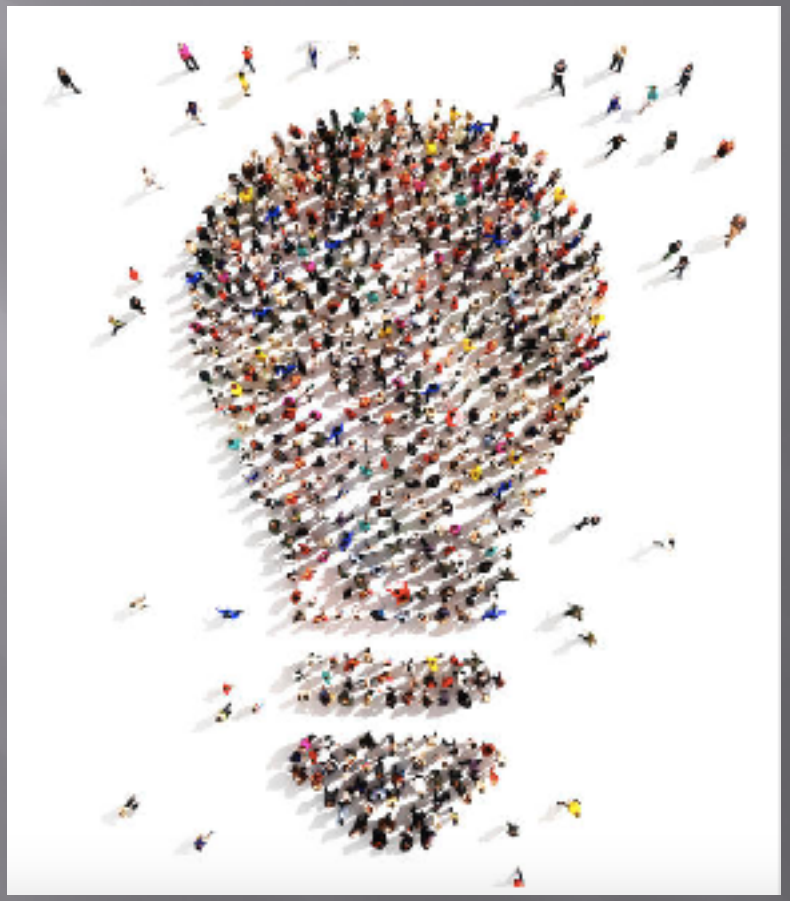


SWARM INTELLIGENCE

SWARM INTELLIGENCE

Tonight's perspective:

1. Robots

2. Humans

ROBOTIC SWARMS

Four characteristics

1: Group(s) of homogeneous, autonomous individuals

2: No leader (decentralized control)

3: No individual member has enough "intelligence" to solve the problem

4: All individual members interacts locally and with their environment (collective behavior)

ROBOTIC SWARMS

TED - 1000 minirobots creating shapes

https://www.ted.com/talks/radhika_nagpal_what_intelligent_machines_can_learn_from_a_school_of_fish?utm_source=newsletter_daily&utm_campaign=daily&utm_medium=email&utm_content=button__2017-09-21
3:11- 7:40

Facebook - series of experiments
https://www.youtube.com/watch?v=GIEhi_sAkU8
Tot: 2:24

SWARM INTELLIGENCE

Tonight's perspective:

1. Robots

2. Humans

SWARM INTELLIGENCE

It starts with the birds and the bees

SWARM INTELLIGENCE

. . . and with fish

SWARM INTELLIGENCE

. . . and with birds

SWARM INTELLIGENCE

. . . and with ants

SWARM INTELLIGENCE

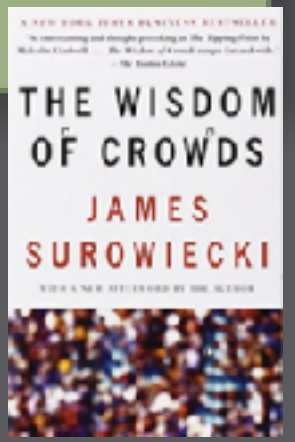
. . . but mostly with bees

SWARM INTELLIGENCE

Famous cases:

- the slaughter-weight of cattle (1906 Sir Francis Galton - UK statistician)

- the disappearance of the U.S. submarine "Scorpion" in the North Atlantic (1968)



Four characteristics

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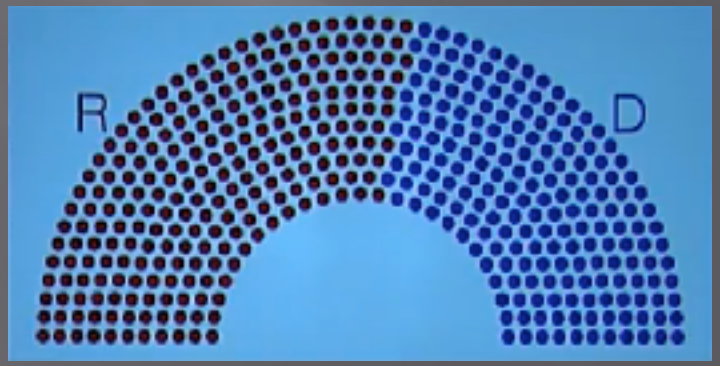
SWARM INTELLIGENCE

Louis Rosenberg -2012

THE UNU MODEL

. . . aggregates diverse perspectives in order to maximize wisdom

It does not use the functions of
- voting
- surveys
- polls
- focus groups



THE UNU MODEL

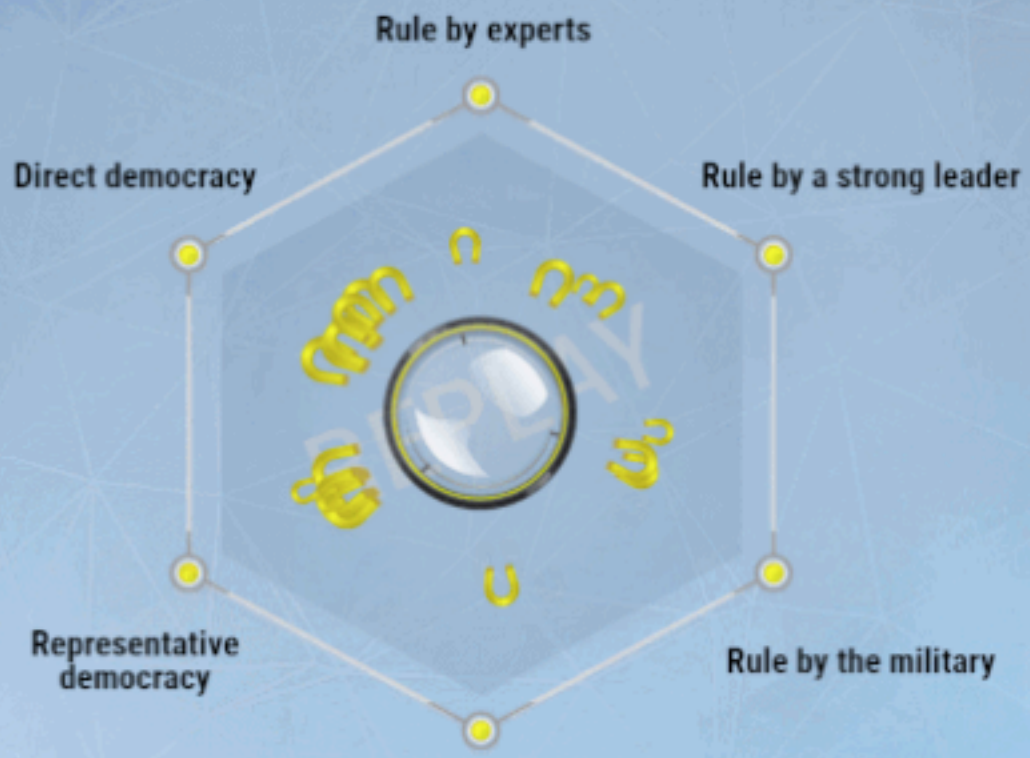
It is characterized by being . . .

- live (synchronous)
- interactive (closed loops)
- anonymous but transparent

SWARM INTELLIGENCE

Louis R 5:00 min > 15:50 min
https://www.youtube.com/watch?v=Eu-RyZt_Uas

Which is the BEST form of government of these?



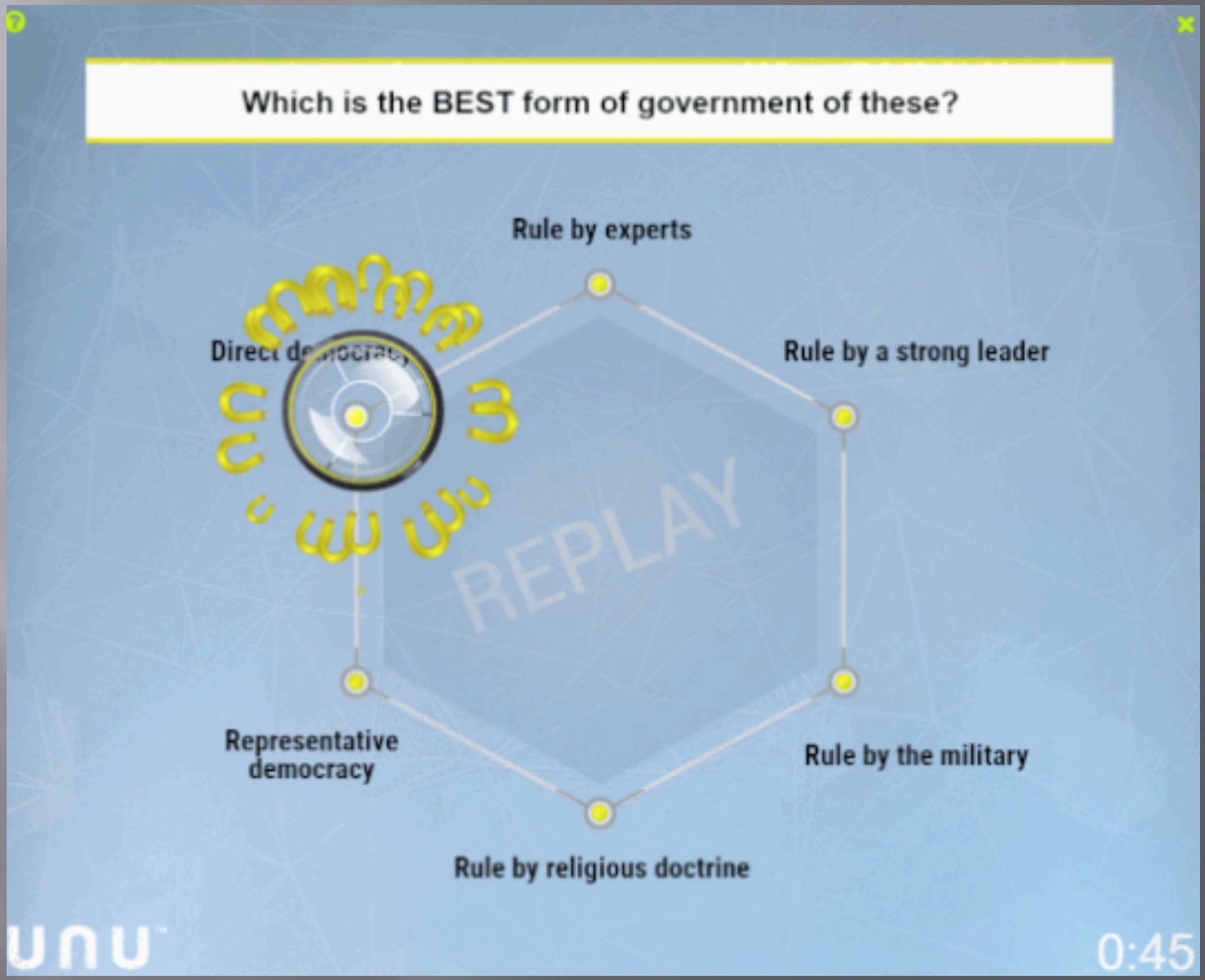
0:59

SWARM INTELLIGENCE

Best government:
https://i.imgur.com/pntlLIg.gif

Chart:
https://i.imgur.com/T46gkzL.png

Citizen governing:
https://i.imgur.com/PkKJOHZ.gif


Which is the BEST form of government of these?
Rule by experts
Direct democracy
Rule by a strong leader
REPLAY
Representative democracy
Rule by the military
Rule by religious doctrine
0:45

Which is the BEST form of government of these?
UNU SAYS:
Direct democracy
OF USERS
33
BRAINPOWER
81%
UNU

Impact of voting tech on democracy

UNANIMOUS A.I.

Question	Swarm's Answer	Swarm's brainpower
Worst form of government?	Rule by religious doctrine	80%
Best form of government?	Direct democracy	81%
Biggest advantage of online or app voting?	Increased voter turnout	81%
Biggest concern with online or app voting?	Tampering/hacking	81%
Do advantages of online/app voting outweigh disadvantages?	Yes (by a little)	82%
Online/app voting makes voter fraud?	More likely (by a lot)	75%
Online or app voting would lead to more/less compromise?	More compromise (low confidence)	83%
Elected representatives should consider constituent votes as?	A binding vote	70%
Which would lead to better decisions for a society	Citizens govern by app	76%
Communities governed by app would represent minority interests?	Adequately (low confidence)	71%
Odds that government entities could tie your vote to your ID?	80%	
Odds an outside group could tie your vote to your ID?	60%	

SWARM INTELLIGENCE

Areas of research:

- from data-points to processing
- factor analyses
- swarm size
- repeatability
- positional bias

SWARM INTELLIGENCE

Areas of research:

- from data-points to processing

Instead of averages, other statistical tests across the sample, ASI measures *whether* or not human data-processors are able to converge upon a unified solution within the allotted time (typically 60 seconds) - and *how* they do it

System measures the degree of conviction: The speed and degree of alignment among participants are expressed in CI (Conviction Index) from - 0 to 1

SWARM INTELLIGENCE

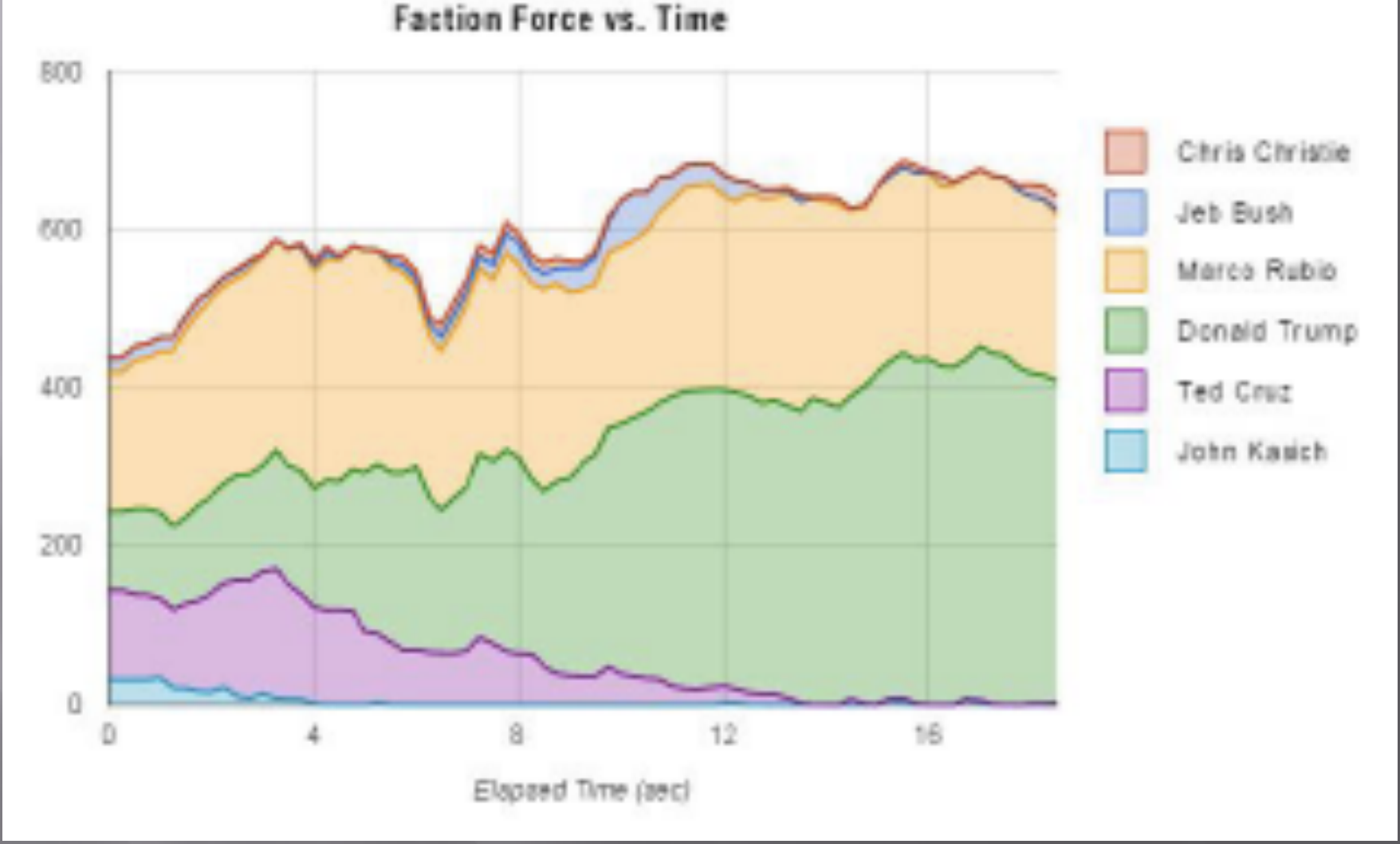
Areas of research:

- factor analyses (brain scan)

System analyzes *how* the competing alternative solutions were considered by the participants

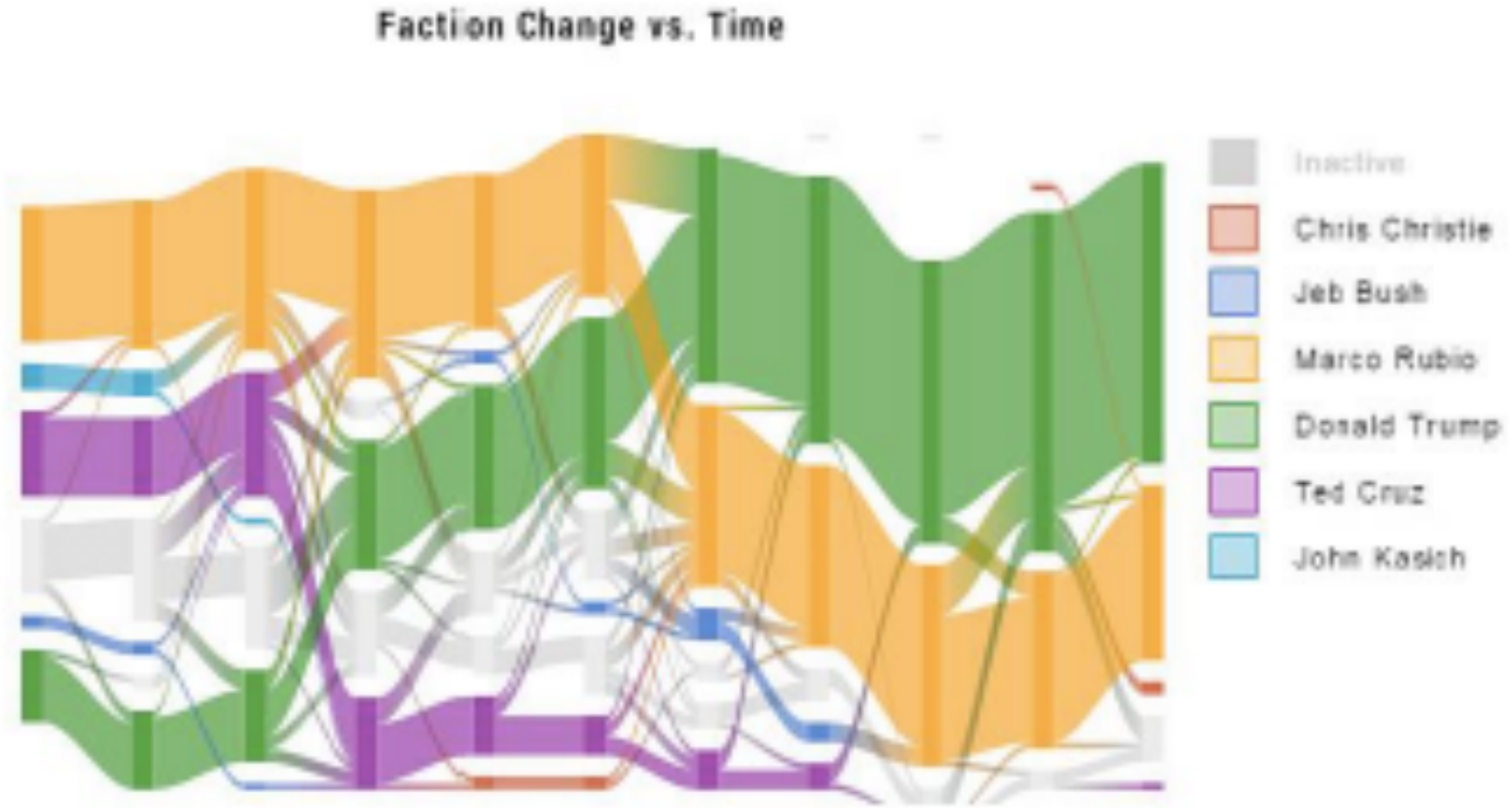
Swarm: 82 likely Republican voters

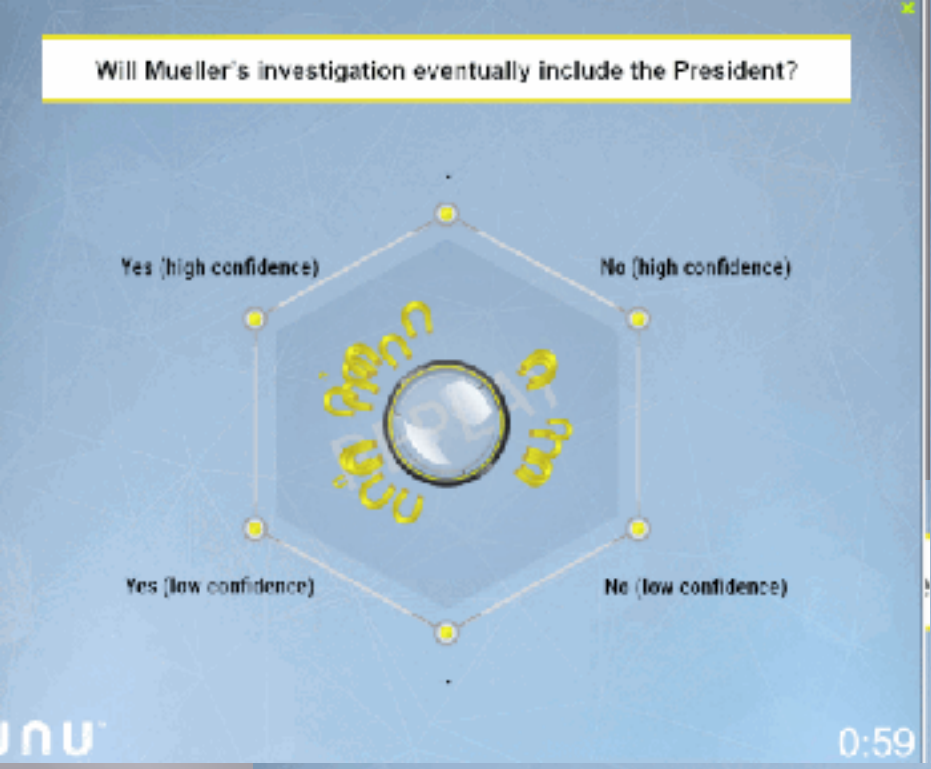
Convergence process

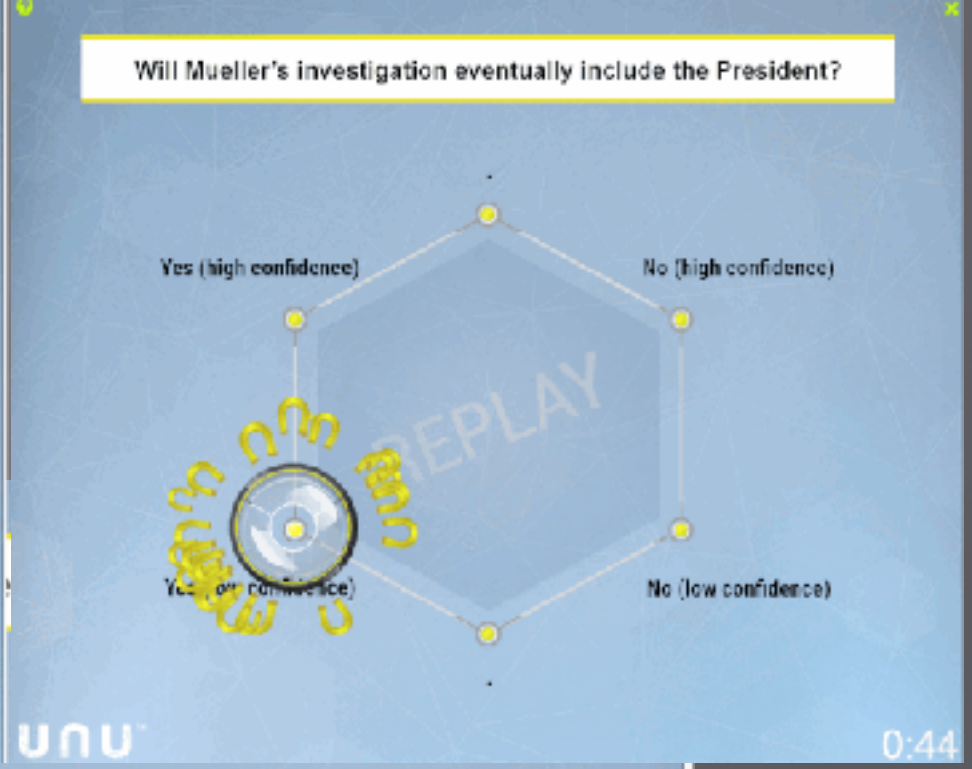


Confidence Index: 0.72 - Deliberation time: 22 sec

Deliberation proces: When and how did changes occur

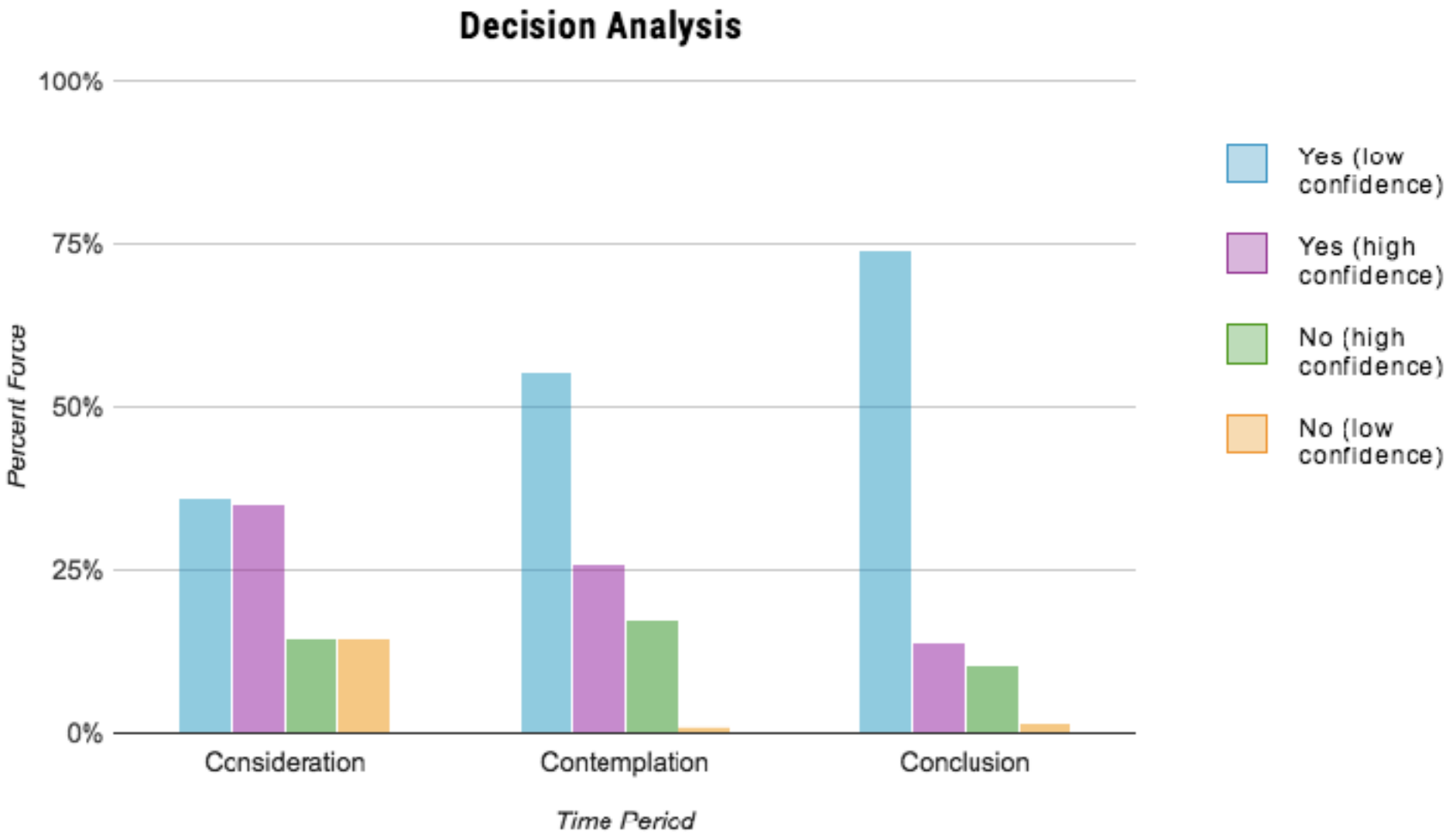


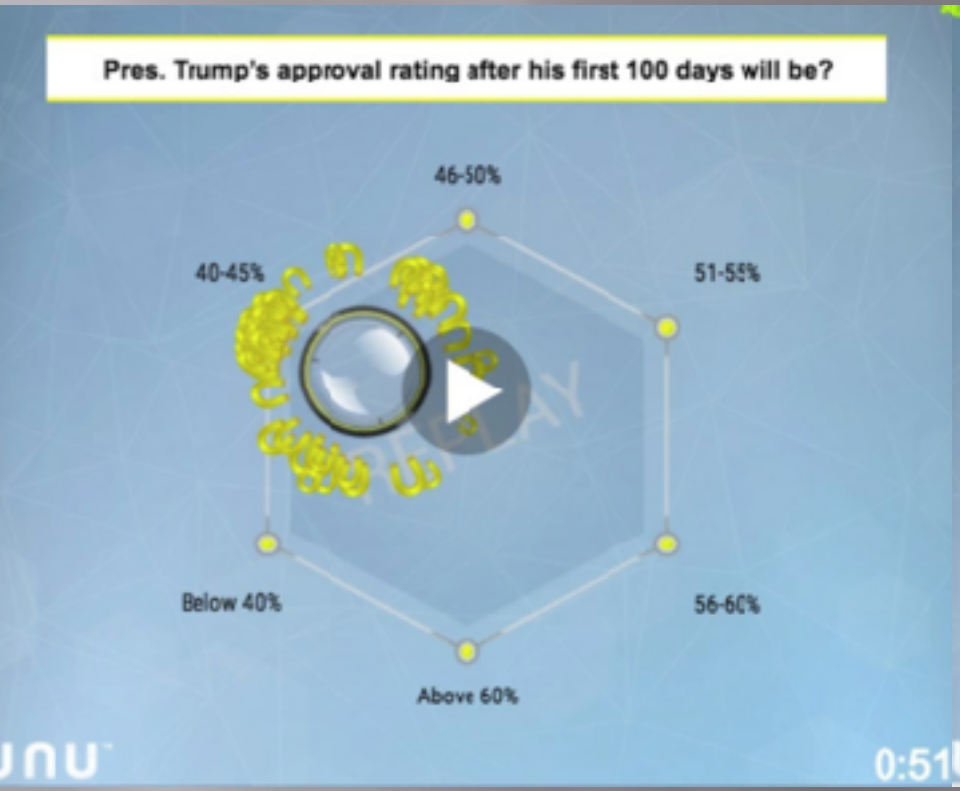

Will Mueller's investigation eventually include the President?
Yes (high confidence)
No (high confidence)
Yes (low confidence)
No (low confidence)
0:59


Will Mueller's investigation eventually include the President?
Yes (high confidence)
No (high confidence)
No (low confidence)
0:44

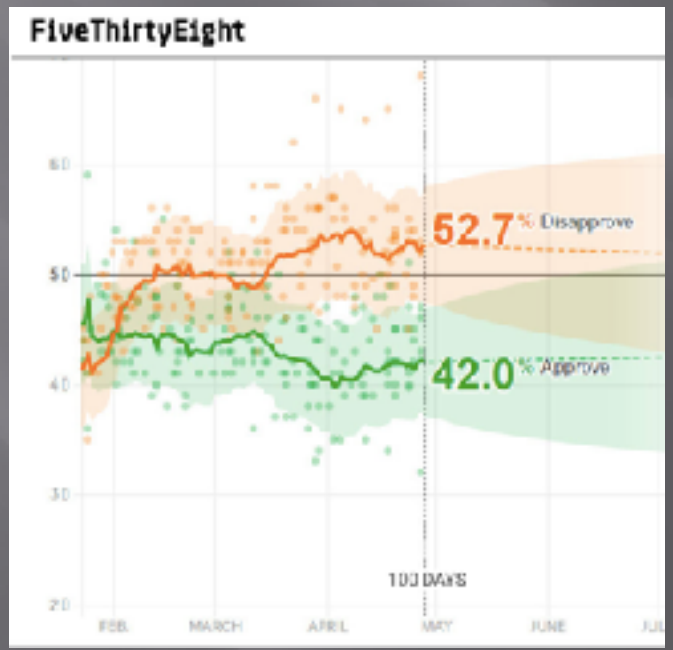
UNU SAYS:
Yes (low confidence)
OF USERS
31
BRAINPOWER
77%

Will Mueller's investigation eventually include the President?




Pres. Trump's approval rating after his first 100 days will be?
46-50%
40-45%
51-55%
Below 40%
56-60%
Above 60%
0:51

Pres. Trump's approval rating after his first 100 Days will be?
42.05
35
50
0:50


FiveThirtyEight
52.7% Disapprove
42.0% Approve
100 DAYS
FEB.
MARCH
APRIL
MAY
JUNE

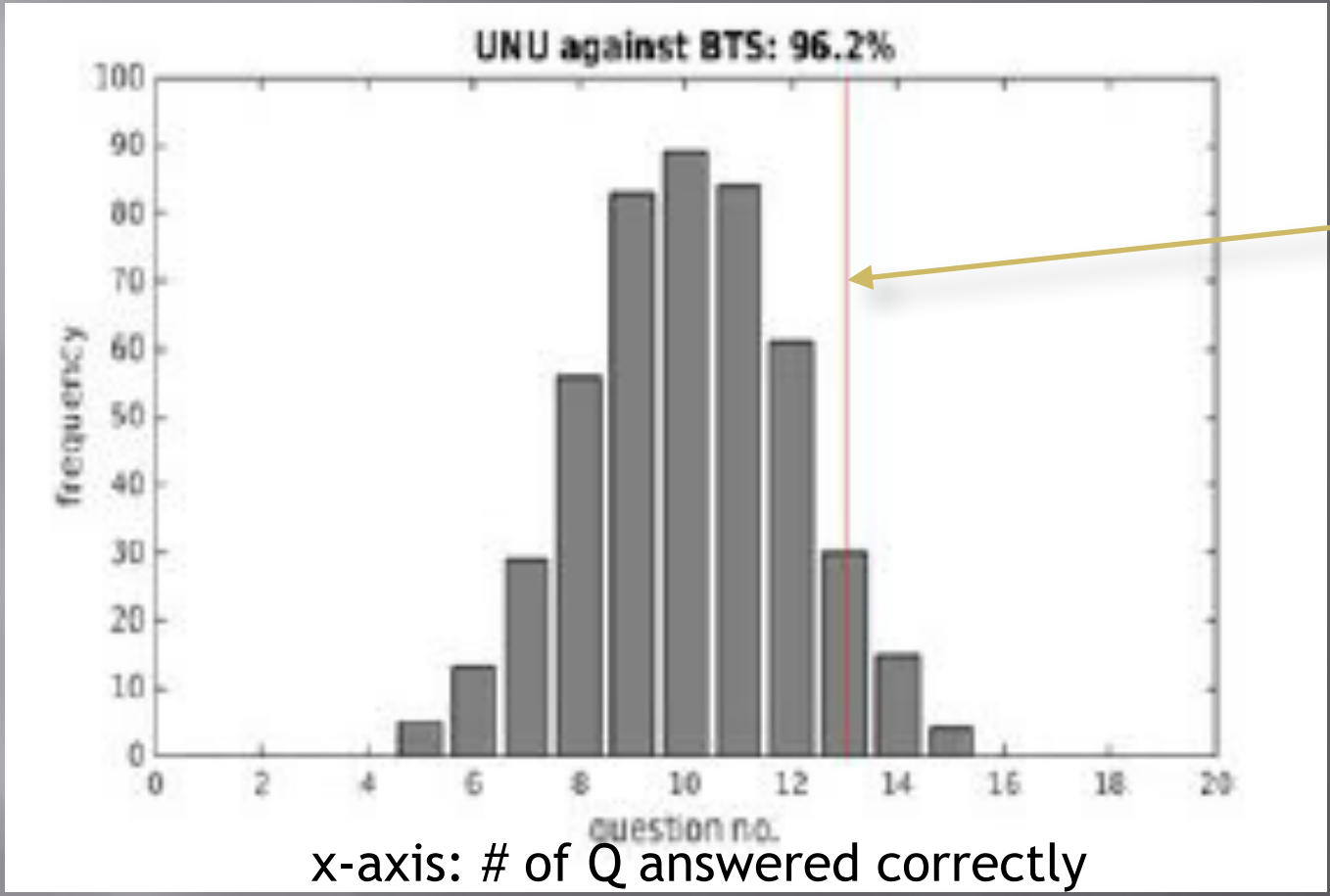
SWARM INTELLIGENCE

Areas of research:

- swarm size

What is the right size of a swarm?
In bees, of a hive of 10,000 members, a swarm of 200-400 scouts are used to locate a home (2-4%)

In humans: study (Univ. of Cambridge) of of polls of 469 vs. swarm of 29 football fans were asked to pick the winner of Super Bowl 2016



x-axis: # of Q answered correctly

Swarm outperformed the 16-times larger poll by 2 standard deviations (99%)

SWARM INTELLIGENCE

Areas of research:

- repeatability

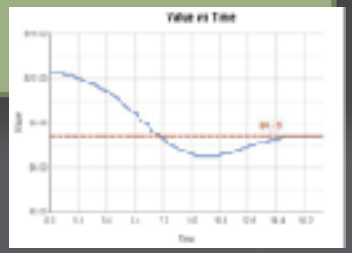
a) results of swarm over a *period of time*

Oxford Univ: Premier Soccer League over 5 weeks, 10 matches

Swarms 113% better performance than individuals

b) results of 20 swarms of *different participants* (answering the *same* question: fair price of a movie ticket)

They all clustered within 10% around the median



SWARM INTELLIGENCE

Areas of research:

- positional bias

No effect of how alternatives were located in the hexagon

THE UNU MODEL

. . . BIF has an invitation to participate in a live swarm on a subject of our choice

Thank You!