


Fram Signature Lecture Series Featuring Dr. Cailin O'Connor

Thinking Critically About Pandemic Misinformation

RIT | Eugene H. Fram Chair in
Applied Critical Thinking

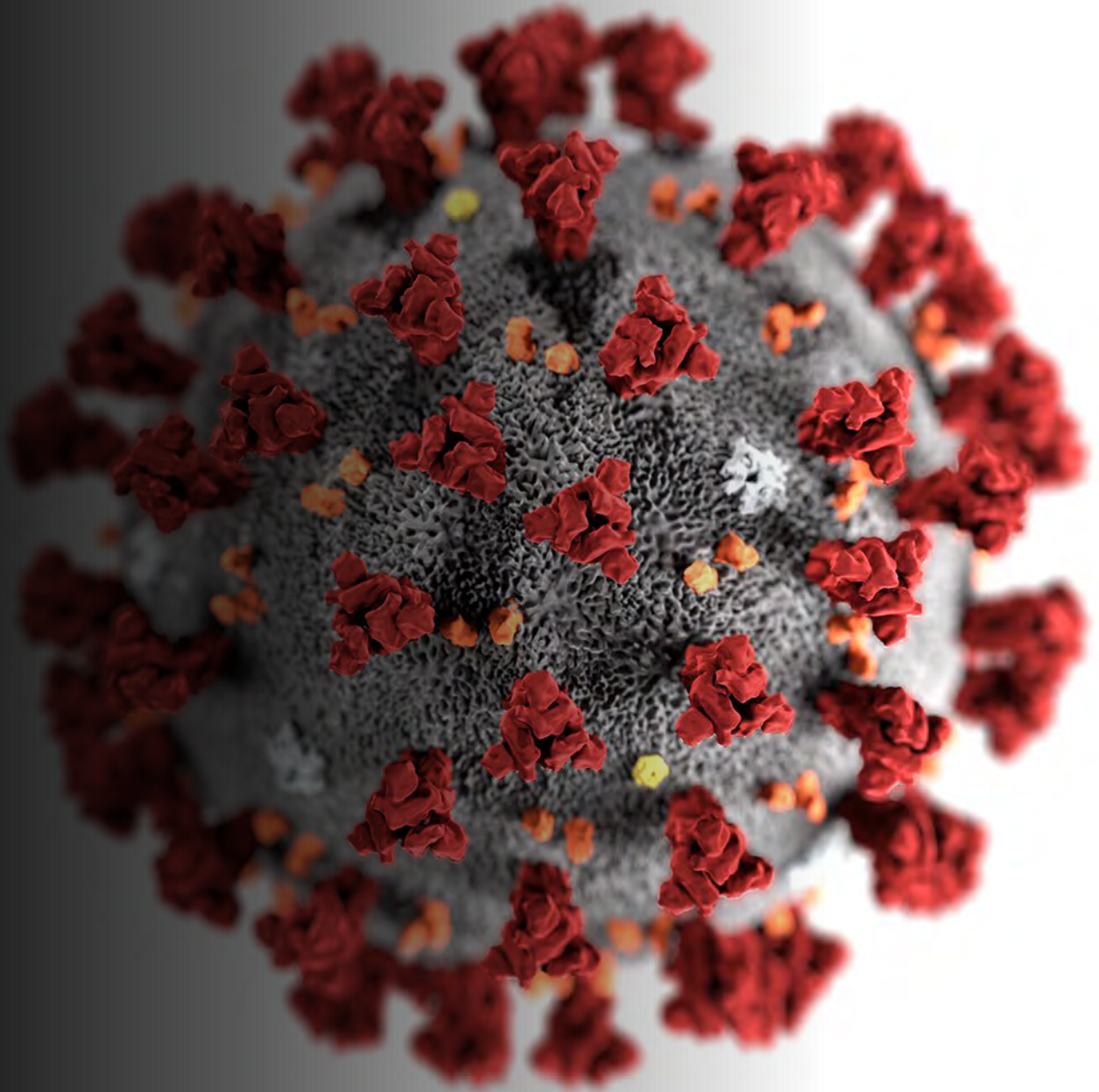
RIT | College of
Science

September 27, 2022



Thinking Critically About Pandemic Misinformation

Cailin O'Connor
Logic and Philosophy of Science
University of California, Irvine



THE MISINFORMATION AGE



How False Beliefs Spread

CAILIN O'CONNOR AND JAMES OWEN WEATHERALL

Modeling False Beliefs



- In my 2019 book with James Weatherall, *The Misinformation Age*, we use historical cases, mathematical models, and simulations to study the propagation and spread of false belief.
- We study the endogenous and exogenous drivers of false belief and polarization.

Endogenous factors:

- Trust & homophily
- Conformity

Exogenous factors:

- Industrial propaganda
- Media practices

The Infodemic

BY THE DEPARTMENT OF GLOBAL COMMUNICATIONS

UN tackles 'infodemic' of misinformation and cybercrime in COVID-19 crisis

31 March 2020 — From selling fake coronavirus cures online to a cyberattack on hospitals' critical information systems, criminals are exploiting the COVID-19 crisis, the United Nations has warned, as it also steps up its fight against a proliferation of false information about the virus.

 **Guterres** 
@ioguterres · [Follow](#)



About the author

Department of Global Communications

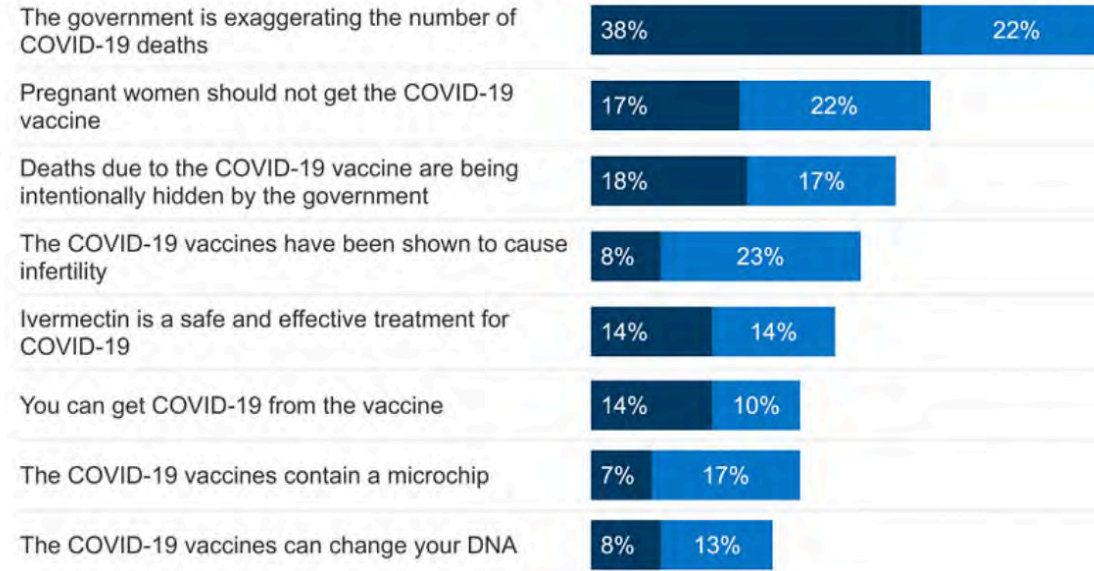
The United Nations Department of Global Communications (DGC) promotes global awareness and understanding of the work of the United Nations.

The Infodemic

Nearly Eight In Ten Believe Or Are Unsure About At Least One Common Falsehood About COVID-19 Or The Vaccine

Have you heard anyone say or have you read anywhere that...? IF YES: To the best of your knowledge is that true or false, or do you not know whether it is true or false?

■ Have heard, believe to be true ■ Have heard, don't know if true ■ NET



NET who have heard at least one of these myths, and either say it is true or are not sure if it is true 78%

NOTE: See topline for full question wording.
SOURCE: KFF COVID-19 Vaccine Monitor (October 14-24, 2021)

KFF COVID-19
Vaccine Monitor

Critical Thinking in an Infodemic



We all would like to form good beliefs. They help us navigate the world.



But how do we separate good information from bad?



One thing that can help?
Learning more about how
misinformation works.



The Usual Suspects

Misinformation

- Content that is readily refuted at the time of production.
- Unfounded rumors, speculation, and (often) conspiracy theories.
- Errors, especially propagated by social transmission.

Disinformation

- Content intentionally designed to mislead or manipulate.
- Sometimes intended to control public belief.
- Sometimes intended to create affective polarization.

PLANDEMIC

Fact check: Will holding your breath for 10 seconds reveal if you have coronavirus?

Devon Link USA TODAY

Published 1:42 p.m. ET Mar. 28, 2020 | Updated 10:24 p.m.



Two men in Georgia drank disinfectants in efforts to prevent COVID-19, officials say

By David Mervin & Christopher M. Smith

Last 100...

344,722

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NEWS

Hundreds dead in Iran after drinking pure alcohol as coronavirus 'cure'

By Lori D. Berman

April 8, 2020 | 1:12pm | [Update](#)

Iran-Linked Group Caught Spreading COVID-19 'Disinformation' On Facebook And Instagram



Facebook group: [Iranian Coronavirus](#)

10 members

Members: [View members](#) | [Join group](#) | [Post](#) | [Add to favorites](#) | [Report group](#)



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Conspiracy theorists are burning 5G towers, claiming they are linked to coronavirus



A technician is apparently working on a 5G tower in North Carolina. (AP Photo/Chris Wedel)

Introduction

What plans to launch 5G networks and to reduce the risk of coronavirus.

The 5G network is being built in the US. Some people are thinking.

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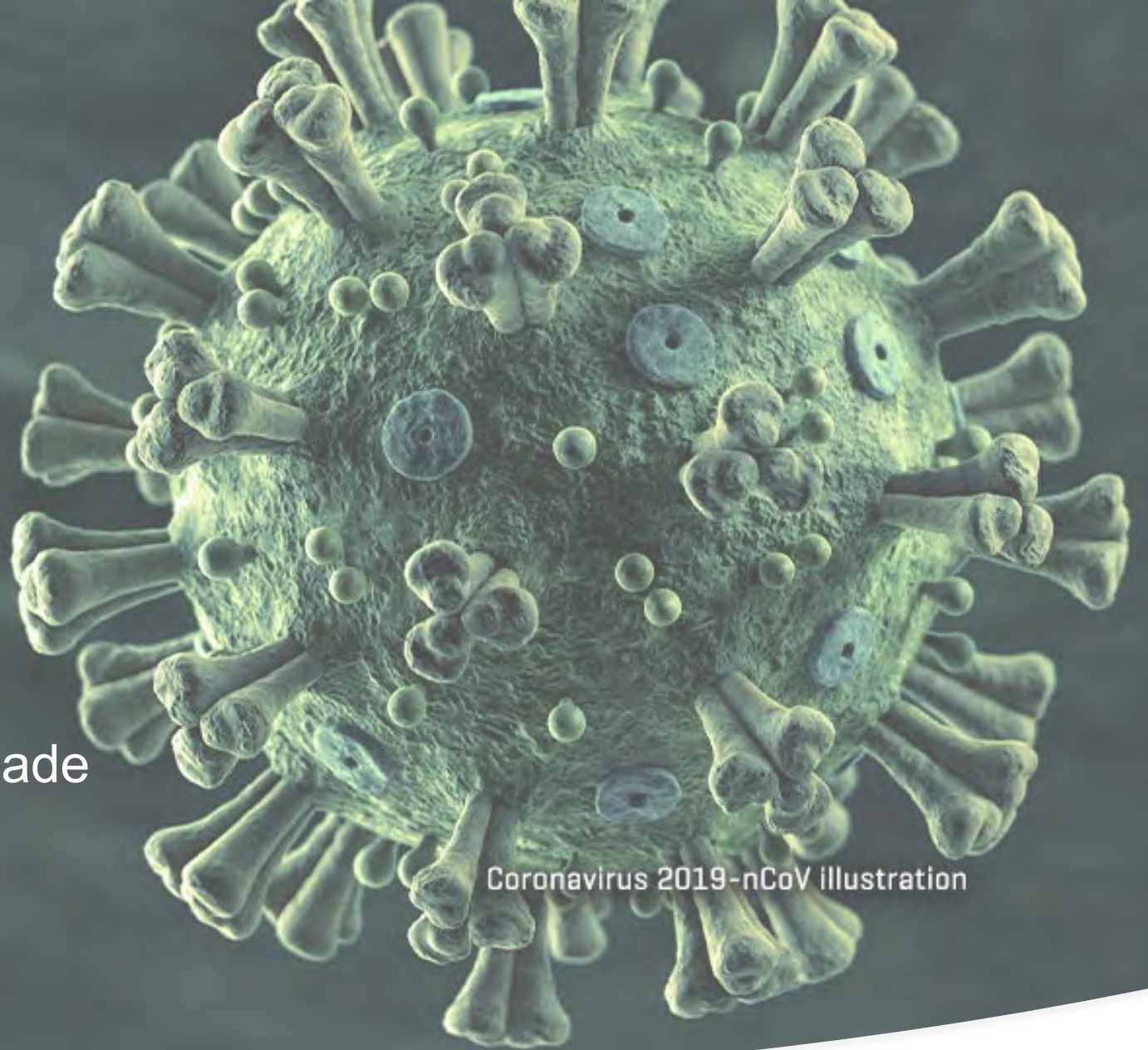
5G network is being built in the US. Some people are thinking.

5G network is being built in the US. Some people are thinking.

We wish to highlight some other, less discussed types and sources of misinformation.

These are not strictly *new* types of misinformation—they are always there.

But the unique scientific, cultural, and political context of the pandemic has made them especially salient.



Coronavirus 2019-nCoV illustration



For Today

We'll focus on two topics:

- 1) Information Zombies
- 2) Belief Factions

Withdrawn

[View current version of this article](#)

Uncanny similarity of unique inserts in the 2019-nCoV spike protein to HIV-1 gp120 and Gag

[Comments \(124\)](#)

Prashant Pradhan, Ashutosh Kumar Pandey, Akhilesh Mishra, Parul Gupta, Praveen Kumar Tripathi, Manoj Balakrishnan Menon, James Gomes, Perumal Vivekanandan, Bishwajit Kundu
doi: <https://doi.org/10.1101/2020.01.30.927871>

Journal List • *Emerging Microbes Infect.* v. 9(1); 2020 • PMC7033656

This article is a preprint and has not been certified by peer review [what does this mean?]

[Abstract](#) [Full Text](#) [Info/History](#) [Metrics](#)

Article usage: February 2020 to May 2020

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- On **8** videos

Emerging Microbes & Infections

Emerg Microbes Infect. 2020; 9(1): 378–381.

Published online 2020 Feb 14. doi: [10.1080/22221751.2020.1727299](https://doi.org/10.1080/22221751.2020.1727299)

PMCID: PMC7033656

PMID: [32066909](https://pubmed.ncbi.nlm.nih.gov/32066909/)

HIV-1 did not contribute to the 2019-nCoV genome

Chuan Xiao,^{a,CONTACT} Xiaoyan Li,^b Shuying Liu,^c Yongming Sang,^d Shou-Jiang Gao,^e and Feng Gao^{a,1}

[Author information](#) • [Article notes](#) • [Copyright and License information](#) [Disclaimer](#)

This article has been cited by other articles in PMC.

When a new pathogen that causes a global epidemic in humans, one key question is where it comes from. This is especially important for a zoonotic infectious disease that jumps from animals to humans. Knowing the origin of such a pathogen is critical to develop means to block further transmission and to develop



Information Zombies

“Information zombies” are ideas that ought to be dead, but keep shambling about the internet causing problems.

Misinformation vs. Information Zombies

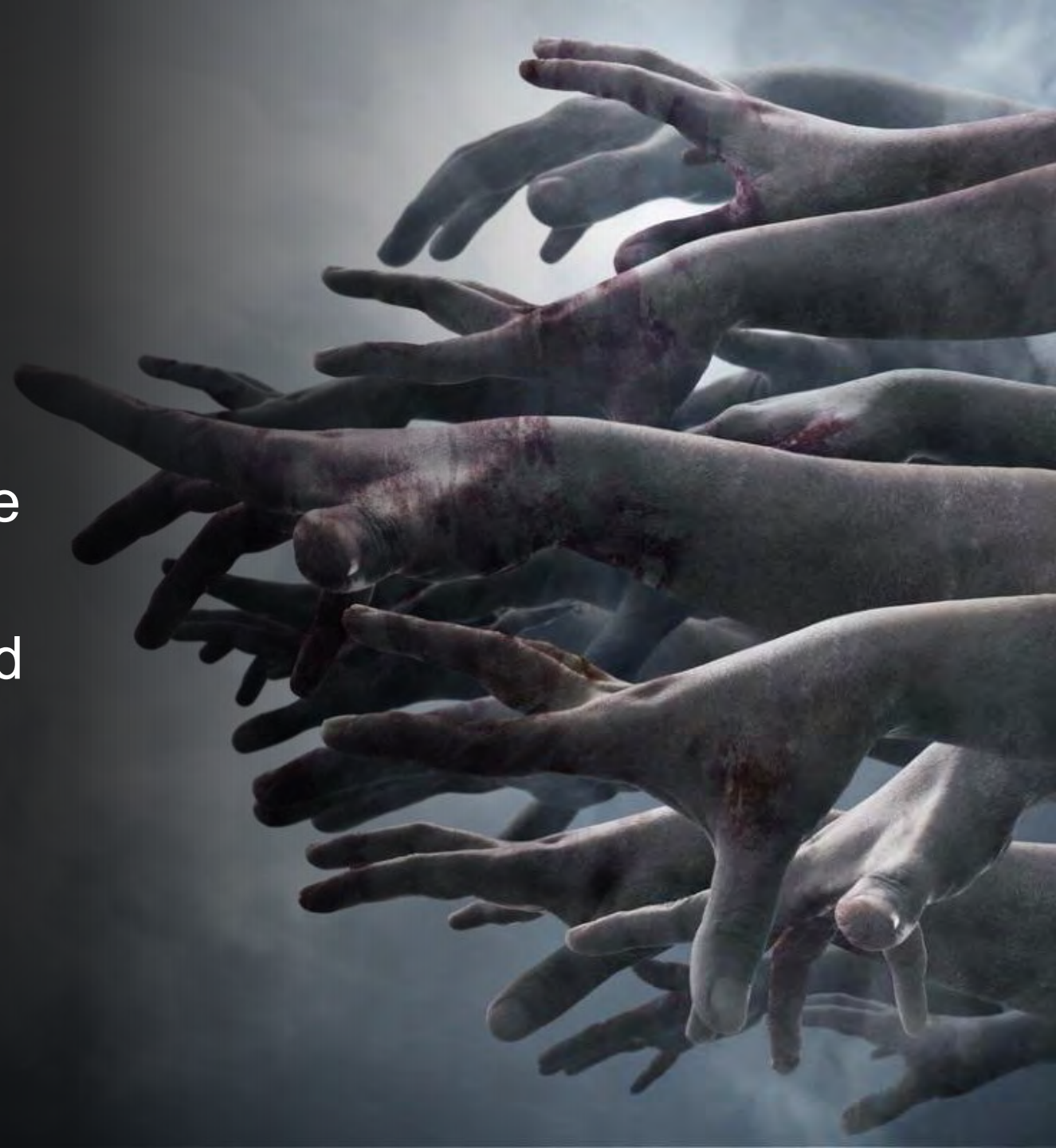
Importantly, in many cases, these do not resemble typical misinformation. They are not:

- 1) Unfounded rumors
- 2) Active disinformation
- 3) Conspiracy theories

Instead, these are reports with some scientific legitimacy, coming from legitimate sources, and reflecting an attempt at truth telling. **But they continue to propagate as if reliable after they are retracted, reversed, or refuted.**

Escaping Detection

Because information zombies have different features from other forms of misinformation, they can be hard to identify as misinformation by users and algorithms.



Retraction in Science

- This phenomenon is not limited to the COVID-19 pandemic, or even to social media.
- It has been widely found that retracted scientific articles are often cited approvingly long after retraction.
- For instance, in 2010 twenty-one articles by anesthesiologist Scott Reuben were retracted for fraud. Four years later, over 1/2 were consistently cited as accurate.

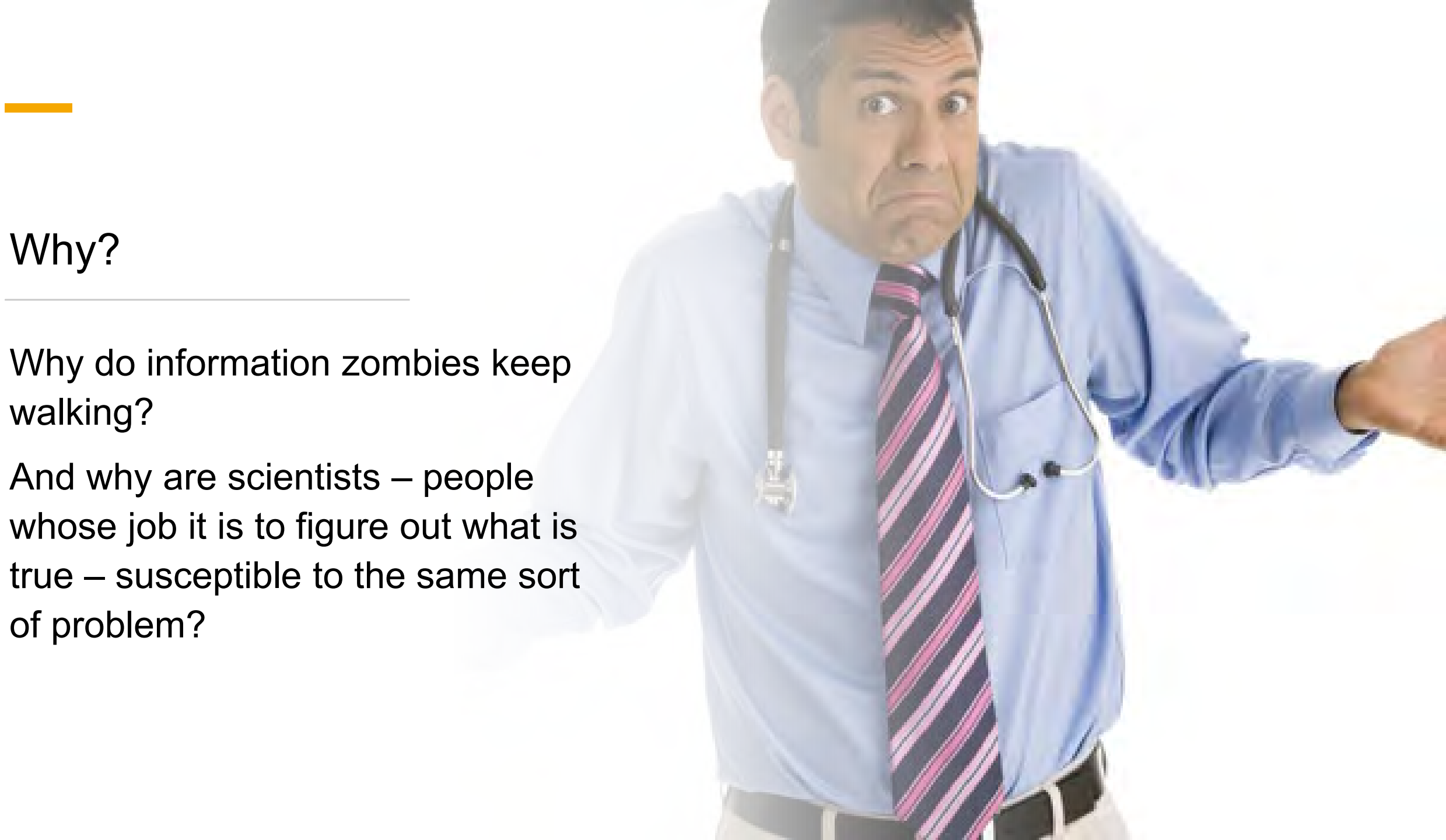




Why?

Why do information zombies keep walking?

And why are scientists – people whose job it is to figure out what is true – susceptible to the same sort of problem?



The Dynamics of Retraction

At least in part, the answer has to do with how people share information.

We all learn socially, and we often pass what we learn on to friends and peers.

Under this assumption, we use models to look at how retracted information spreads on social networks.



THE DYNAMICS OF RETRACTION IN EPISTEMIC NETWORKS

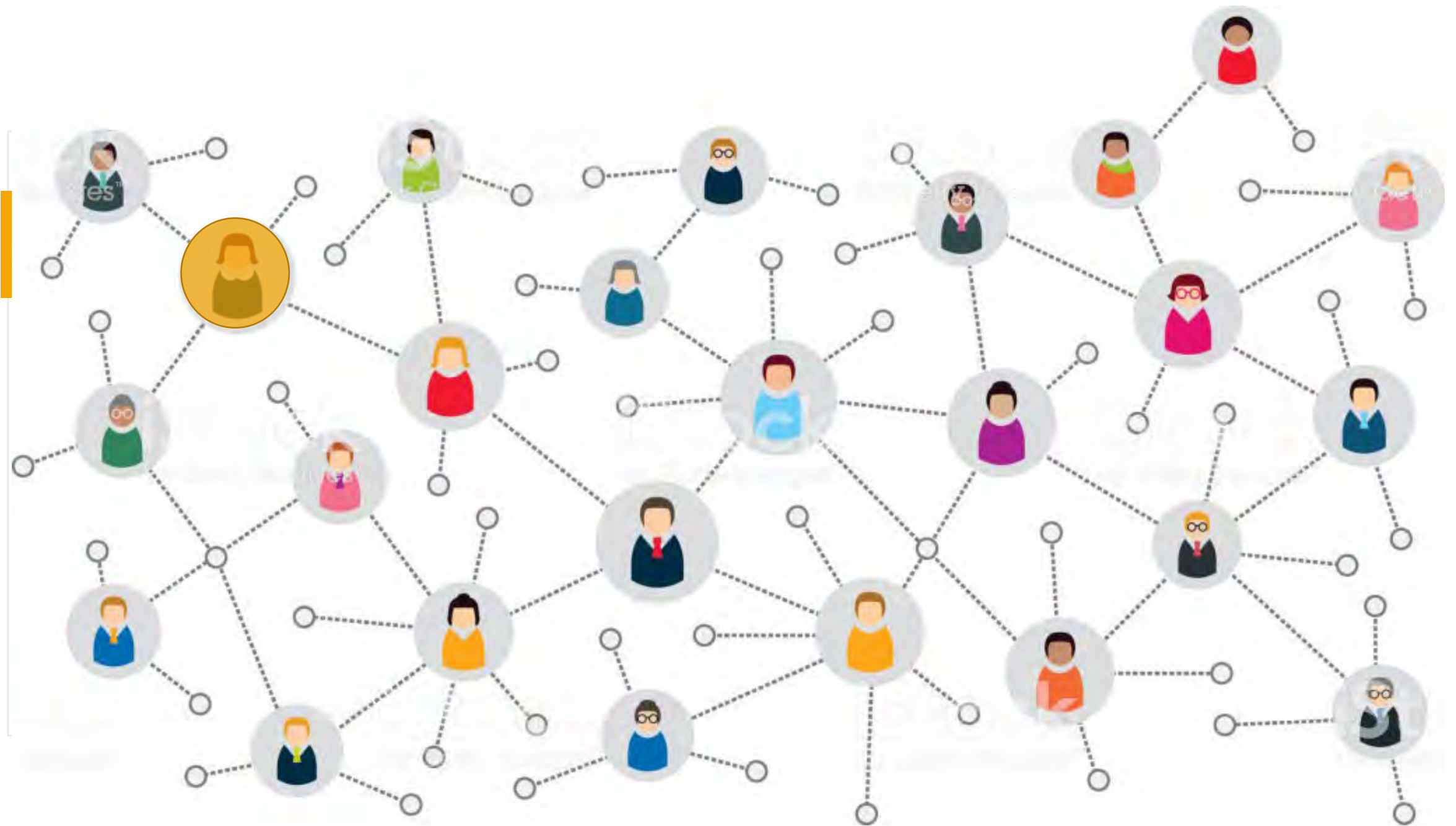
Travis LaCroix^{a,b}, Anders Geil^{a,c}, Cailin O'Connor^a

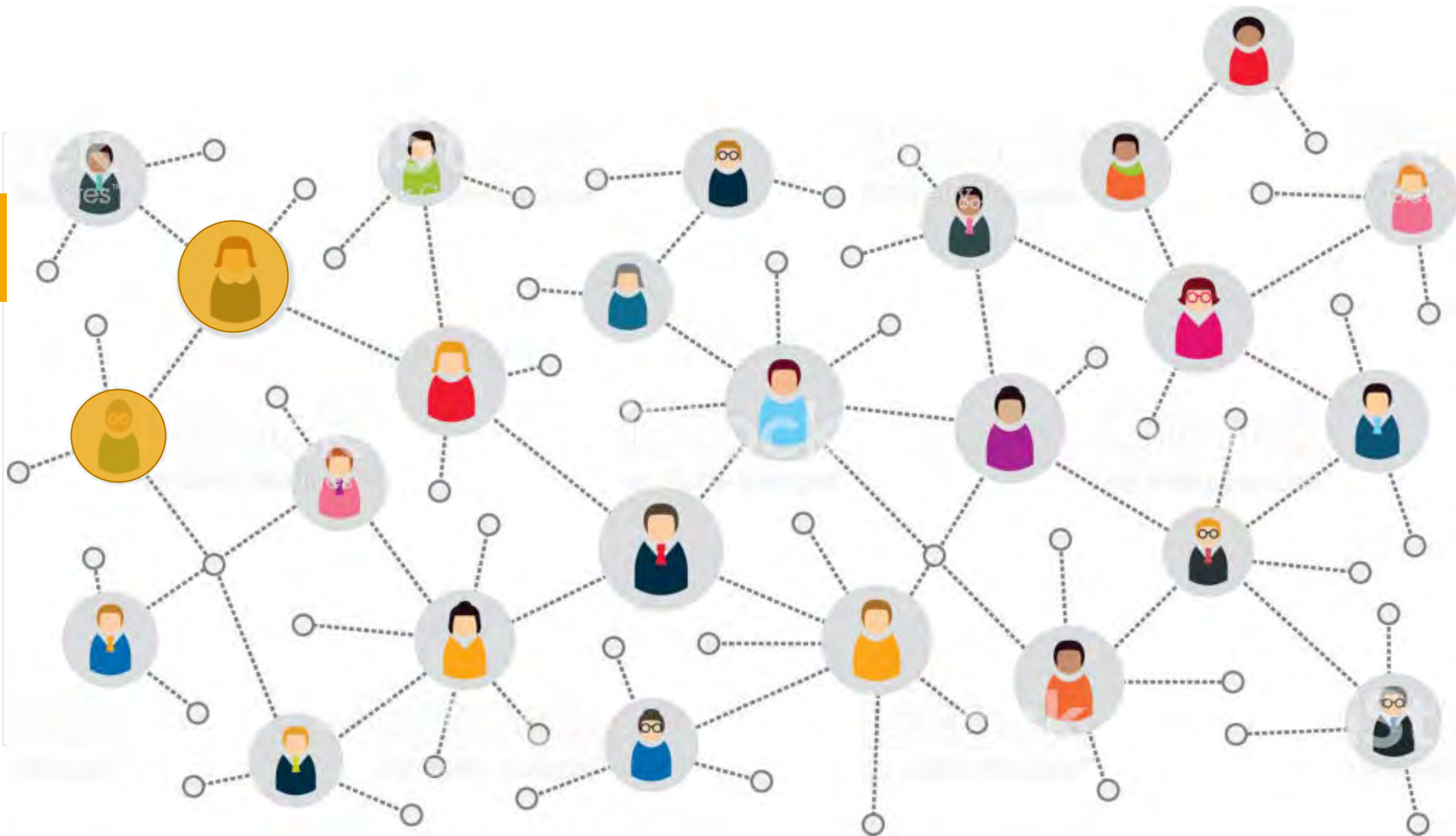
^a*Department of Logic and Philosophy of Science
University of California, Irvine*

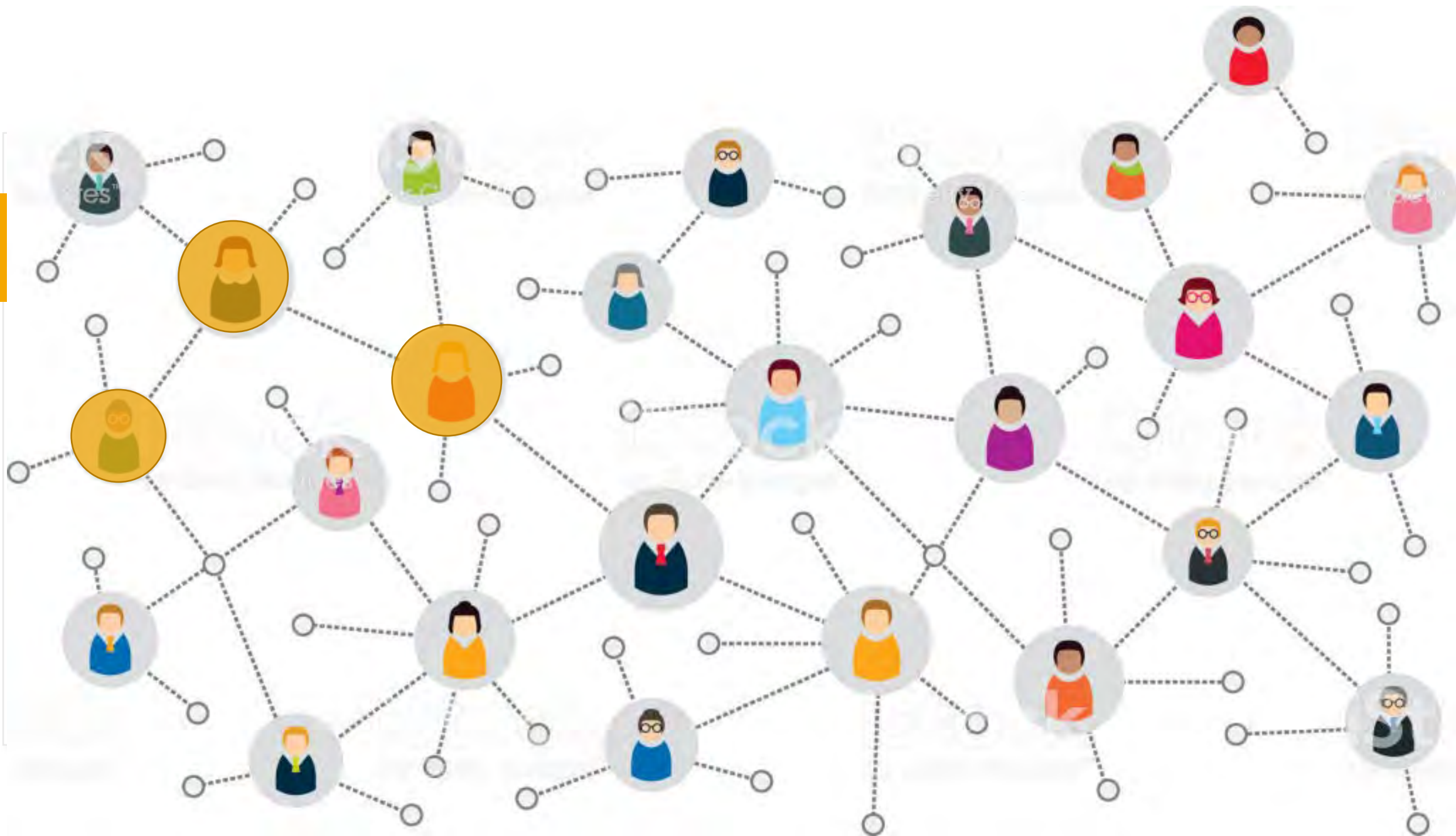
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^b*Mila
Québec Artificial Intelligence Institute*

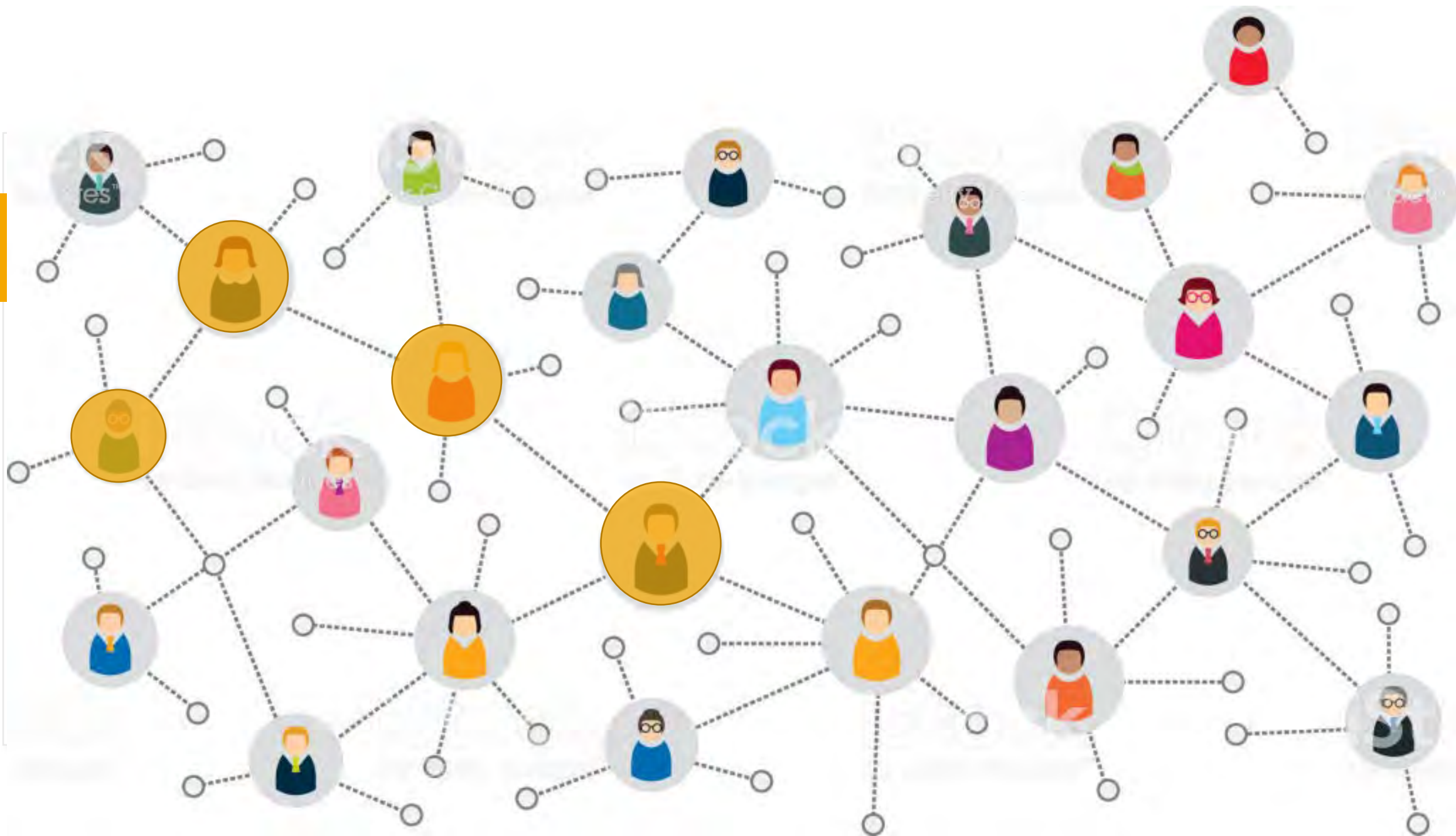
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^c*Department of Computer Science
Columbia University*

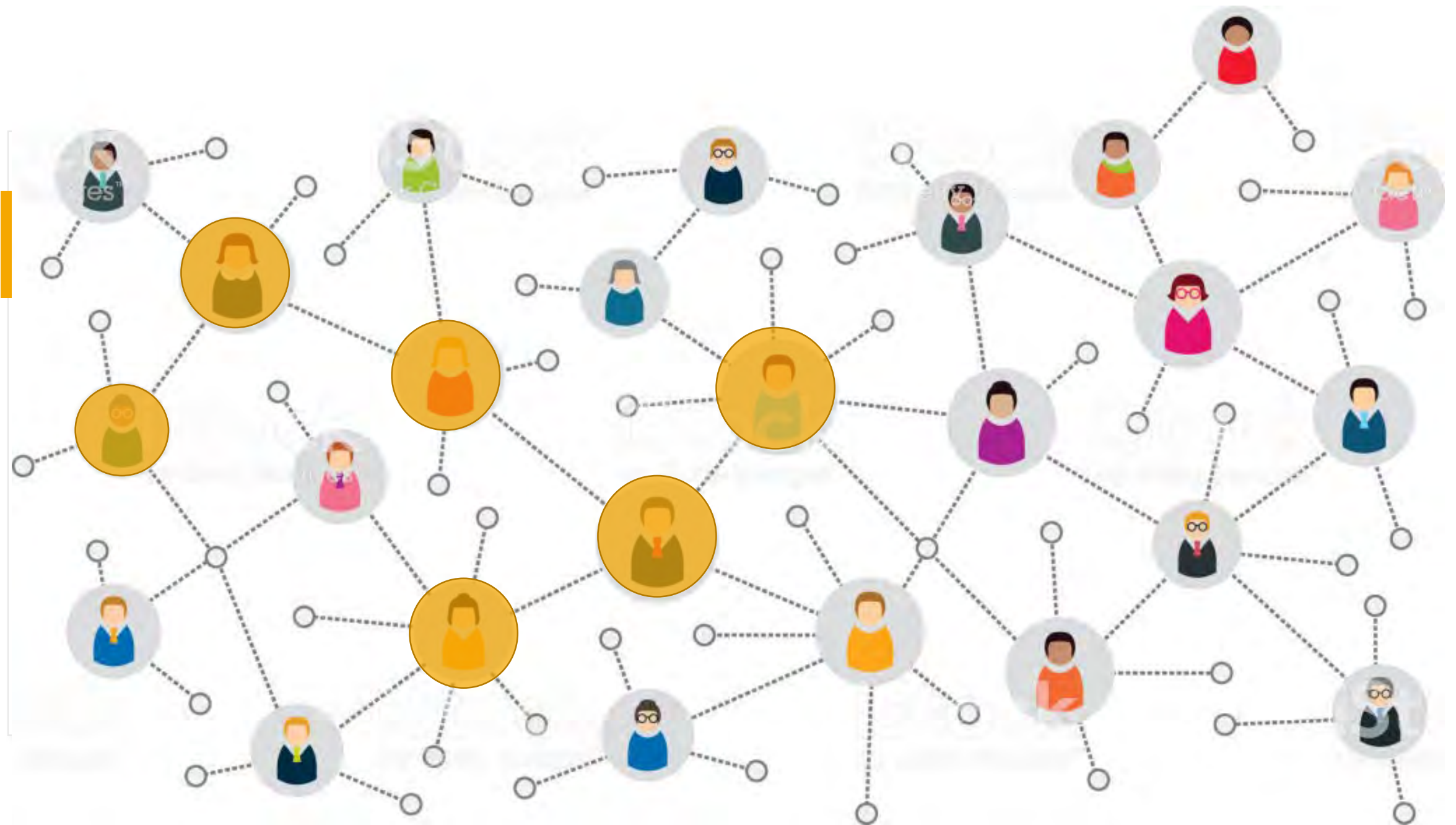
Abstract

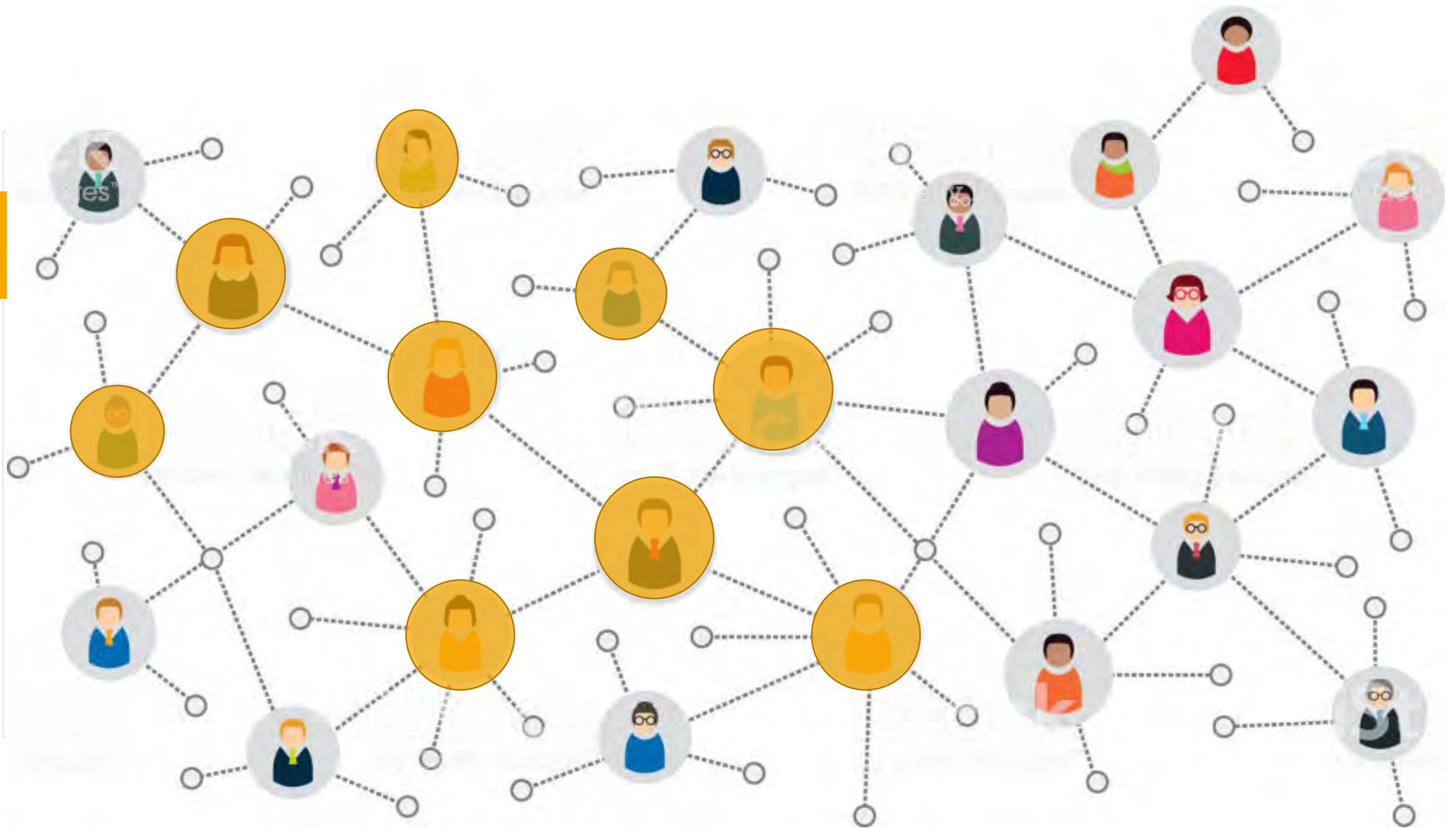








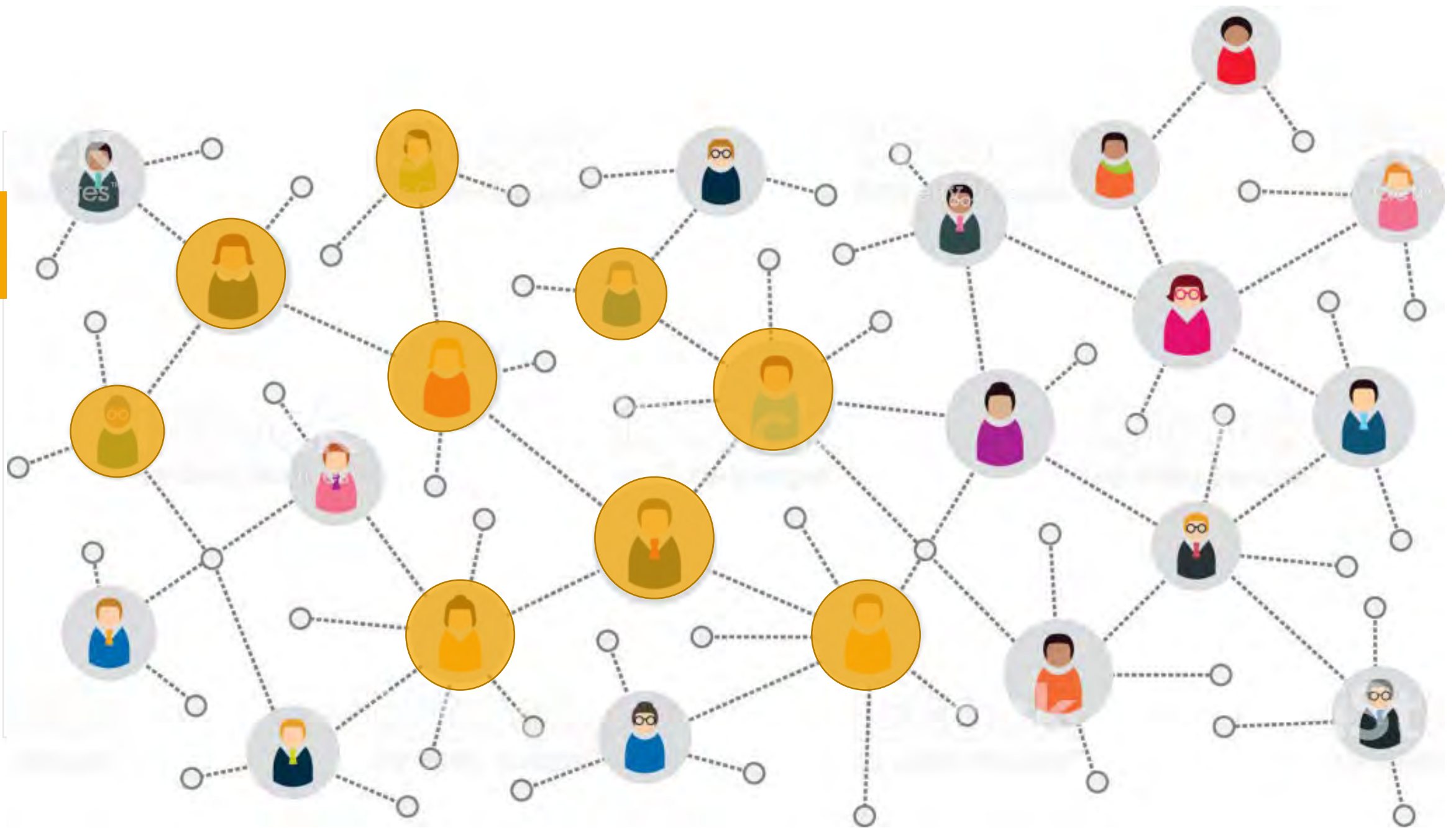


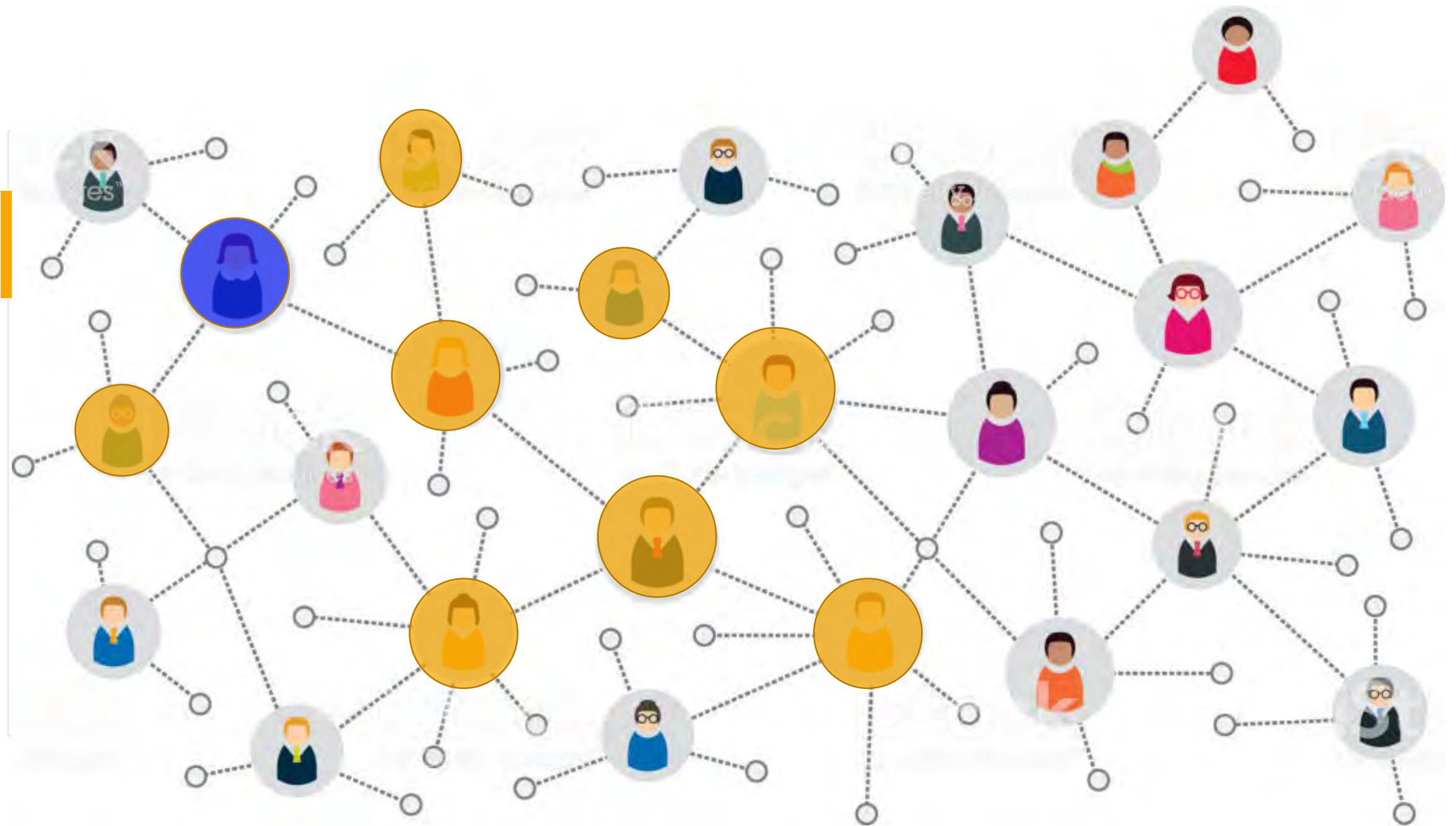


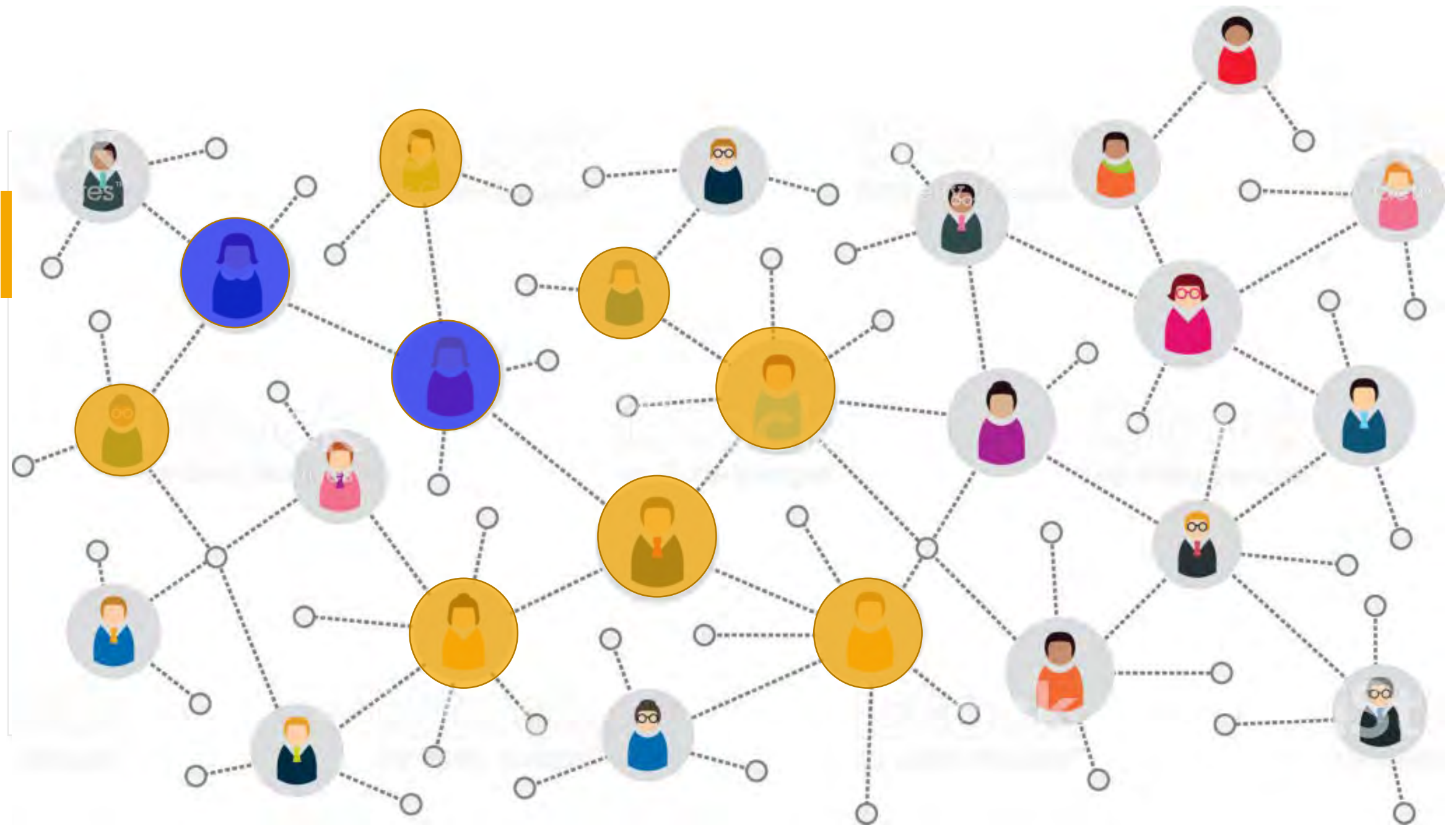
The background of the slide is a photograph of a bookshelf. The books are arranged vertically, and their spines are visible. The lighting is soft, and the colors are muted, creating a scholarly or academic atmosphere.

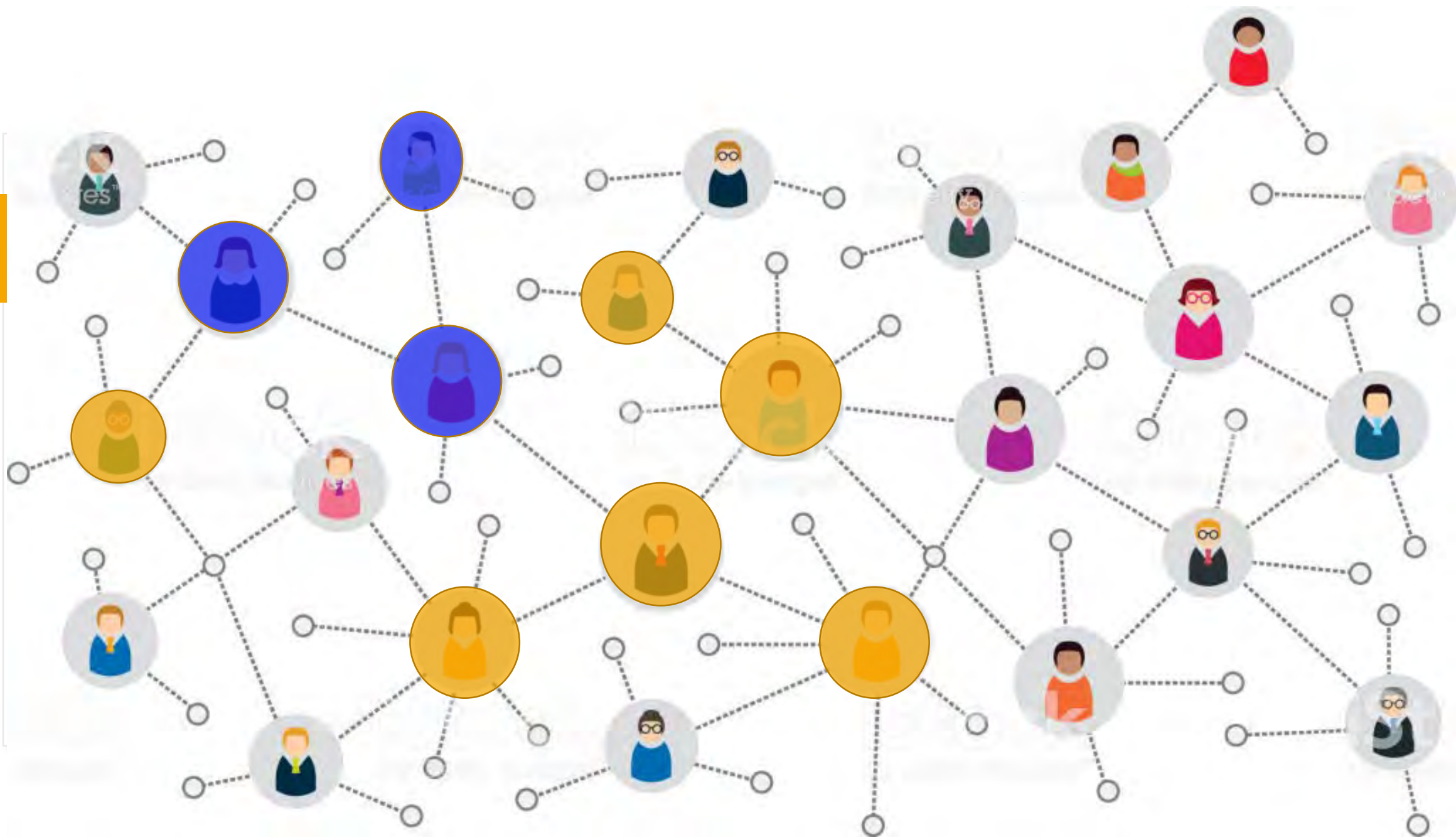
Retractions vs. Novel Claims

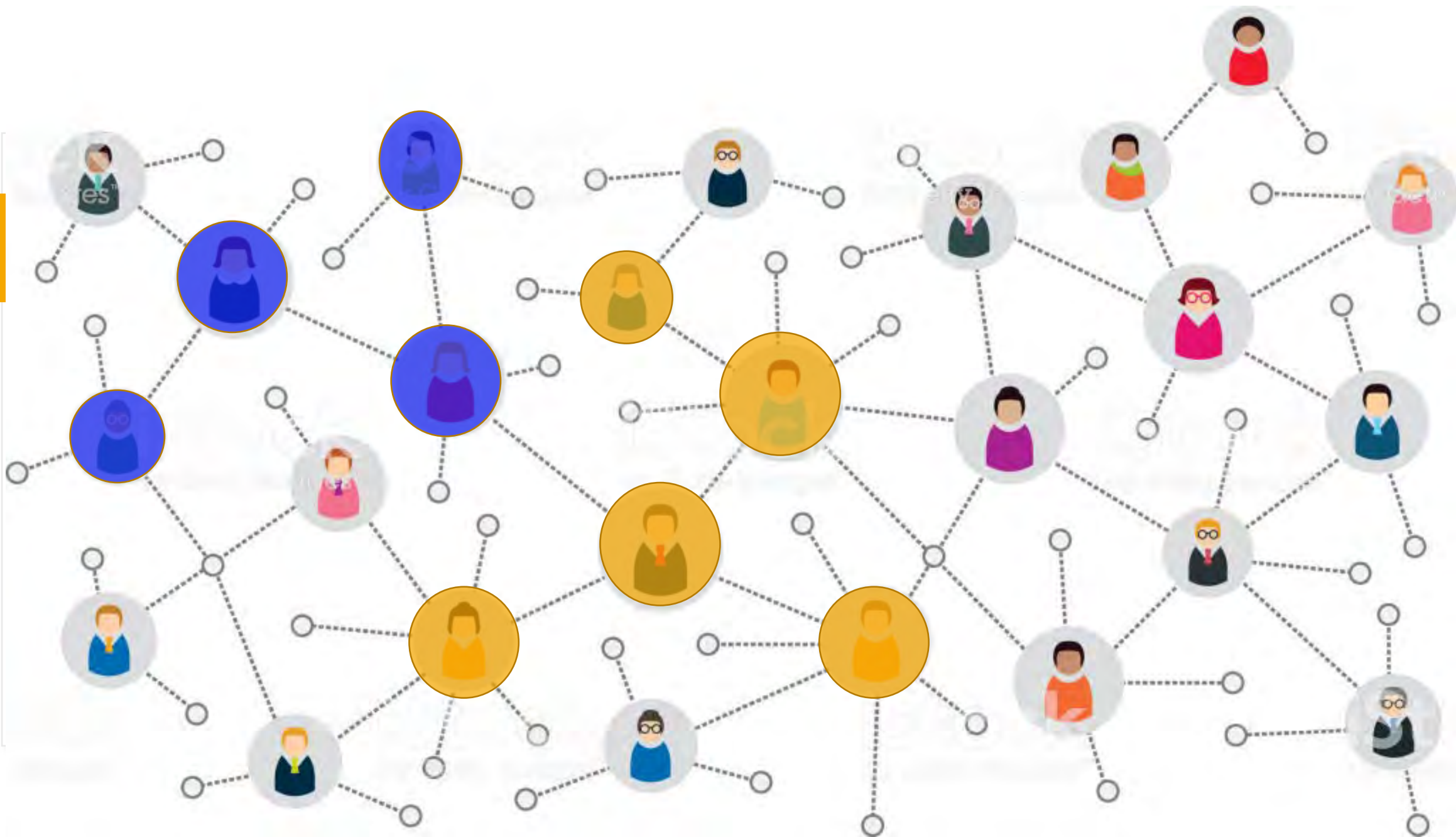
There is an important difference between novel claims and retractions.
Retractions are more likely to spread where false beliefs have already gone.

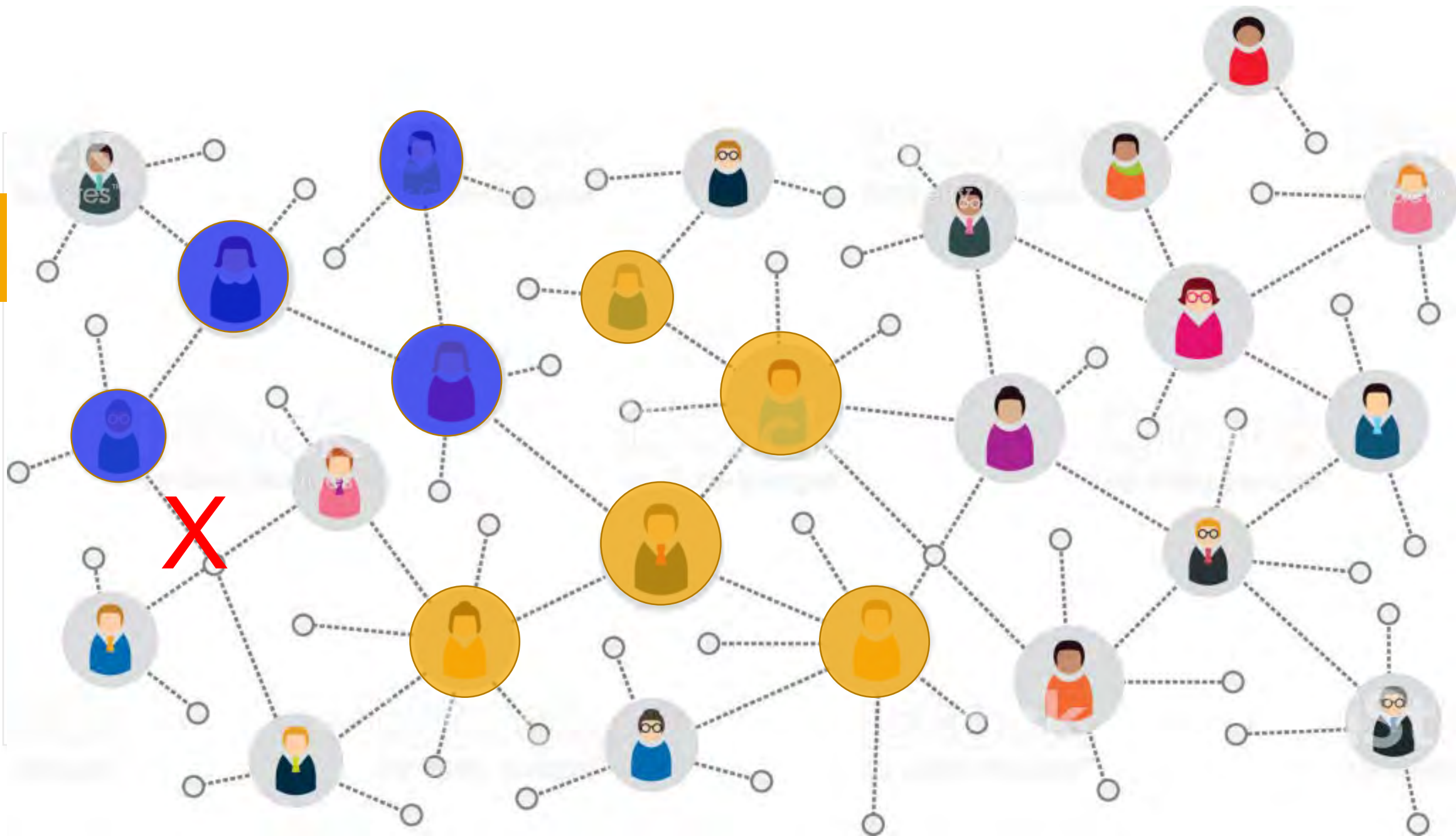












Important Take-Aways

- Originators lose control of their ideas. They cannot just reverse them.
- A retraction may not spread as well as an original false claim.
- People who hear a false claim often simply fail to encounter a retraction.
- False claims continue to spread, even after they are known to be false.
- Information zombies look, walk, and quack like reliable information.

COVID-19 Antibody Seroprevalence in Santa Clara County, California

COVID-19 Antibody Seroprevalence in Santa Clara County, California

Eran Bendavid¹, Bianca Mulaney², Neeraj Sood³, Soleil Shah³, Emilia Ling³, Rebecca Bromley-Dulfano³, Cara Lai², Zoe Weissberg², Rodrigo Saavedra-Walker⁴, Jim Tedrow², Dana Tversky⁵, Andrew Bogan⁷, Thomas Kapic⁶, Daniel Eichner⁹, Ribhav Gupta¹⁰, John P.A. Ioannidis^{1,10}, Jay Bhattacharya¹



inary report of the work.)

Initial paper: true cases 50x – 85x confirmed cases.
Implied infection fatality rate: .12-.2%

Revised paper: true cases 25x – 91x confirmed cases.
Implied infection fatality rate: .11-.4%

Uncertainty interval increased by factor of >2; overlapped with other estimates (e.g. WHO from February: .3%-1%; German study .29-.45%; etc.). Recent estimates are much higher, e.g. .78% - 1.79%.

WSJ **OPINION** Opinion Headlines

Opinion Editor • May 13, 2020 • Third Edition • 10:00a

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COVID-19 [1,400+ ARTICLES](#) [BACK TO WORK CASE](#) [CORONAVIRUS SAFETY](#) [WORLD LATEST & ANALYSIS](#) [RECOVERING](#) [BONUS: AGED](#) [GETTING TESTED](#) [VIDEO: TESTING](#) [RECOMMEND](#)

OPINION | COMMENTARY

New Data Suggest the Coronavirus Isn't as Deadly as We Thought

A study finds 50 to 85-times as many infections as known cases—meaning a far lower fatality rate.

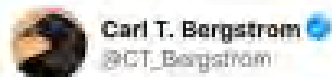
By Andrew Bogan
Apr 17, 2020, 4:29 pm ET

[Like](#) [Retweet](#) [Share](#)

RECOMMENDED VIDEOS

Test: 'We Don't Know Everything About This Virus'

Thread



Carl T. Bergstrom
@CT_Bergstrom

I haven't even gone to bed last night yet and today's bullshit coronavirus story is already here, courtesy of @pbleic.

Elsevier's journal _Medical Hypotheses_ brings us a paper entitled "The use of aspirated consonants during speech may increase the transmission of COVID-19".

4:52 AM · Sep 17, 2020 · Twitter Web App

41 Retweets · 33 Quote Tweets · 180 Likes



Carl T. Bergstrom
@CT_Bergstrom · 1h

Replying to @CT_Bergstrom

That's right. The hypothesis is that English speakers may be n spread COVID because the aspirated consonants at the end of (p,k,t) generate respiratory droplets.

21

19

68



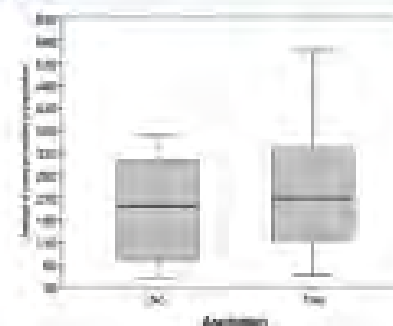
Carl T. Bergstrom
@CT_Bergstrom · 1h



Carl T. Bergstrom
@CT_Bergstrom · 2h

The best part is that their analysis provides ZERO support for their hypothesis. Their t-test is non-significant. It's not even close. If I understand what they are doing, their p value of 0.73 with 18 df gives p=0.237 (online got the same value).

Here are the data.



Carl T. Bergstrom
@CT_Bergstrom · 1h

And then, @pbleic notes, @Forbes just has to jump on the story, and presents it as if the hypothesis is supported.

This is why, in our class we encourage students to trace back to the source. Reading the Forbes story, you'd never expect the graph above.

ASPIRATION

NO ASPIRATION



Why Speaking English May Spread More Coronavirus Than Other Lan
New research suggests that English speakers put more droplets into the air when they talk. Which may make them more likely to spread...



Putting Information Zombies to Rest

What are the practical take-aways?

- 1) The sharing of unvetted or under-tested scientific claims can have serious harms.
- 2) Journalists should report on multiple studies, and survey all known data.
- 3) We should all shout retractions to the rooftops.





For Today

We'll focus on two topics:

- 1) Information Zombies
- 2) Belief Factions

Letter to the Editor | [Open Access](#) | Published: 04 February 2020

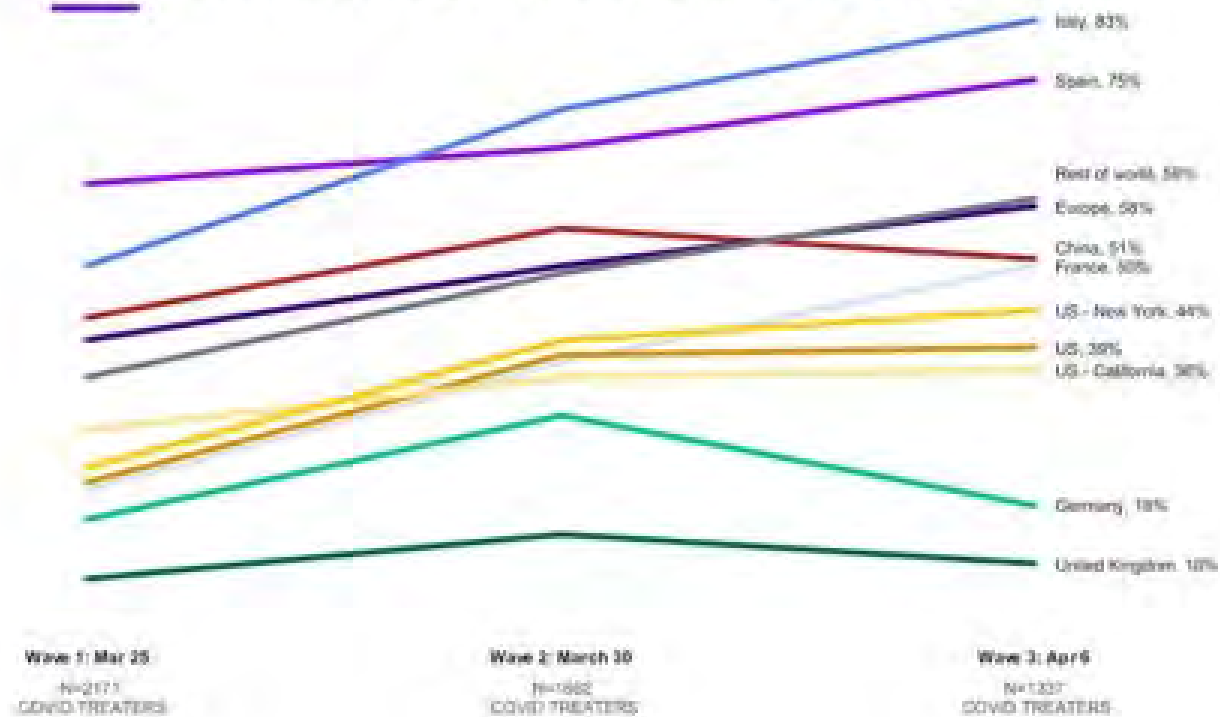
Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro

Manli Wang, Ruiyuan Cao, Leike Zhang, Xinglou Yang, Jia Liu, Mingyue Xu, Zhengli Shi, Zhihong Hu , Wu Zhong  & Gengfu Xiao 

Cell Research **30**, 269–271(2020) | [Cite this article](#)

1.12m Accesses | **319** Citations | **7208** Altmetric | [Metrics](#)

Percentage of physicians having used Hydroxychloroquine to treat a diagnosed COVID-19 patient, over time and by region





Adrian Bee

Chloroquine will keep most people out of hospital. The US hasn't learned about that yet.

My estimate includes a second more deadly version coming back after summer. I really do think we will get a handle on this.

11:45 AM · 11 Retweets · 1 Like

25 Retweets · 25 Likes

March 11



Maybe worth considering chloroquine for C19 docs.google.com/document/d/1v2...

10:10 AM · 4 Retweets · 1 Like

11.6K Retweets · 88.8K Likes



Hydroxychloroquine probably better www.youtube.com/watch?v=...



10:10 AM · 4 Retweets · 1 Like

6.4K Retweets · 17.6K Likes

March 16



March 19

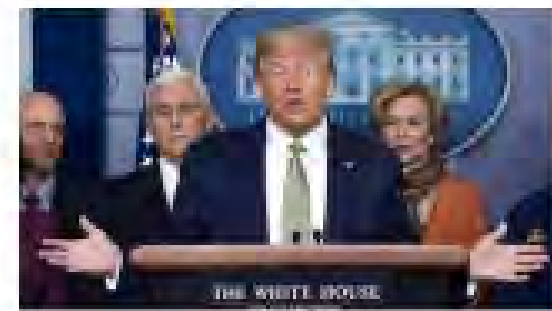


There is growing evidence of Chloroquine as a highly effective treatment for COVID-19. In a collaborative effort, @BigunESSG (Johns Hopkins), Thomas Broker, PhD (Stanford) & I explore Chloroquine as a treatment/prophylactic to treat & prevent coronavirus. docs.google.com/document/d/1v2...

10:10 AM · 11 Retweets · 1 Like

2.1K Retweets · 5.1K Likes

March 13



March 19



Dr. Marty Fox 🇺🇸
@DrMartyFox

ATTN Trump Deranged DemocRAT Governors


Preventing Doctors
From Saving Patients

To Drive Up The Death Rate Because You Think It Hurts
[#PresidentTrump](#)



Richard H. Ebright
@R_H_Ebright

Trumpian Charlatan Behind Trump's
Hydroxychloroquine Hype
Didier Raoult, French charlatan behind..hyped
hydroxychloroquine study, has..history of playing fast
and loose with facts



Polarization and Factionalization

Polarization refers to situations where subgroups in a society hold **stable, mutually exclusive beliefs**, even in the face of debate and discussion.

Belief factions are groups in which actors hold **multiple, shared, polarized beliefs**.

Figure from [Brady et al. 2017](#)

Ideology and Explanation

Many previous authors have explained belief factions by appealing to **shared ideology**: commitment to an ideology makes certain beliefs more likely.

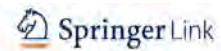
George Lakoff, for example, claims that in the US conservatives hold to a '**strict father**' model, and liberals to a '**nurturant parent**' model:

“...the role of government, social programs, taxation, education, the environment, energy, gun control, abortion, the death penalty, and so on... are ultimately not different issues, but manifestations of a single issue: strictness versus nurturance” (Lakoff, 2010, x)



Strict Fathers Prefer
Hydroxychloroquine?

Endogenous Factions



S.I.: Disagreement in Science | Published: 04 June 2020

Endogenous epistemic factionalization

[James Owen Weatherall](#)  & [Cailin O'Connor](#)

[Synthese](#) (2020) | [Cite this article](#)

30 Accesses | 0 Altmetric | [Metrics](#)

Abstract

Why do people who disagree about one subject tend to disagree about other subjects as well? In this paper, we introduce a model to explore this phenomenon of 'epistemic factionization'. Agents attempt to discover the truth about multiple propositions by testing the world and sharing evidence gathered. But agents tend to mistrust evidence shared by those who do not hold similar beliefs. This mistrust leads to the endogenous emergence of factions of agents with multiple, highly correlated, polarized beliefs.

Modeling Approaches

Many researchers have modeled polarization. These models usually include a feature of the following sort. **Similarity of belief/opinion determines level of social influence.**

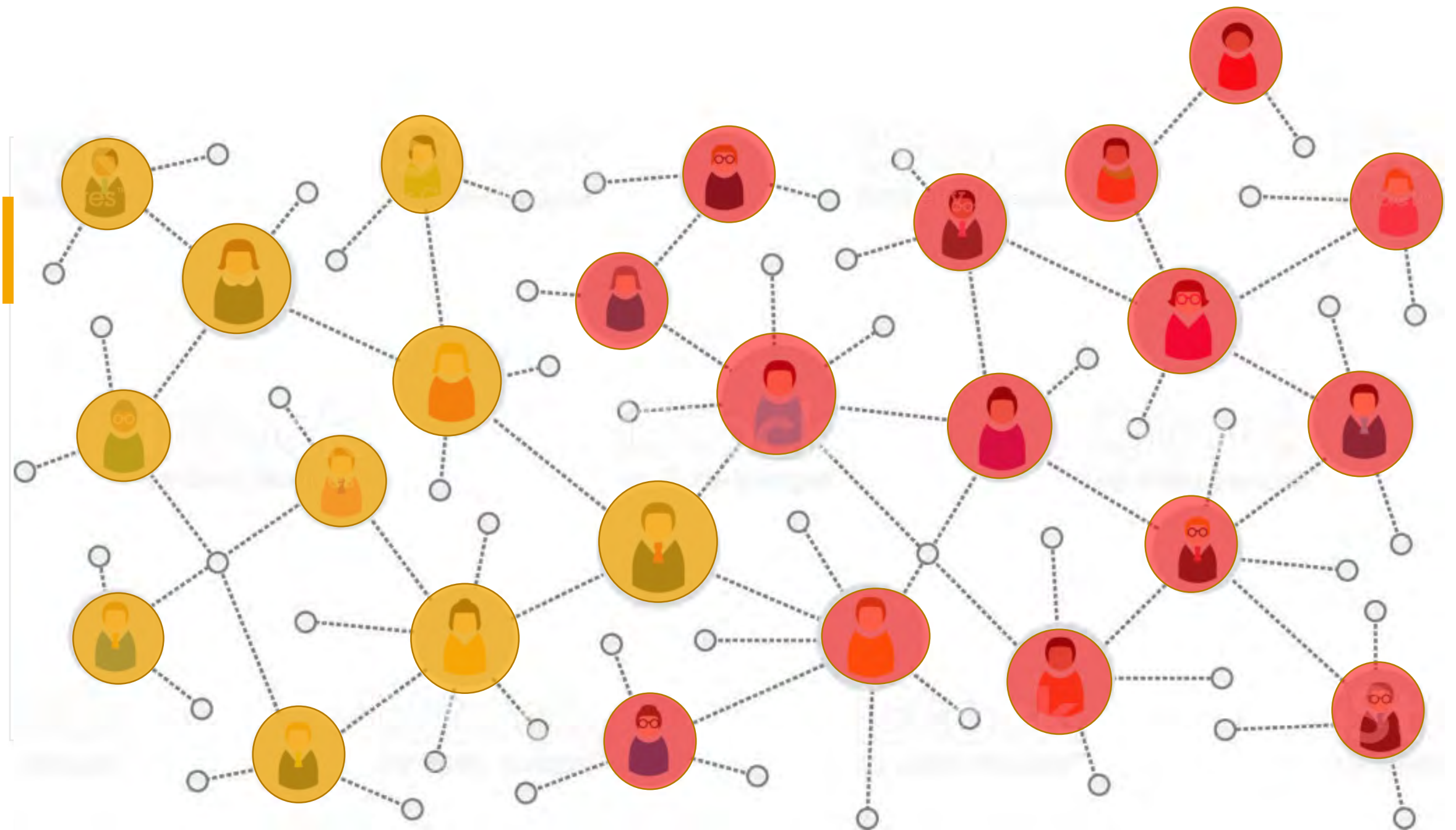


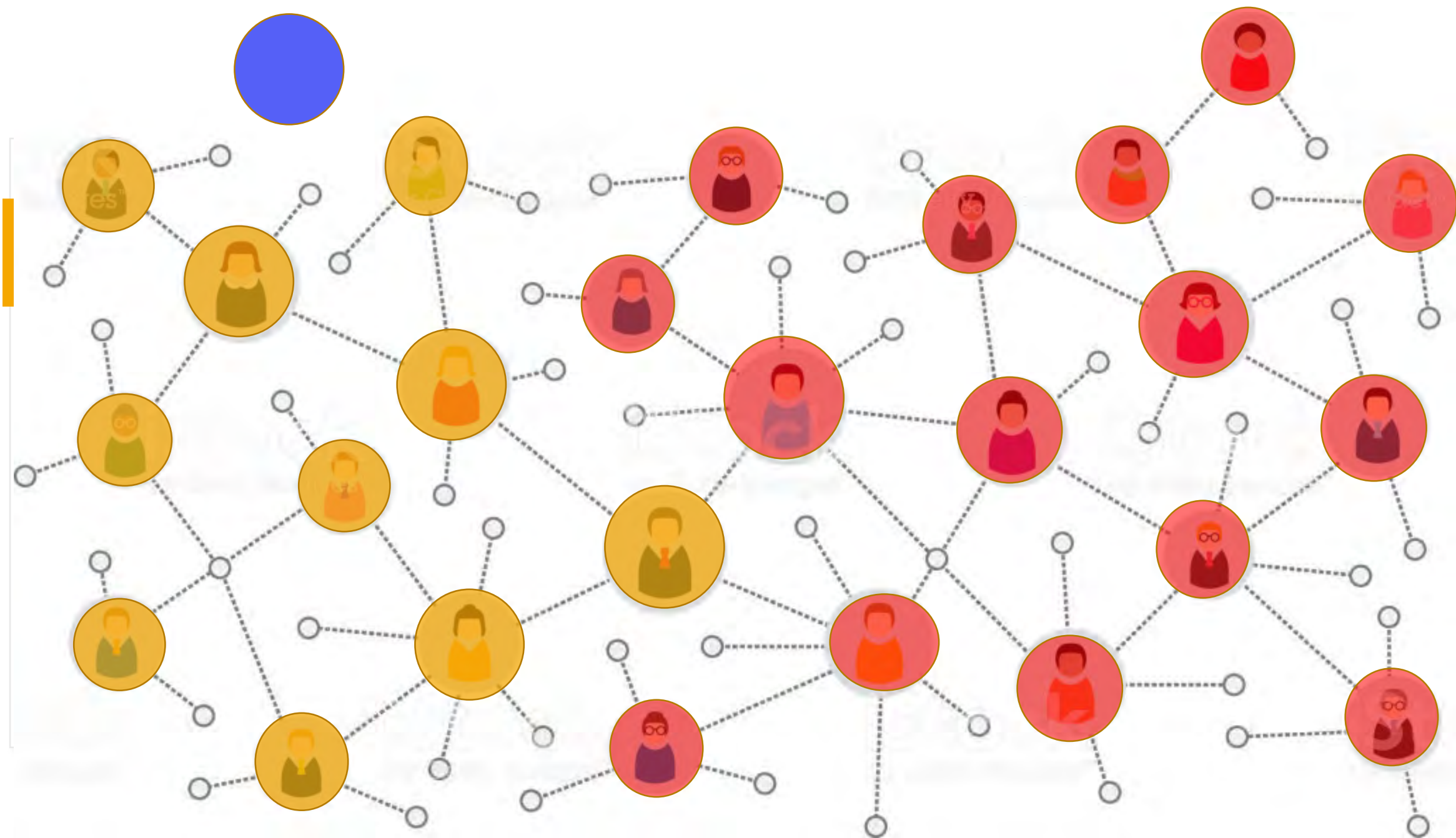
Our Approach

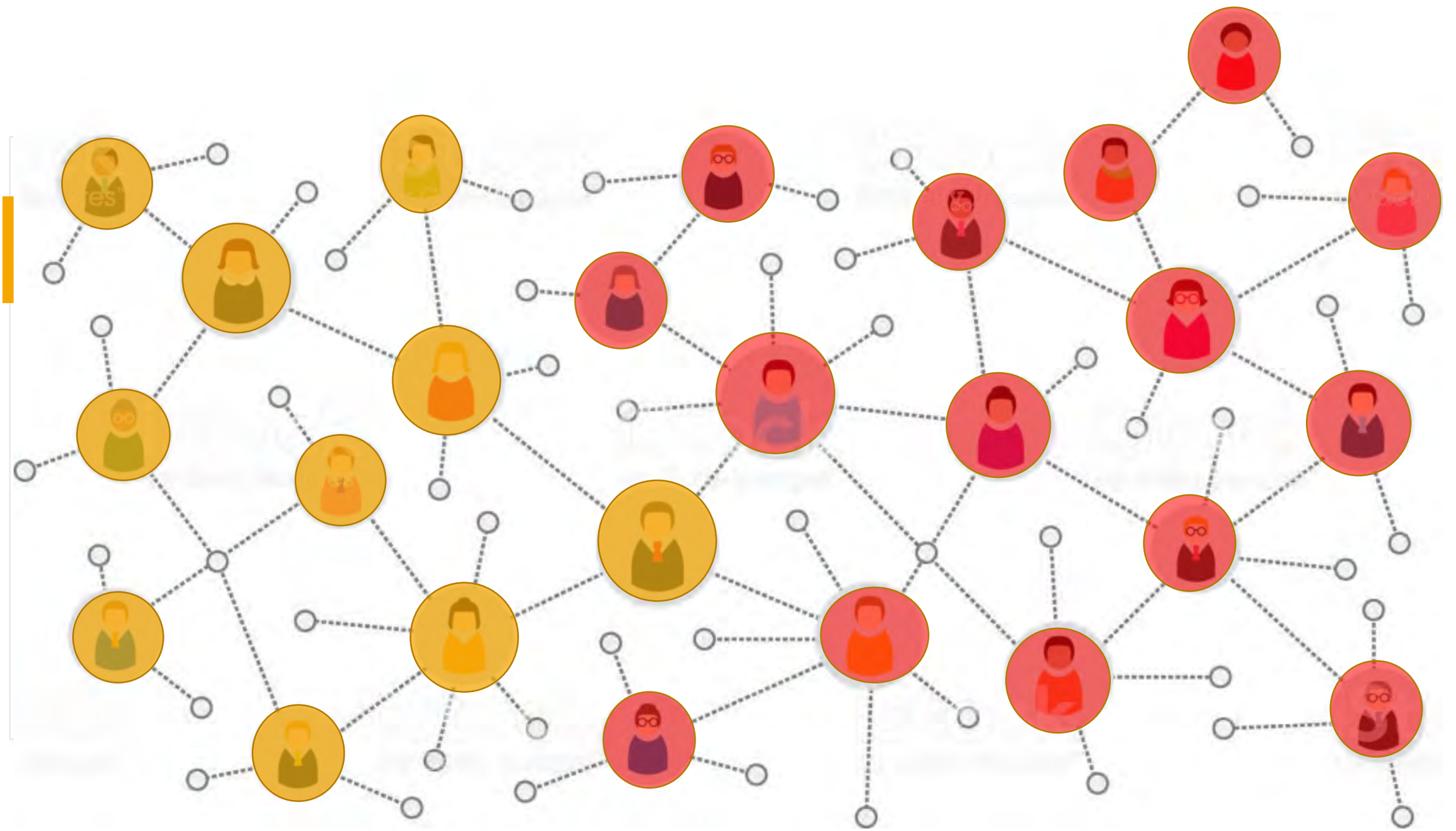
We look at models specifically tuned to **scientific beliefs and scientific communities**.

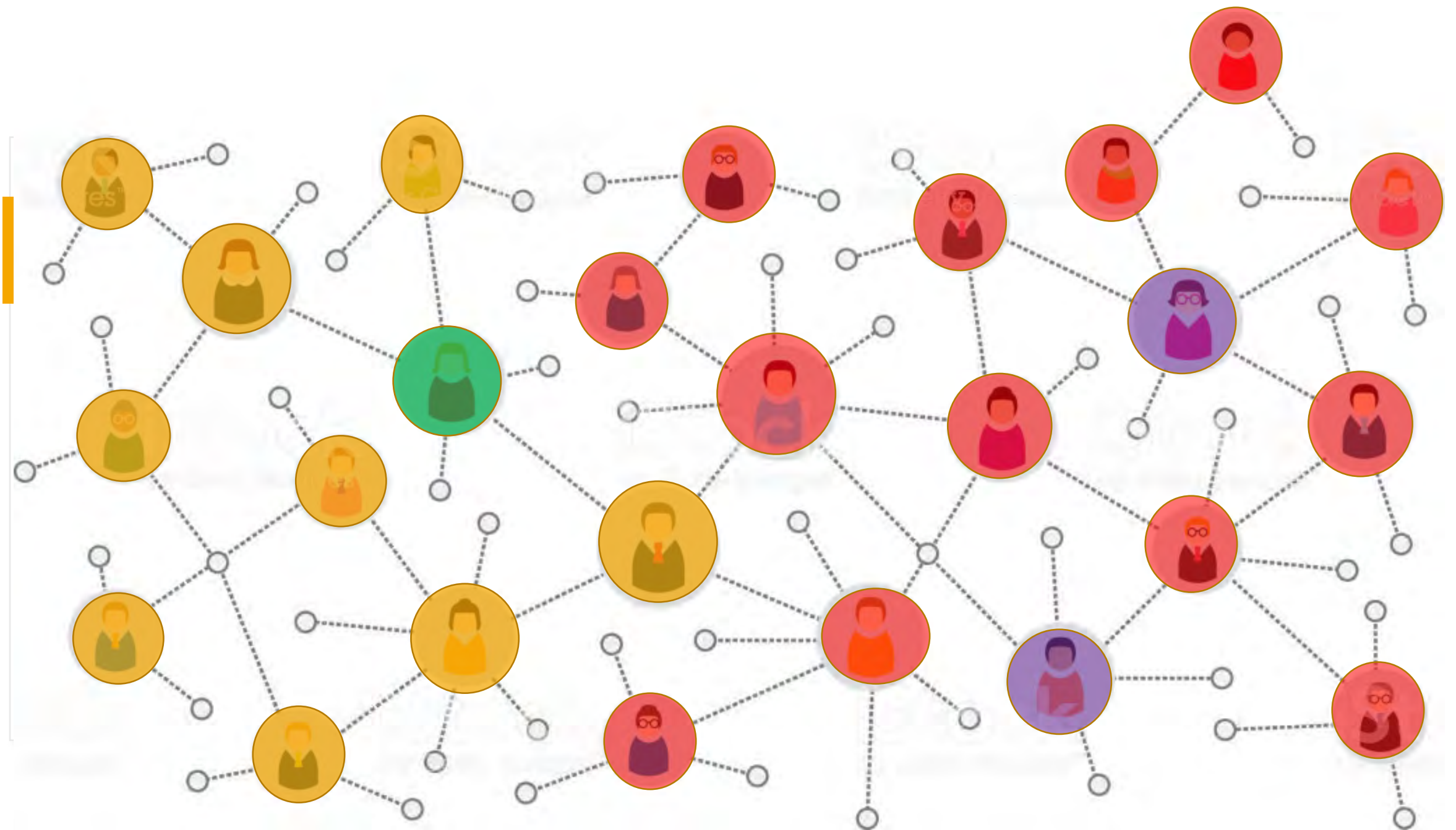
Agents use social markers, such as **similarity across beliefs**, to determine how much to **trust information** shared by others.

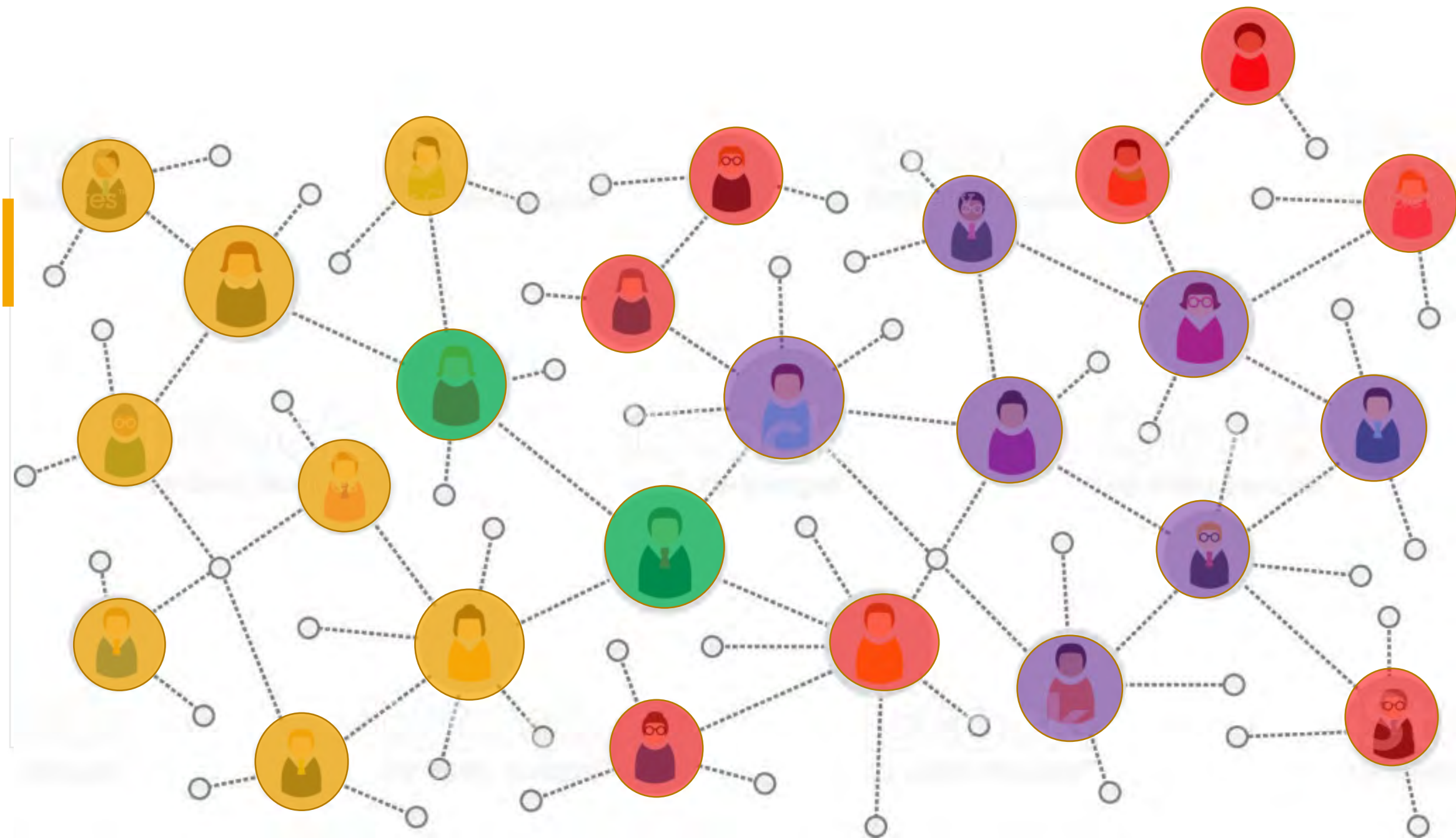
We ask: can belief factions **emerge endogenously** as a result of such social trust?

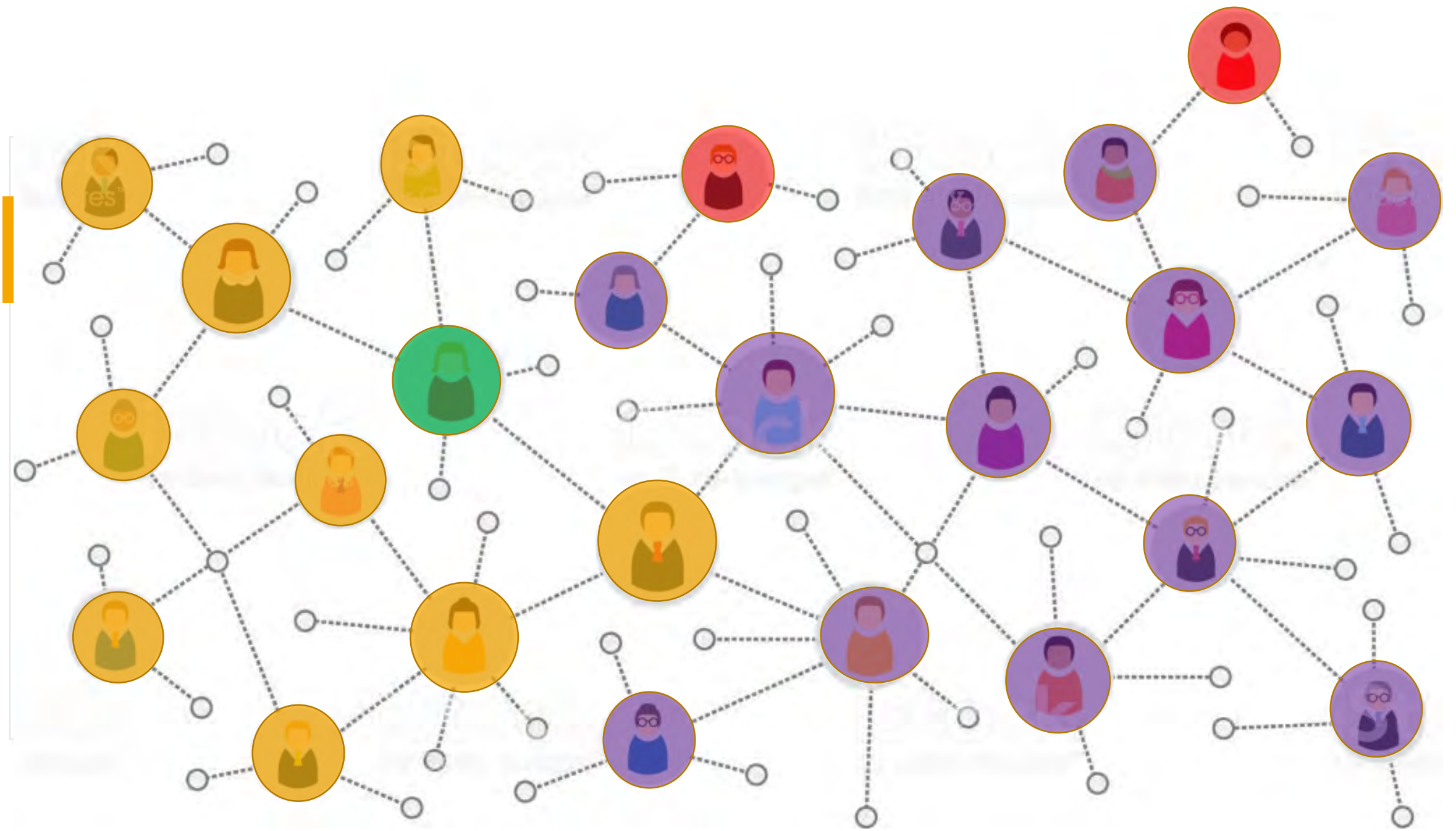


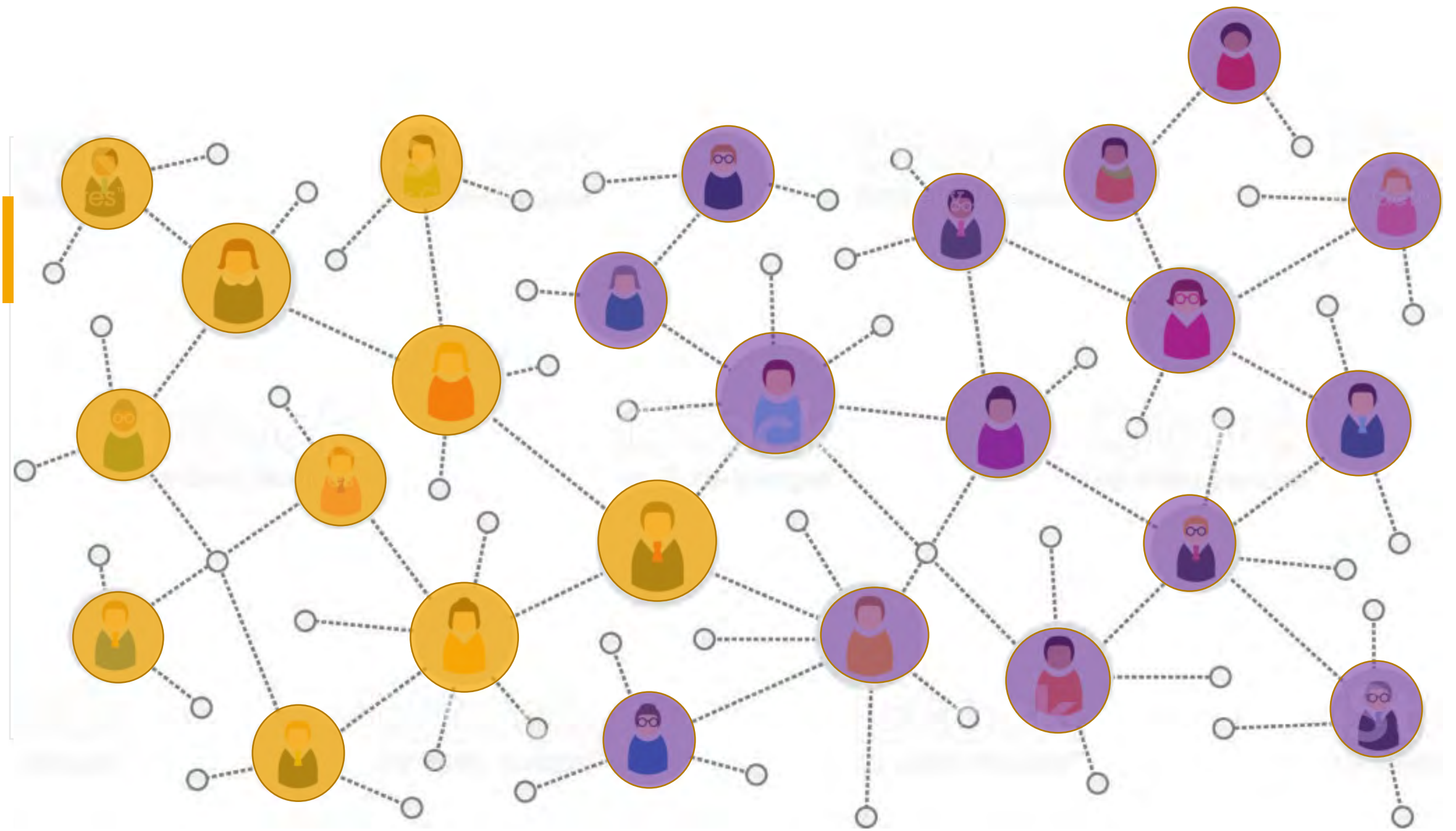














Important Take-Aways

- In cases where no one is spreading misinformation, people can nonetheless end up misinformed because of belief factionalization.
- We need not appeal to underlying ideology to explain such factions (though it still may play a role).
- When polarizing political figures promote specific scientific claims (especially without proper vetting) they run the risk of polarizing those claims.
- Hydroxychloroquine just as easily could have been some other drug—say, Remdesivir.

Thinking Critically During a Pandemic

As we've seen, misinformation can take many forms, some of which can be hard to identify.

- 1) Look for reviews, overviews, and old news
- 2) Trust expert consensus
- 3) Be ready to revise



Thank you!