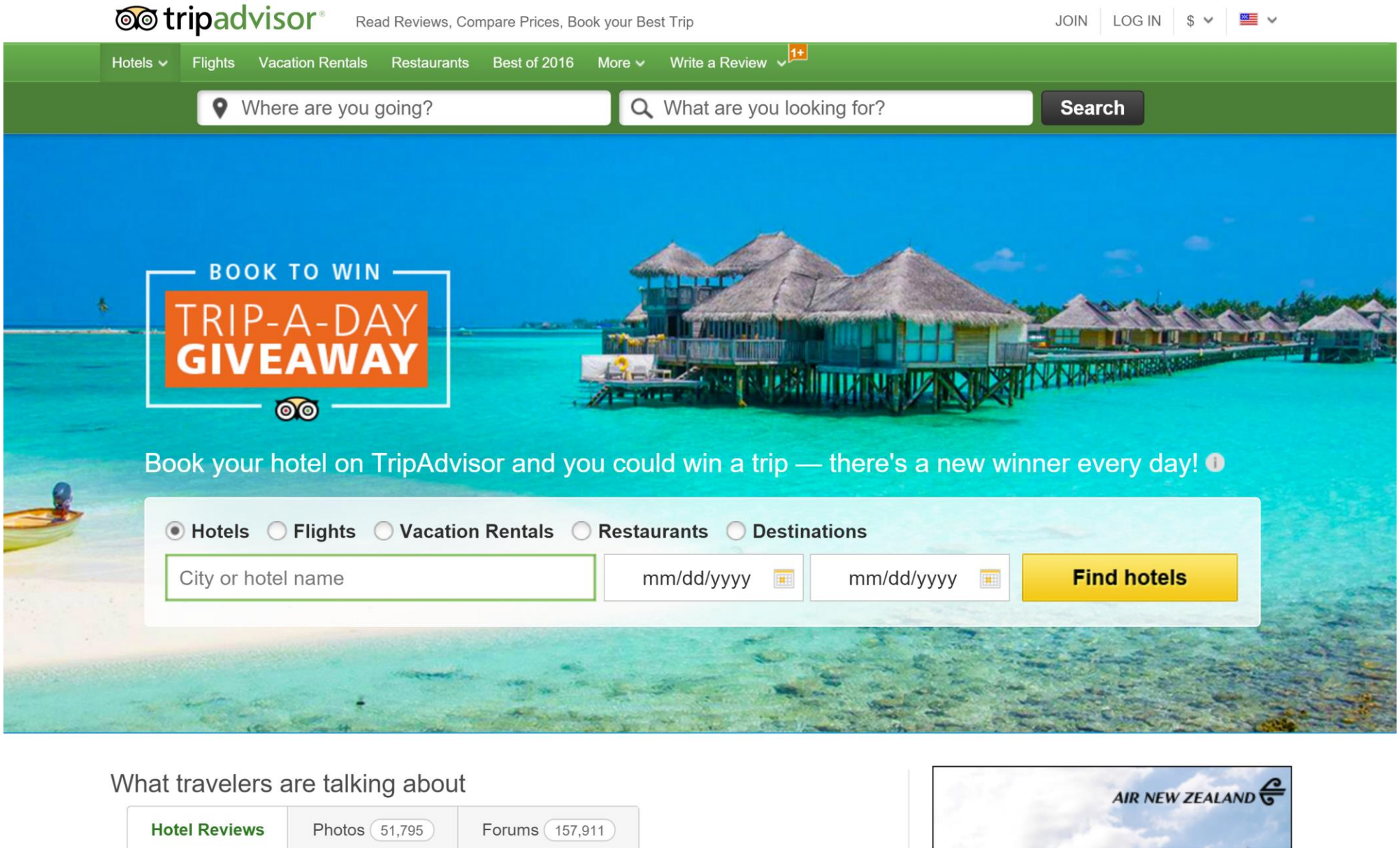
$$ · Tapas Bars

3. Ithaca Falls

24 reviews

Local Flavor



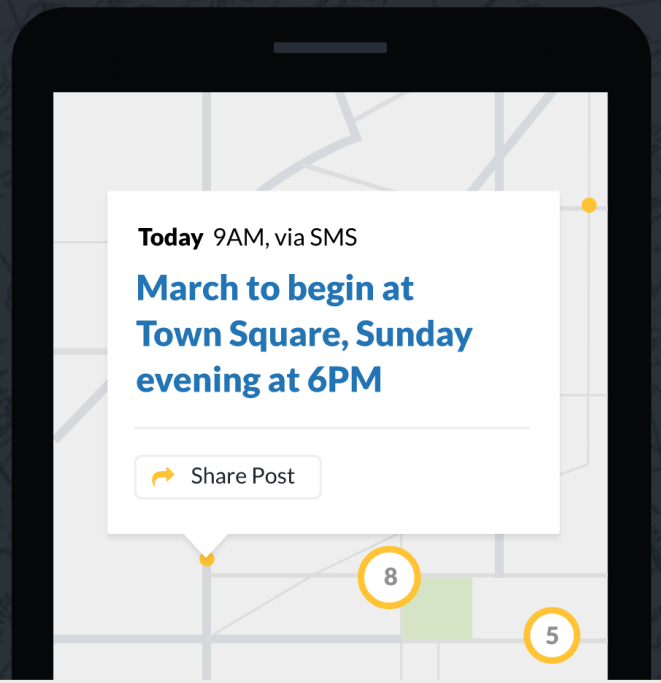


What travelers are talking about

Hotel Reviews | Photos 51,795 | Forums 157,911

Ushahidi

FEATURES PLANS SOLUTIONS ABOUT SUPPORT + MORE CONTACT LOG IN



RAISE YOUR VOICE

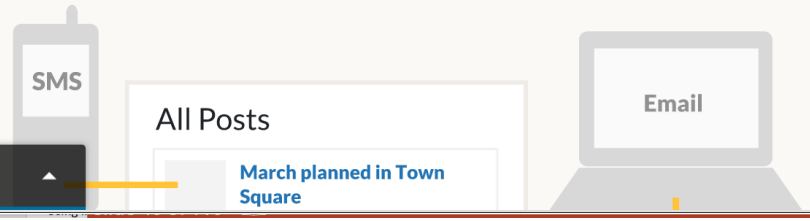
Gather reports to see what happened, when, and where

Create your first deployment for free

Your email address | Create Deployment

or download open source code from GitHub now

FEB 18 2016 Responder: Your team's dashboard for handling big data sets



English

Collect meaningful data

Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)

Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets

amazonmechanical turk
Artificial Artificial Intelligence

Your Account | HITs | Qualifications

Already have an account?
Sign in as a Worker | Requester

Introduction | Dashboard | Status | Account Settings

Mechanical Turk is a marketplace for work.

We give businesses and developers access to an on-demand, scalable workforce.
Workers select from thousands of tasks and work whenever it's convenient.

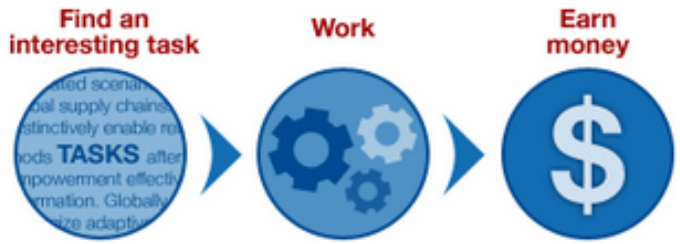
74,026 HITs available. View them now.

Make Money
by working on HITs

HITs - *Human Intelligence Tasks* - are individual tasks that you work on. Find HITs now.

As a Mechanical Turk Worker you:

- Can work from home
- Choose your own work hours
- Get paid for doing good work



Find HITs Now

or learn more about being a **Worker**

Get Results
from Mechanical Turk Workers

Ask workers to complete HITs - *Human Intelligence Tasks* - and get results using Mechanical Turk. Register Now

As a Mechanical Turk Requester you:

- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you're satisfied with the results

Get Started

An amazon.com company

Galaxy Zoo is a **Zooniverse** project. | Our Projects

username | password | Login | Sign up

Forgot Password?

CLASSIFY | STORY | SCIENCE | GALAXY ZOO | DISCUSS | PROFILE | LANGUAGE

Few have witnessed what you're about to see

Experience a privileged glimpse of the distant universe as observed by the SDSS and the CTIO, and tested through state-of-the-art simulations.

Classify Galaxies

To understand how galaxies formed we need your help to classify them according to their shapes. If you're quick, you may even be the first person to see the galaxies you're asked to classify.

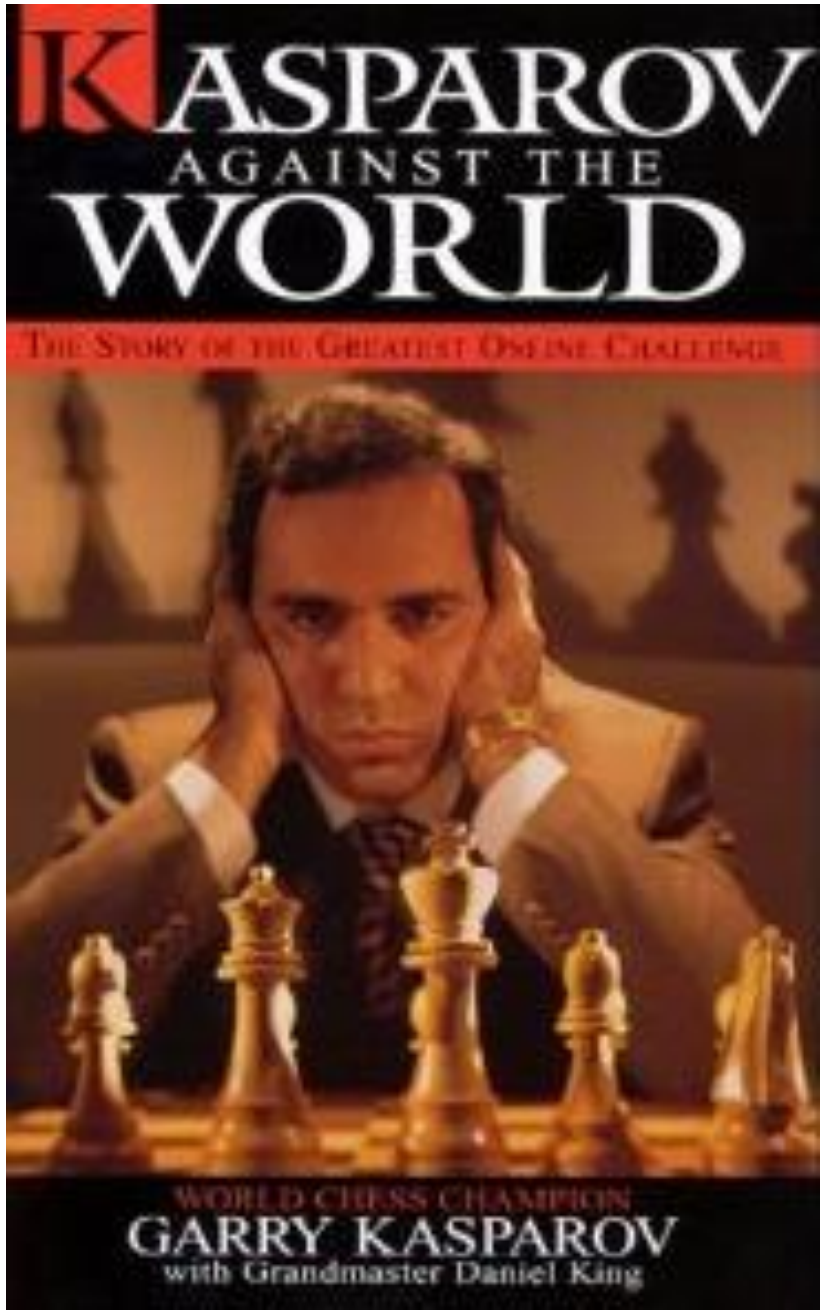
Begin Classifying

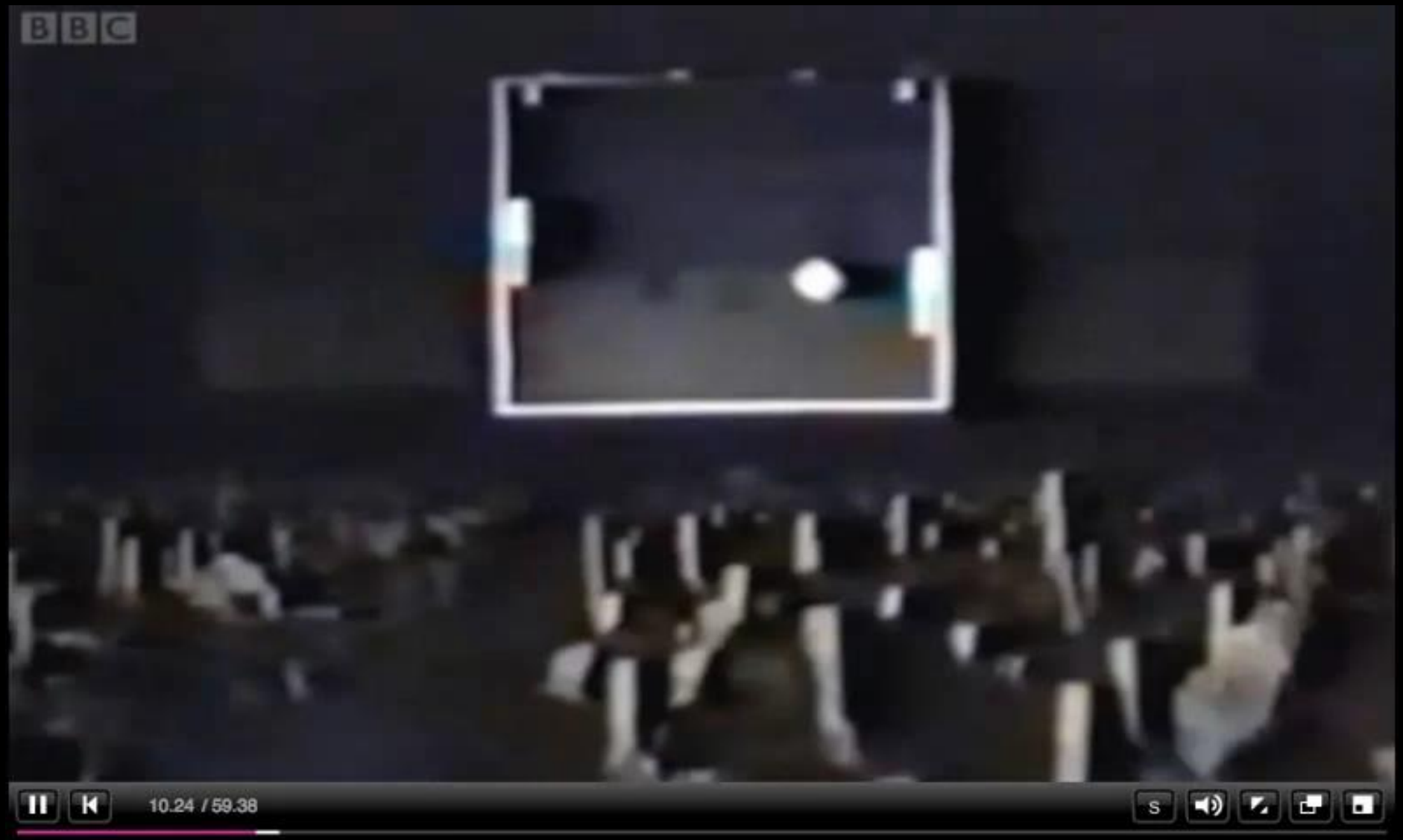
Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets (Amazon Mechanical Turk)

Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets (Amazon Mechanical Turk)
  - Collaborative Decisions


KASPAROV
AGAINST THE
WORLD
The Story of the Greatest Online Challenge
WORLD CHESS CHAMPION
GARRY KASPAROV
with Grandmaster Daniel King


BBC
10.24 / 59.38

IEM | Iowa Electronic Markets

THE UNIVERSITY OF IOWA

Search the IEM GO

MARKETS ACCOUNT MAINTANANCE ABOUT IEM LOGIN AND TRADE OPEN AN ACCOUNT

The Iowa Electronic Market is a futures market run for research and teaching purposes. Traders can buy and sell real-money contracts based on their belief about the outcome of an election or other event. Using this "wisdom of crowds," the price of a contract at any given time is a forecast of the outcome.

2016 U.S. PRESIDENTIAL NOMINATION MARKETS

This is a real-money futures market where contract payoffs will be determined by outcomes in the 2016 Presidential Nomination process.

There are two markets in this set:

Democratic Nomination

A winner-take-all market based on the outcome of the 2016 Democratic National Convention. Prices reflect the

Republican Nomination

A winner-take-all market based on the outcome of the 2016 Republican National Convention. Prices reflect the

Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets (Amazon Mechanical Turk)
  - Collaborative Decisions (Prediction Markets)
  - Collaborative Creation


Apache
SOFTWARE FOUNDATION

A NEW PROOF OF THE DENSITY HALES-JEWETT THEOREM

D. H. J. POLYMATH

ABSTRACT. The Hales–Jewett theorem asserts that for every r and every k there exists n such that every r-colouring of the n-dimensional grid $\{1,\dots,k\}^n$ contains a combinatorial line. This result is a generalization of van der Waerden's theorem, and it is one of the fundamental results of Ramsey theory. The theorem of van der Waerden has a famous density version, conjectured by Erdős and Turán in 1936, proved by Szemerédi in 1975, and given a different proof by Furstenberg in 1977. The Hales–Jewett theorem has a density version as well, proved by Furstenberg and Katznelson in 1991 by means of a significant extension of the ergodic techniques that had been pioneered by Furstenberg in his proof of Szemerédi's theorem. In this paper, we give the first elementary proof of the theorem of Furstenberg and Katznelson, and the first to provide a quantitative bound on how large n needs to be. In particular, we show that a subset of $\{1,2,3\}^n$ of density δ contains a combinatorial line if n is at least as big as a tower of 2s of height $O(1/\delta^2)$. Our proof is surprisingly simple: indeed, it gives arguably the simplest known proof of Szemerédi's theorem.

1. INTRODUCTION

1.1. **Statement of our main result.** The purpose of this paper is to give the first elementary proof of the density Hales–Jewett theorem. This theorem, first proved by Furstenberg and Katznelson [FK89, FK91], has the same relation to the Hales–Jewett theorem [HJ63] as Szemerédi's theorem [Sze75] has to van der Waerden's theorem [vdW27]. Before we go any further, let us state all four theorems. We shall use the notation $[k]$ to stand for the

Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets (Amazon Mechanical Turk)
  - Collaborative Decisions (Prediction Markets)
  - Collaborative Creation (Wikipedia)

Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets (Amazon Mechanical Turk)
  - Collaborative Decisions (Prediction Markets)
  - Collaborative Creation (Wikipedia)
  - Smartest in the Crowd (Contests)
  - Games with a Purpose
- Covert / Crowd Mining
  - Web page linkage, search logs, social media, collaborative filtering

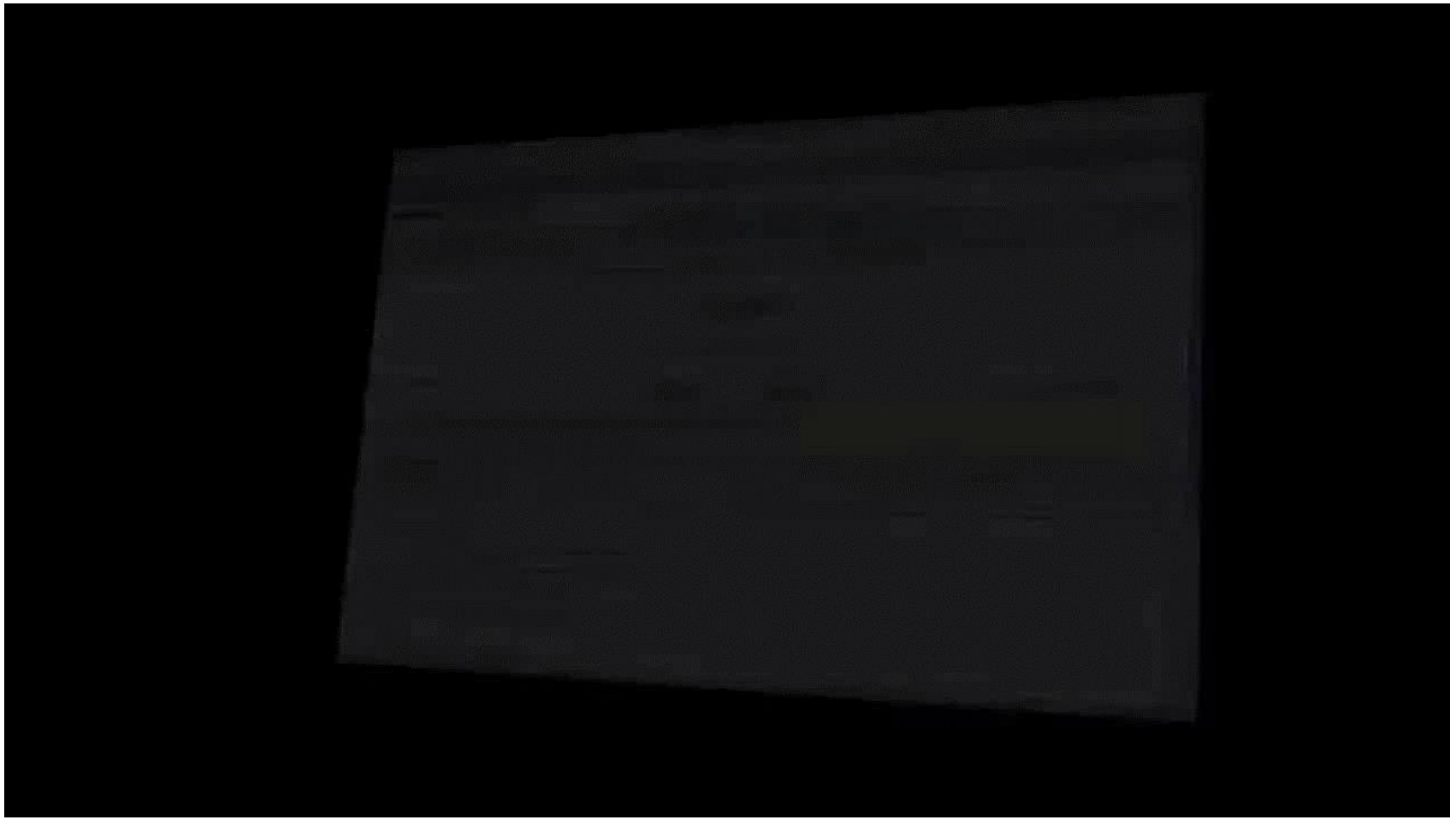
Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets (Amazon Mechanical Turk)
  - Collaborative Decisions (Prediction Markets)
  - Collaborative Creation (Wikipedia)
  - Smartest in the Crowd (Contests)
  - Games with a Purpose
- Covert / Crowd Mining
  - Web page linkage, search logs, social media, collaborative filtering

Types of Crowdsourcing

- Overt
  - Collecting (Amazon Reviews)
  - Labor Markets (Amazon Mechanical Turk)
  - Collaborative Decisions (Prediction Markets)
  - Collaborative Creation (Wikipedia)
  - Smartest in the Crowd (Contests)
  - Games with a Purpose
- Covert / Crowd Mining
  - Web page linkage, search logs, social media, collaborative filtering

Use Examples of Labor Markets: Ten Thousand Cents



Use Examples of Labor Markets: Soylent

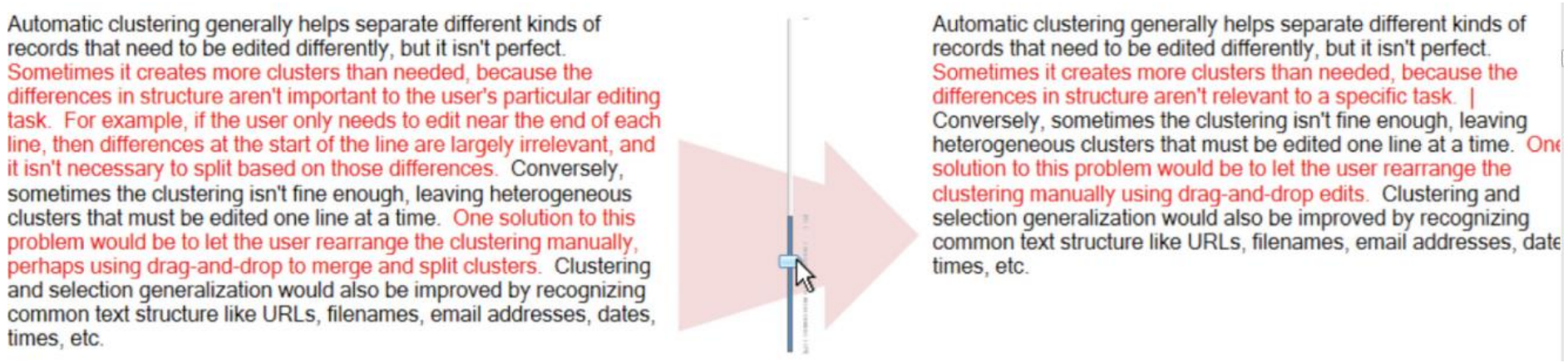
"Soylent: A Word Processor with a Crowd Inside"

Michael S. Bernstein, Greg Little, Robert C. Miller, Björn Hartmann, Mark S. Ackerman, David R. Karger, David Crowell, and Katrina Panovich

UIST 2010

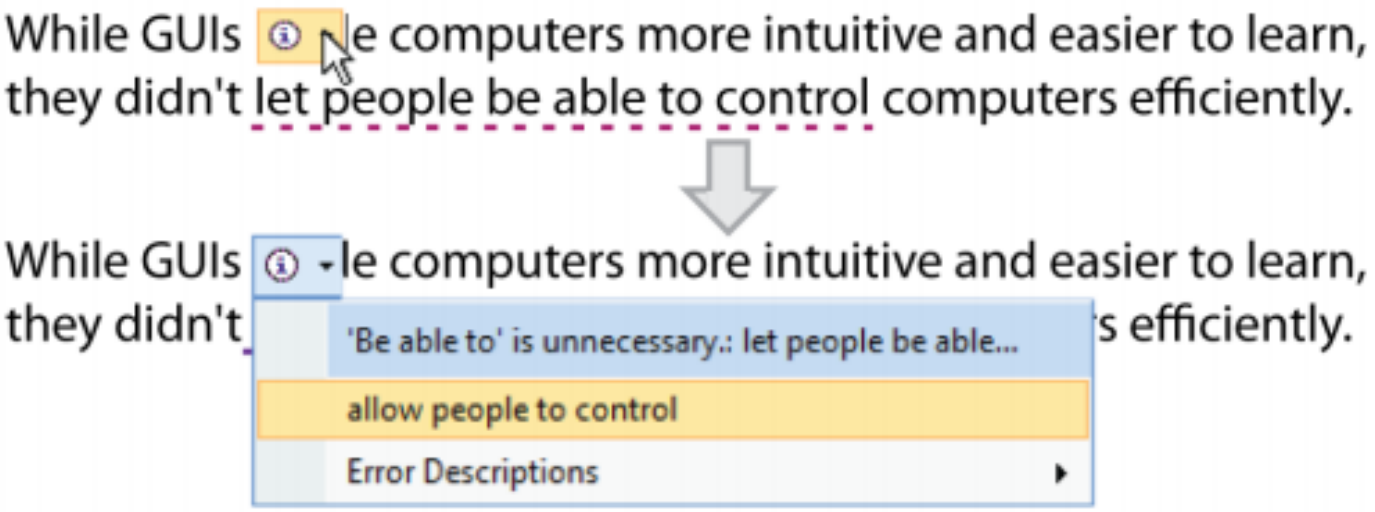
Use Examples of Labor Markets: Soylent

shortn

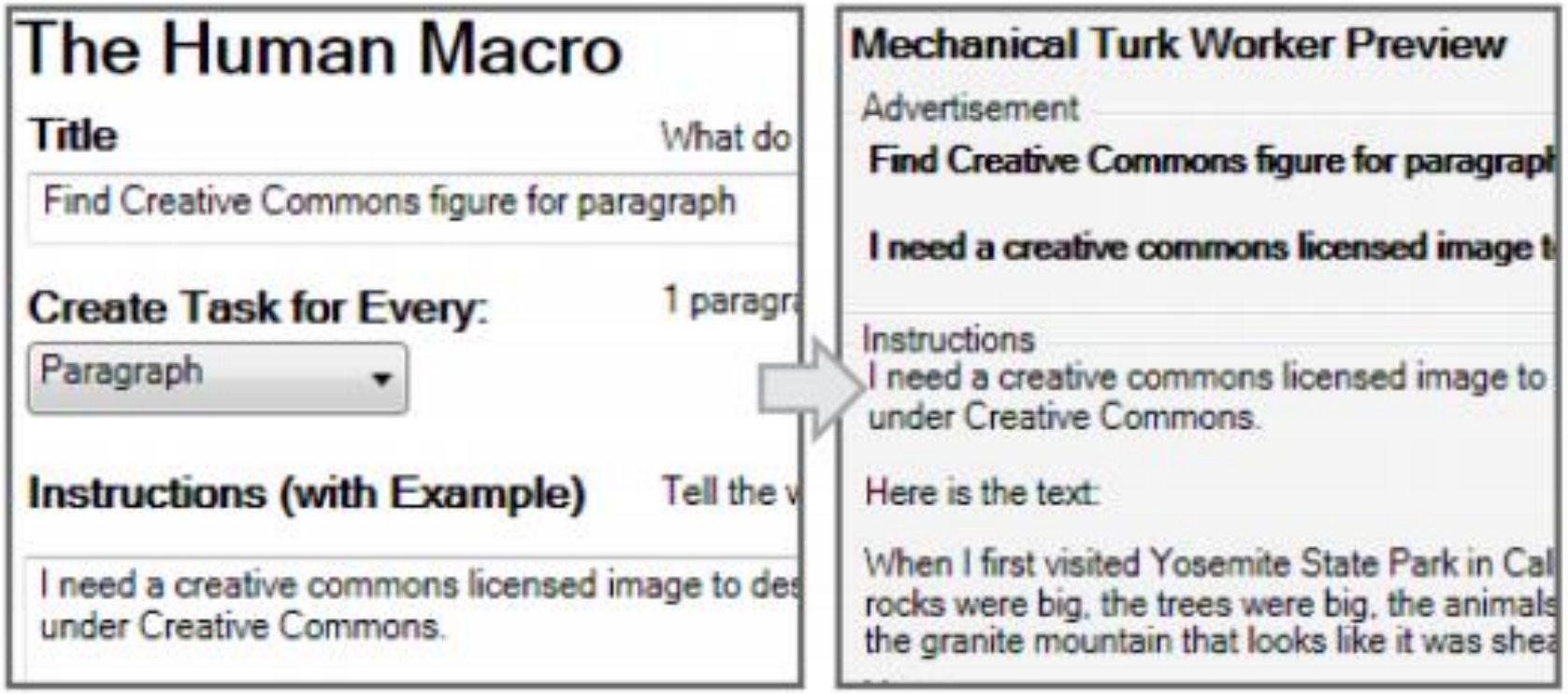


Use Examples of Labor Markets: Soylent

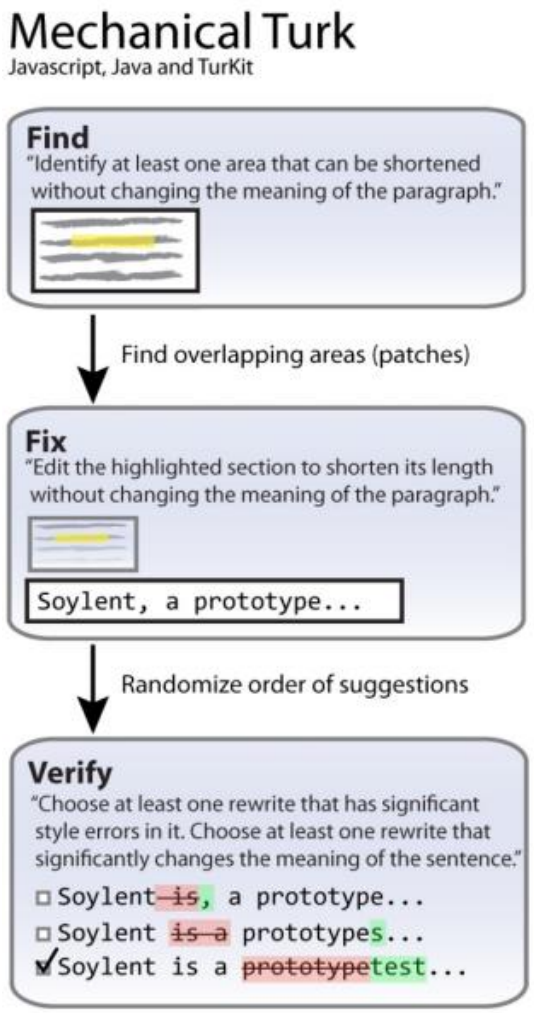
Crowdproof



Use Examples of Labor Markets: Soylent



Use Examples of Labor Markets: Soylent



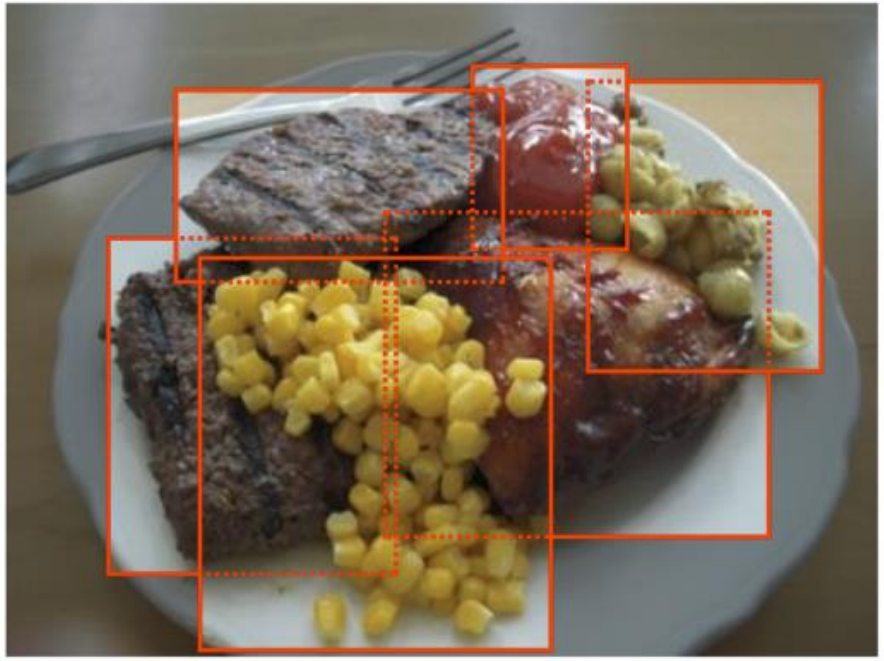
Use Examples of Labor Markets: PlateMate

"PlateMate: Crowdsourcing Nutritional Analysis from Food Photographs"

Jon Noronha, Eric Hysen, Haoqi Zhang, Krzysztof Z. Gajos

UIST 2011

Use Examples of Labor Markets: PlateMate

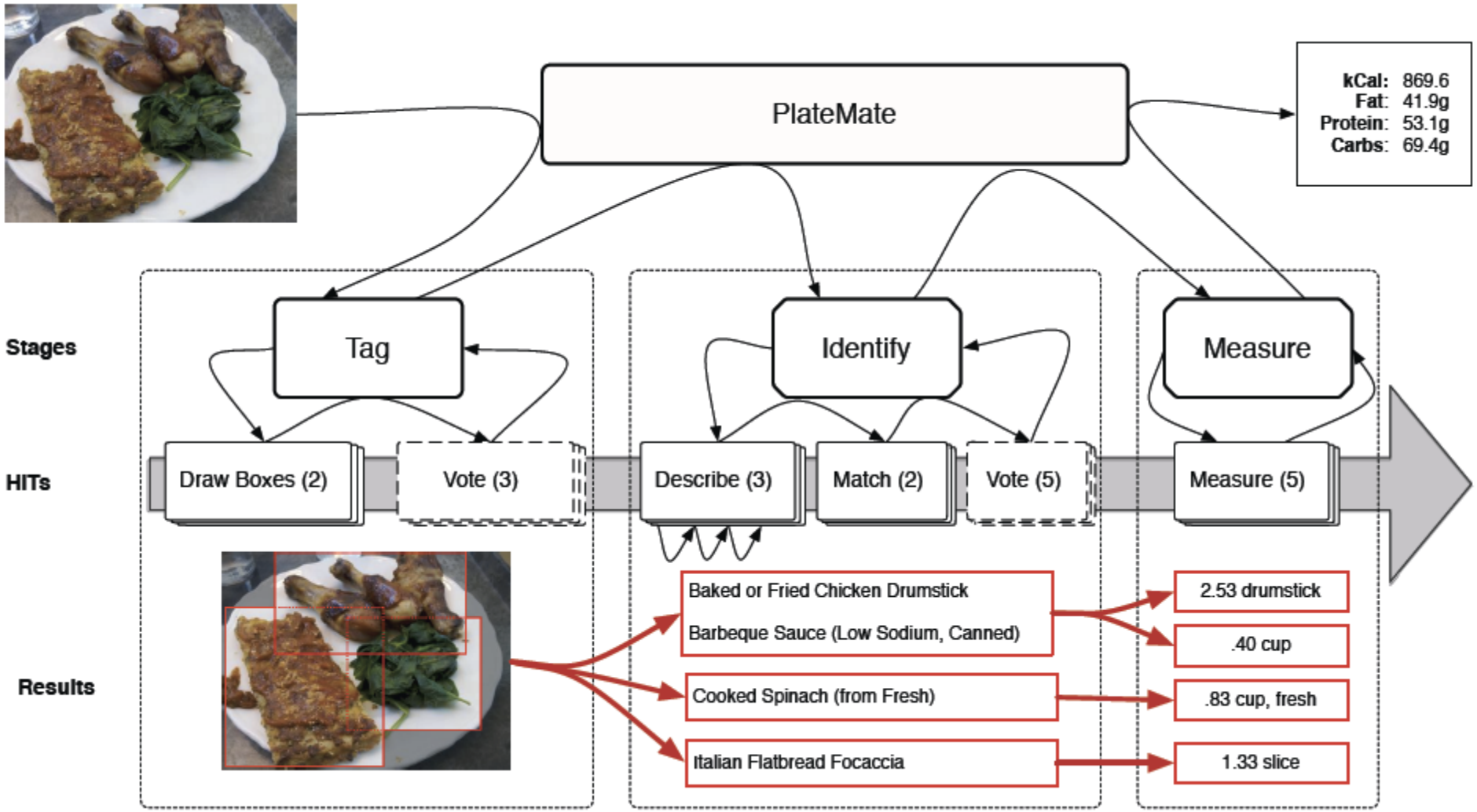


	kcal	fat (g)	carbs (g)	protein (g)
	1573.2	72.9	84	138.9
Yellow Corn (0.50 cup)	303	3.9	61.6	7.8
barbeque chicken breast				
Chicken Breast Meat and Skin (Broilers or Fryers) (1.00 breast, bone removed)	249	13.4	0	30.2
Barbeque Sauce (Low Sodium, Canned) (0.14 cup)	26.6	0.6	4.5	0.6
Beef Steak (0.92 medium steak (yield after cooking, bone removed))	471.3	28.1	0	51.0
Hominy (White, Canned) (0.44 cup)	52.8	0.6	10.4	1.1
Ketchup (2.00 tbsp)	30	0.1	7.5	0.5
Beef Steak (0.86 medium steak (yield after cooking, bone removed))	440.5	26.2	0	47.7

+ Add Food

Delete this photo

Use Examples of Labor Markets: PlateMate



Use Examples of Labor Markets: VizWiz

"VizWiz: Nearly Real-time Answers to Visual Questions"

Jeffrey P. Bigham, Chandrika Jayant, Hanjie Ji, Greg Little, Andrew Miller, Robert C. Miller, Robin Miller, Aubrey Tatarowicz, Brandyn White, Samual White, Tom Yeh

UIST 2010

Use Examples of Labor Markets: VizWiz

What color is this pillow?

(89s) I can't tell.
(105s) multiple shades of soft green, blue and gold

What denomination is this bill?

(24s) 20
(29s) 20

Do you see picnic tables across the parking lot?

(13s) no
(46s) no

What temperature is my oven set to?

(69s) it looks like 425 degrees but the image is difficult to see.
(84s) 400
(122s) 450

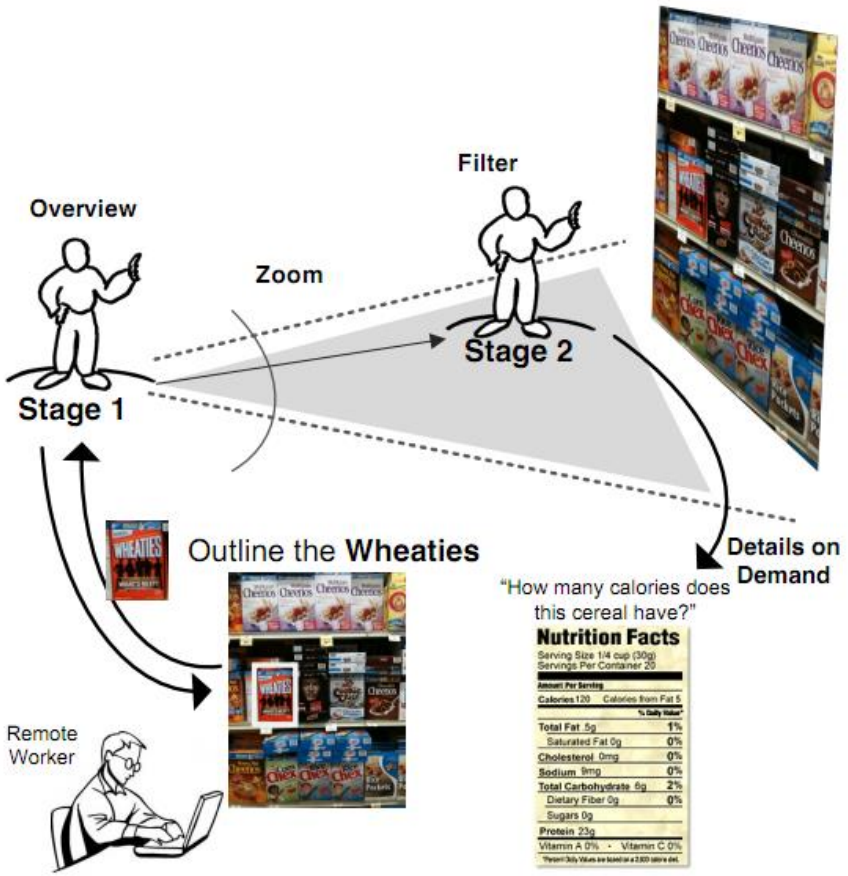
Can you please tell me what this can is?

(183s) chickpeas.
(514s) beans
(552s) Goya Beans

What kind of drink does this can hold?

(91s) Energy
(99s) no can in the picture
(247s) energy drink

Use Examples of Labor Markets: VizWiz



Use Examples of Labor Markets: Adreneline

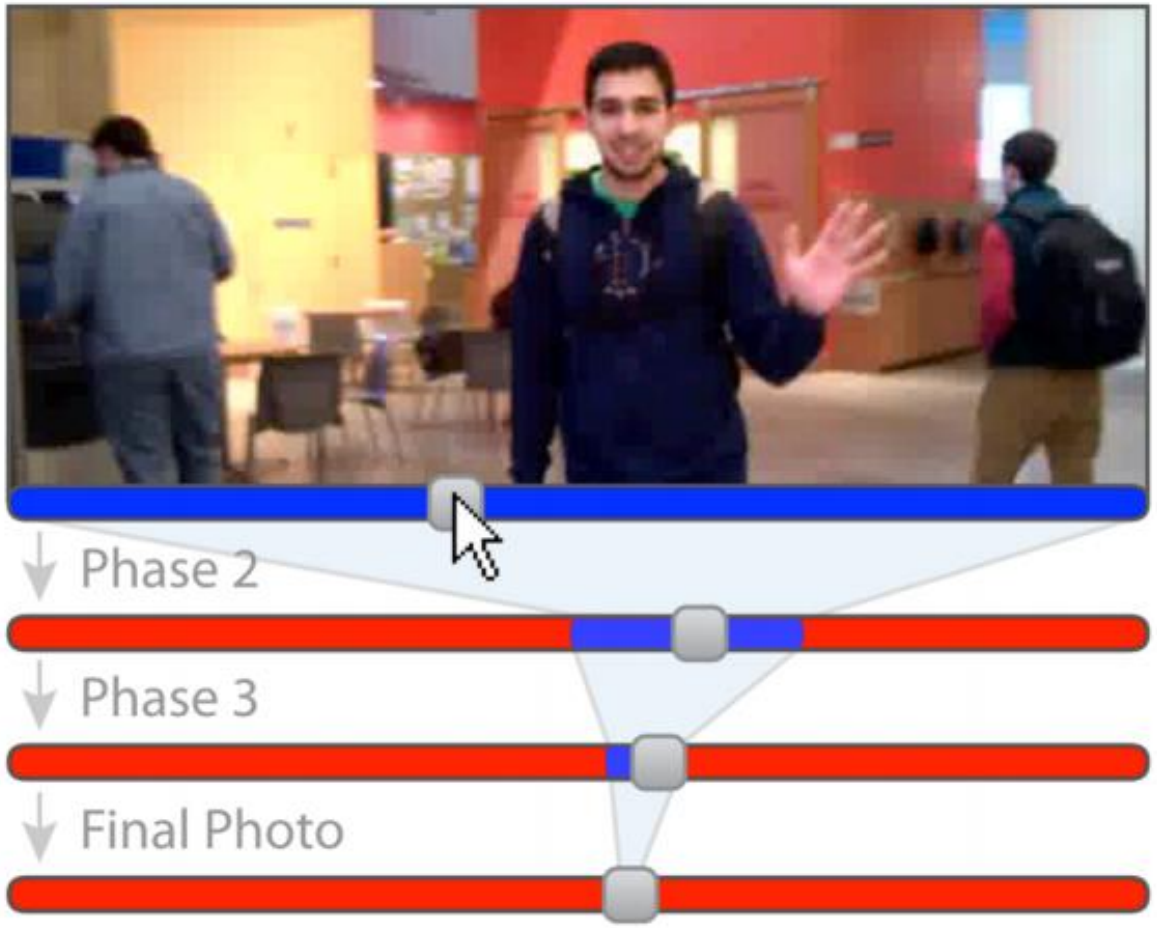
"Crowds in Two Seconds: Enabling Realtime Crowd-Powered Interfaces"

Michael S. Bernstein, Joel Brandt, Robert C. Miller, and David R. Karger

UIST 2011

Use Examples of Labor Markets: Adreneline

Use Examples of Labor Markets: Adreneline



Use Examples of Labor Markets: Behavioral Graph Theory

Behavioral Dynamics and Influence in Networked Coloring and Consensus

Stephen Judd, Michael Kearns, and Yevgeniy Vorobeychik

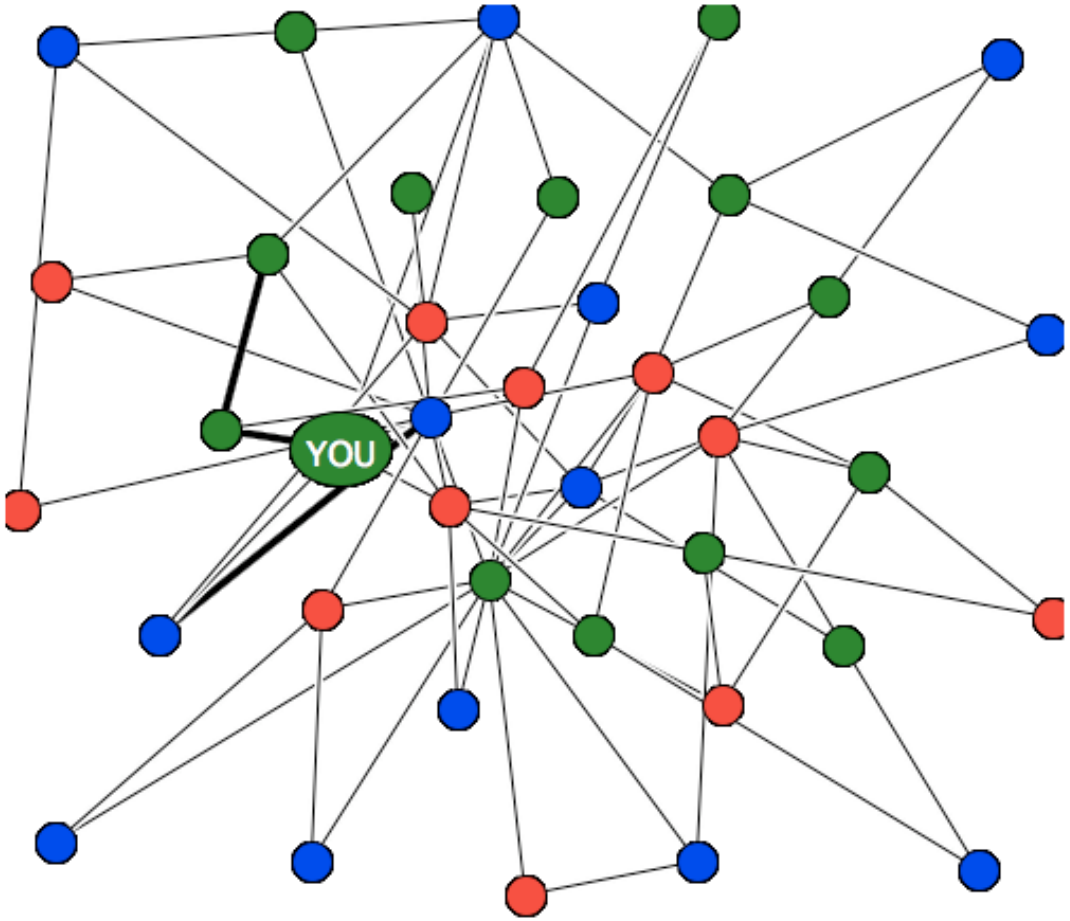
Proc Natl Acad Sci 24 Aug 2010; 107(34): 14978-14982

Behavioral Dynamics and Influence in Networked Coloring and Consensus

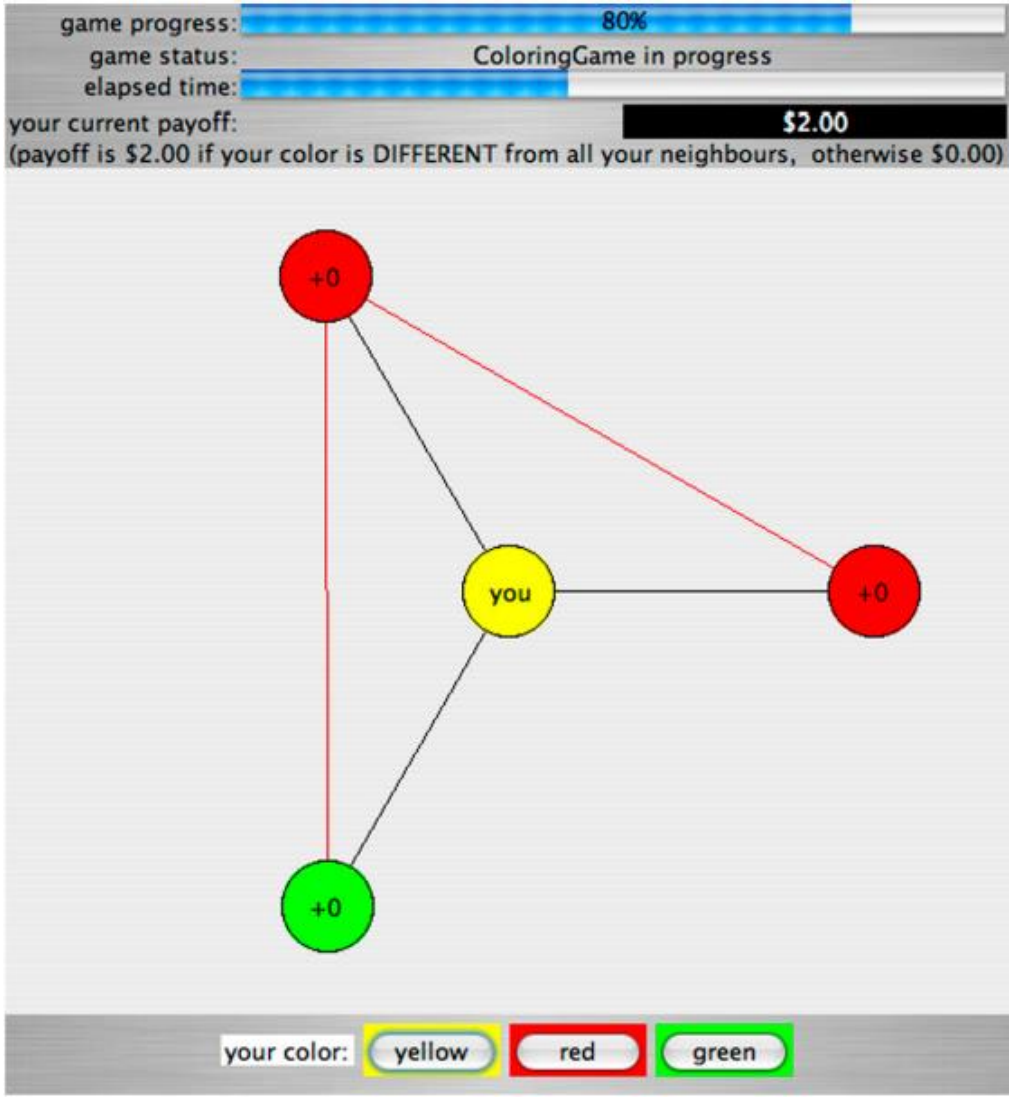
Stephen Judd, Michael Kearns, and Yevgeniy Vorobeychik

Proc Natl Acad Sci 24 Aug 2010; 107(34): 14978-14982

A Stylized Social Network



What You Actually See

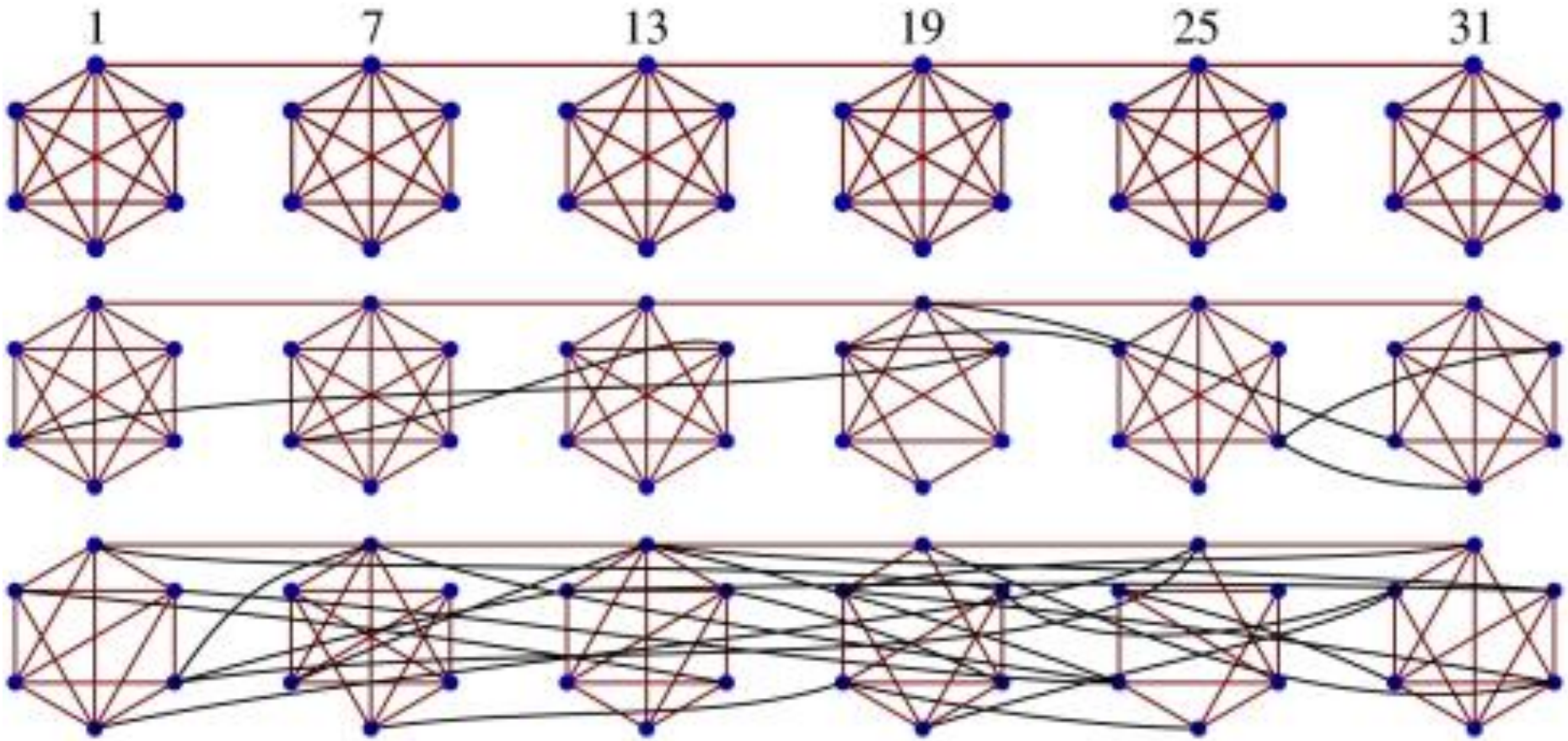


Behavioral Graph Theory Experiments

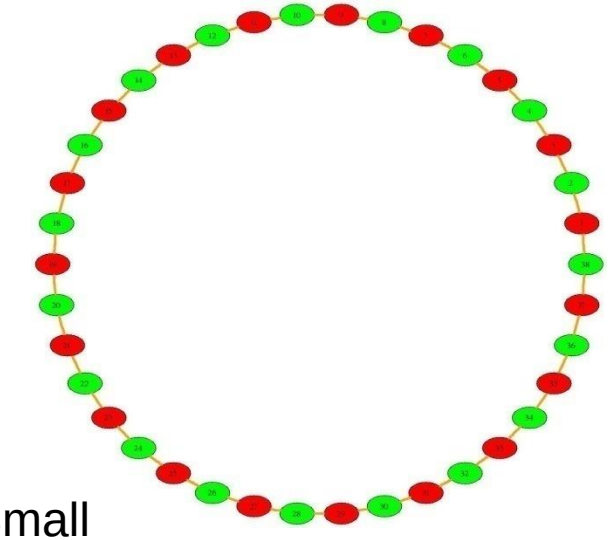
- Create a graph

Behavioral Graph Theory Experiments

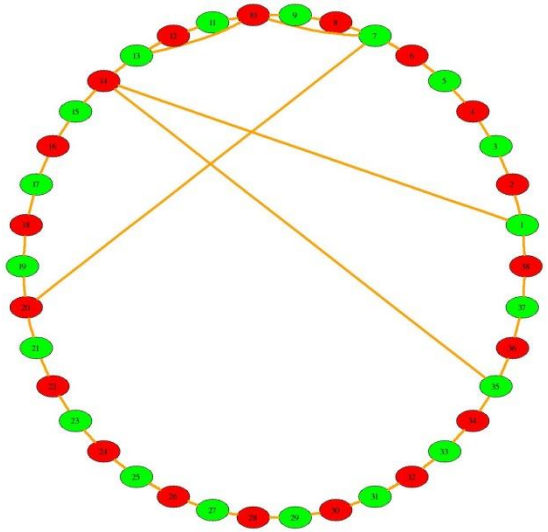
- Create a graph (with 36 nodes)


1
7
13
19
25
31

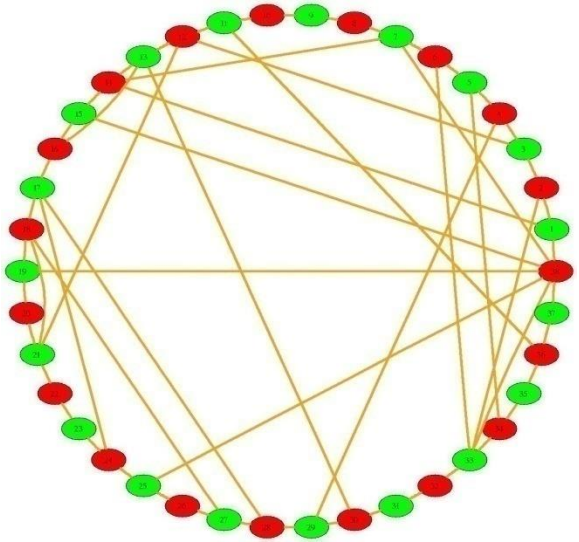
Small Worlds Family



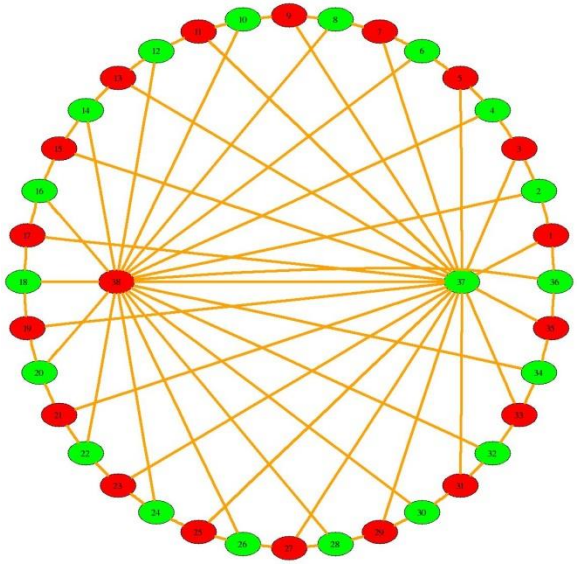
Simple Cycle



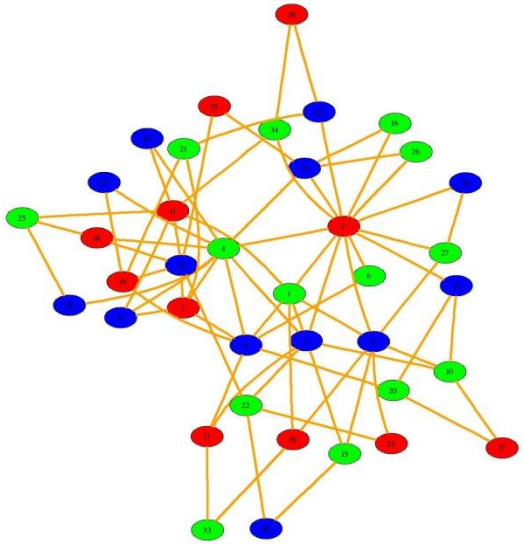
5-Chord Cycle



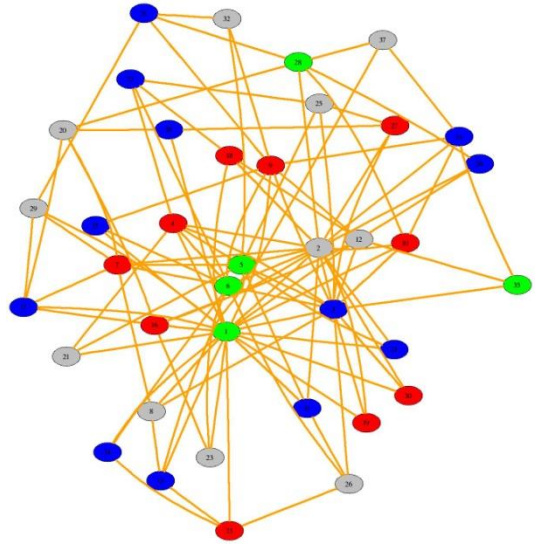
20-Chord Cycle



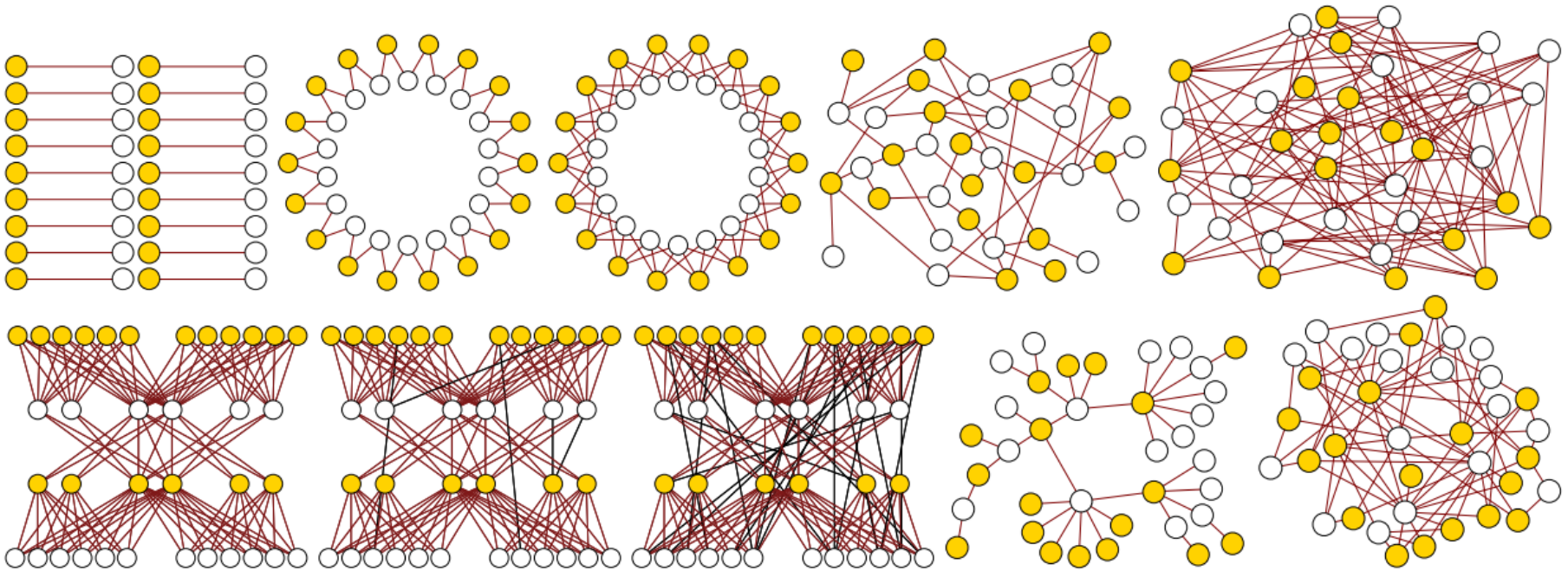
Leader Cycle



Preferential Attachment, $\nu = 2$



Preferential Attachment, $\nu = 3$



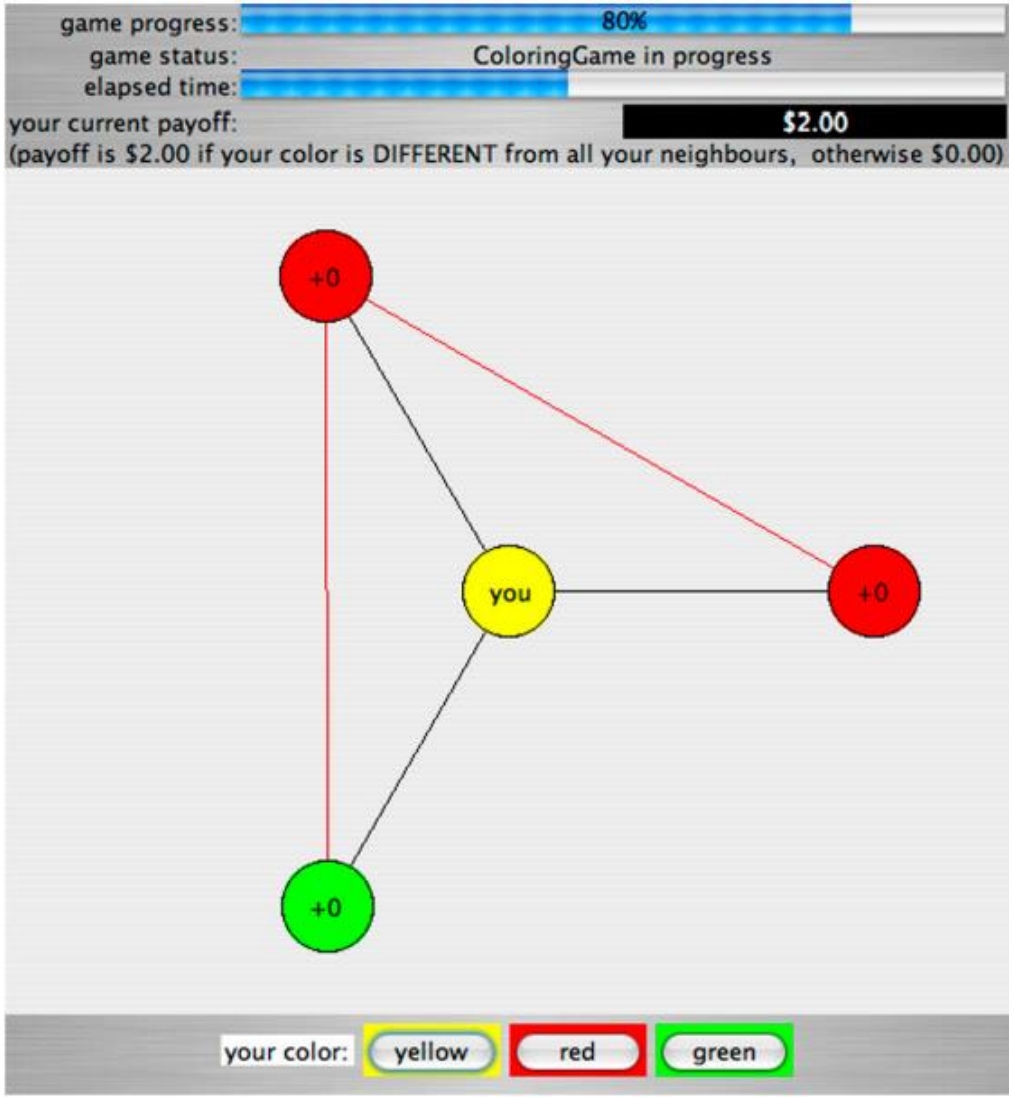
Behavioral Graph Theory Experiments

- Create a graph (with 36 nodes)

Behavioral Graph Theory Experiments

- Create a graph (with 36 nodes)
- Assign a person to each node
  - Each person can only sees his or her neighbors, not the full graph

What You Actually See

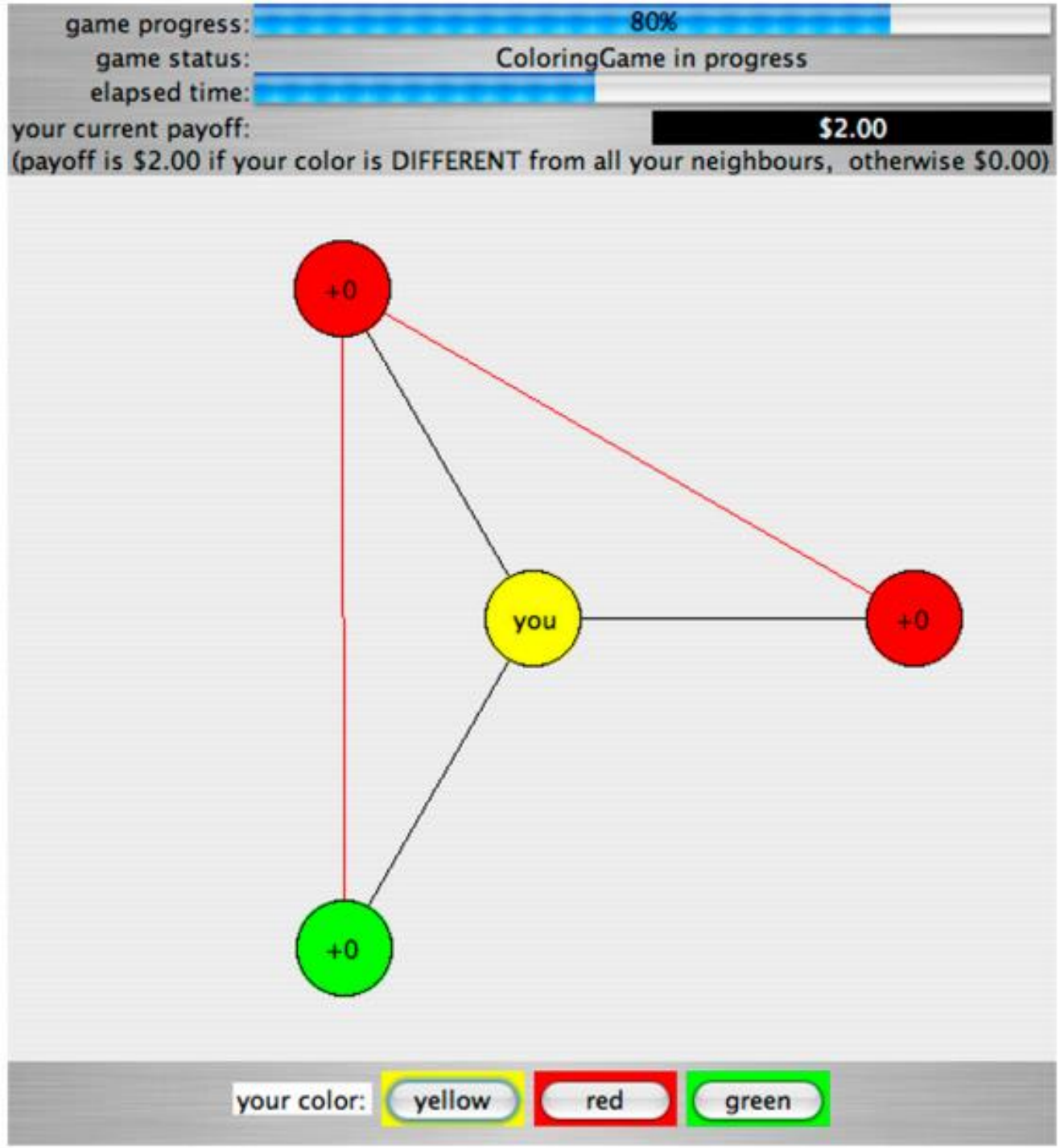


Behavioral Graph Theory Experiments

- Create a graph (with 36 nodes)
- Assign a person to each node
  - Each person can only sees his or her neighbors, not the full graph

Behavioral Graph Theory Experiments

- Create a graph (with 36 nodes)
- Assign a person to each node
  - Each person can only sees his or her neighbors, not the full graph
- Allow people to change the color of their nodes – changes are propagated to the neighbors


game progress:
80%
game status:
ColoringGame in progress
elapsed time:
your current payoff:
$2.00
(payoff is $2.00 if your color is DIFFERENT from all your neighbours, otherwise $0.00)
+0
you
+0
+0
your color:
yellow
red
green

Behavioral Graph Theory Experiments

- Create a graph (with 36 nodes)
- Assign a person to each node
  - Each person can only sees his or her neighbors, not the full graph
- Allow people to change the color of their nodes – changes are propagated to the neighbors

Behavioral Graph Theory Experiments

- Create a graph (with 36 nodes)
- Assign a person to each node
  - Each person can only sees his or her neighbors, not the full graph
- Allow people to change the color of their nodes – changes are propagated to the neighbors
- Pay everyone money if they achieve some collective result in a given period of time

Pay Everyone Money

- Consensus:
  - Each subject gets $2 if everyone selects the same color within 3 minutes
  - Easy to compute
- Coloring:
  - Each subject gets $2 if for entire graph no two neighbors share a color
  - (NP) Hard to compute
- 3 minutes per game

Other Papers

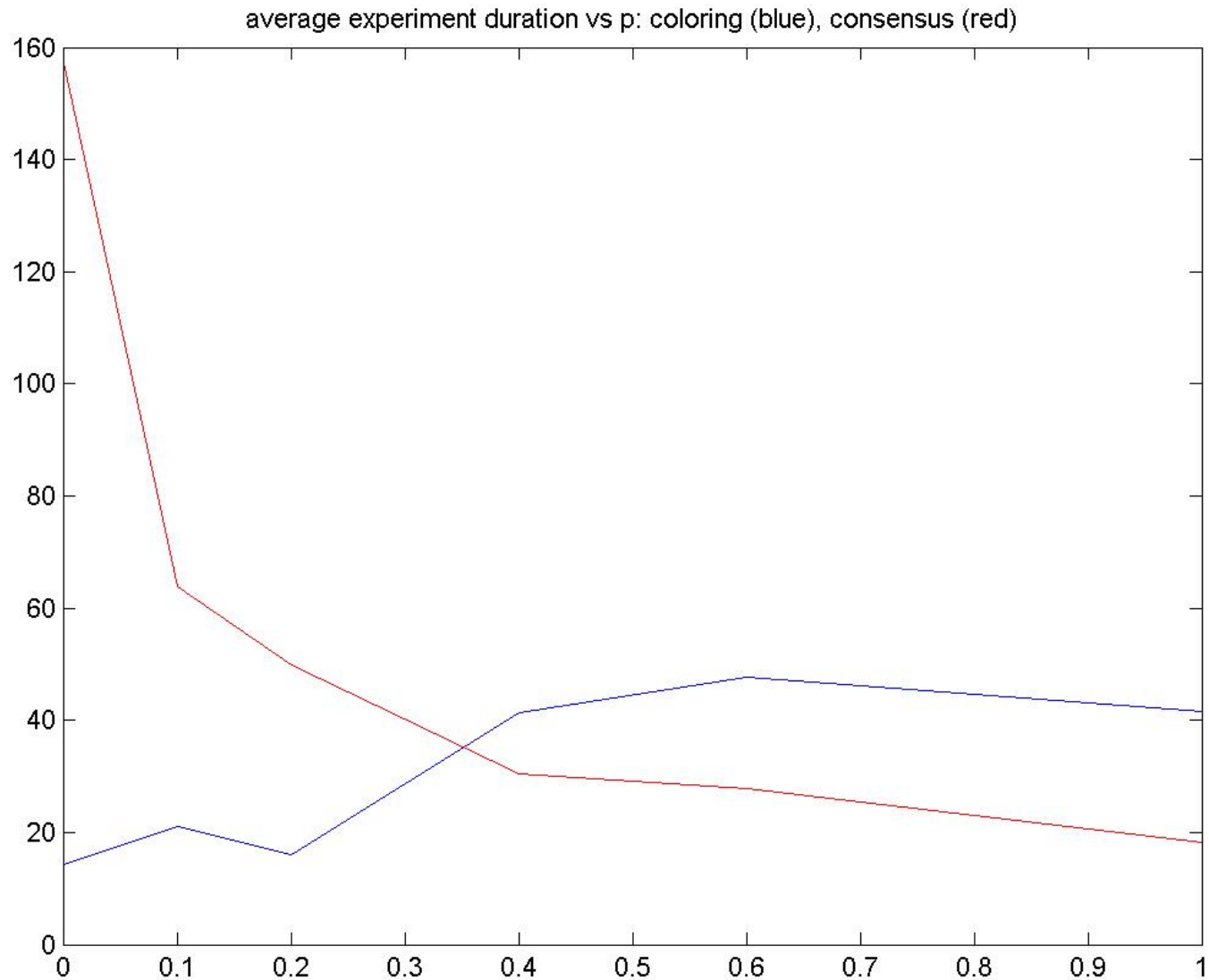
- King / Pawn
  - $1 per minute for being a King with no neighboring King (“Lone King”)
  - $0.50 per minute for being a Pawn
  - $0 per minute for being a King with a neighboring King (“Fighting King”)
  - Games last 2 minutes

Other Papers

- Biased voting
  (the “Primary Problem”)
  - Most: $1.50 blue $0.50 red (varied)
  - Minority: $1.50 red $0.50 blue (varied)

Finding 1:

- Greater connectivity makes consensus easier, coloring harder


average experiment duration vs p: coloring (blue), consensus (red)
160
140
120
100
80
60
40
20
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Finding 1:

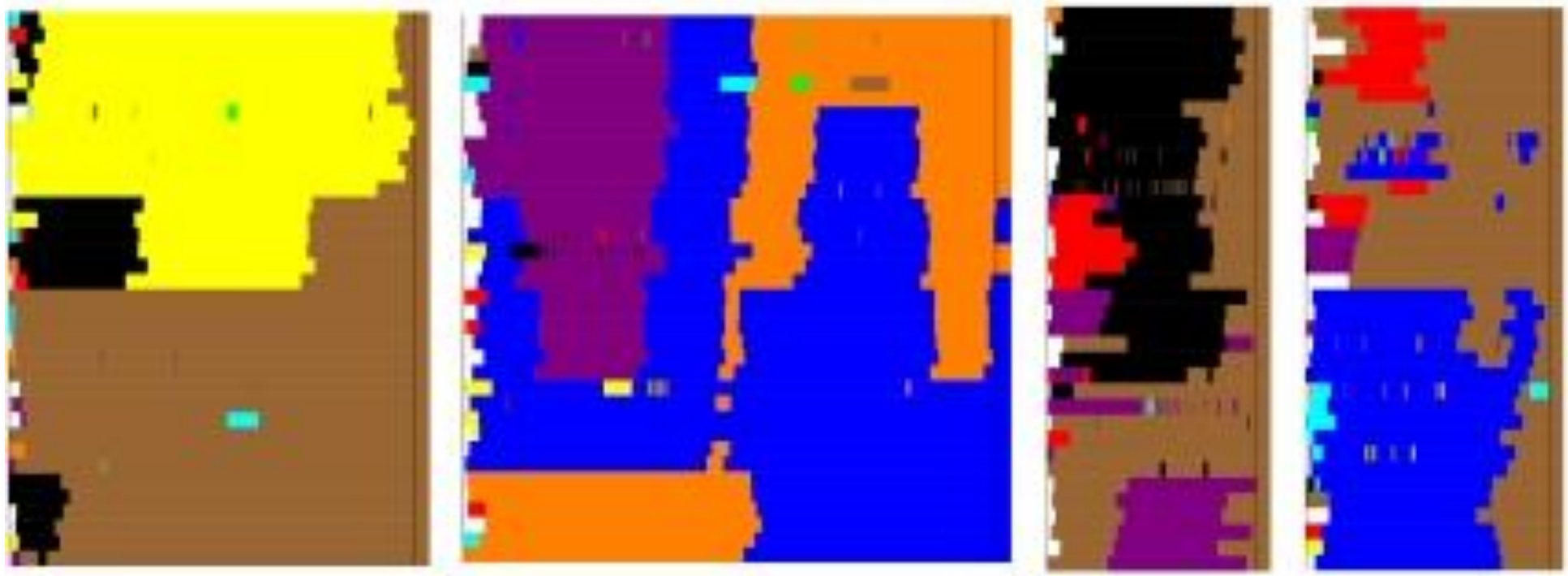
- Greater connectivity makes consensus easier, coloring harder

Finding 1:

- Greater connectivity makes consensus easier, coloring harder
- Implies that *task* interacts with graph structure

Finding 2:

- What is the impact of individual behavior on global outcomes?



Finding 2:

- What is the impact of individual behavior on global outcomes?

Finding 2:

- What is the impact of individual behavior on global outcomes?
- “Influence”:
  - Neighborhood influence: higher if your neighbors changed colors to the color you’ve selected
  - Outcome influence: how much time before convergence did you select your final color

Finding 2:

- Frequent changing and stubbornness both negatively correlate with influence and convergence time

Finding 2:

- Frequent changing and stubbornness both negatively correlate with influence and convergence time
- Many graph structures not correlated with influence

Finding 2:

- Frequent changing and stubbornness both negatively correlate with influence and convergence time
- Many graph structures not correlated with influence

- Implies that it is necessary to consider individual behavioral traits

Course Project: Milestones

1.	Fr 3/18:	Initial proposal ideas	(nothing to submit in CMS)
2.	Tu 3/22:	Comments on classmates' ideas	(nothing to submit in CMS)
		Submit as follow-ups, not as replies to others' follow-ups	
3.	Th 3/24:	Revise your ideas	(nothing to submit in CMS)
4.	Th 4/7:	Project proposal	**(submit using CMS)**
5.	Th 4/21:	Status report 1	(submit to TA)
6.	Th 5/5:	Status report 2	(submit to TA)
7.	Tu 5/17:	Project report (group)	**(submit using CMS)**
		Project report (individual)	**(submit using CMS)**

Revised handout on website