

# Online Learning

Best practices for a promising future  
of (online) learning in the age of AI  
and automation

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Associate Provost, Online Learning  
Professor, Educational Theory and  
Practice & Informatics, CEHC  
University at Albany, SUNY

# Online Learning Research

## How People Learn Online

*The How People Learn Online Project*



[Home](#) [IITG Project](#) [Is Online Learning Effective?](#) [News](#) [Online Learning Blog](#) [People](#) [Presentations](#) [Publications](#) [Recent Grants](#)

### Publications

Shea P. & Bidjerano, T. (2019). Effects of Online Course Load on Degree Completion, Transfer, and Dropout. *Online Learning* 23(4). [Article](#)

Shea P. & Bidjerano, T. (2019) Effects of Online Course Load on Degree Completion, Transfer, and Dropout among Community College Students of the State University of New York. *2019 American Educational Research Association Annual Meeting*, Toronto, Canada. [Preprint](#)

Shea P. & Bidjerano, T. (2018). Online course enrollment in community college and degree completion: The tipping point. *International Review Of Research in Open and Distributed Learning*. [Preprint](#)

Shea, P. & Bidjerano, T. (2017). Online learning in the 30 community colleges of the State University of New York: Differences in outcomes between classroom and online

### Archives

▪ [June 2012](#)

### Meta

▪ [Log in](#)

# Analyses of Online Instructional Quality



Internet and Higher Education 9 (2006) 175–190

THE INTERNET  
AND HIGHER  
EDUCATION

## A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses

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<sup>b</sup> *School of Education, Department of Educational Psychology, State University of New York at Albany, Albany, NY 12222, USA*

<sup>c</sup> *SUNY Learning Network, State University of New York, Albany, NY 12640, USA*

Accepted 21 June 2006

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### Abstract

This paper focuses on two components of a model for online teaching and learning “teaching presence” and “community”. It is suggested that previous research points to the critical role that community plays in academic success and persistence in higher education. Through a review of recent literature it is proposed that teaching presence viewed as the core roles of the online instructor is a promising mechanism for developing learning community in online environments. This investigation presents a multi-institutional study of 1067 students across 32 different colleges that further substantiates this claim. An instrument to assess instructor teaching presence (“The Teaching Presence Scale”) is presented and validated. Factor and regression analysis indicate a significant link between students’ sense of learning community and effective instructional design and “directed facilitation” on the part of course instructors, and highlights interesting differences between online and classroom environments. Alternative hypotheses regarding student demographics associated with variables such as age (the “net generation” effect) and gender are also examined. Despite recent assertions that younger students are or soon will be too sophisticated to “feel at home” in largely text-based asynchronous learning environments, no significant effects were found by demographic differences examined. Recommendations for online course design, pedagogy, and future research are included.

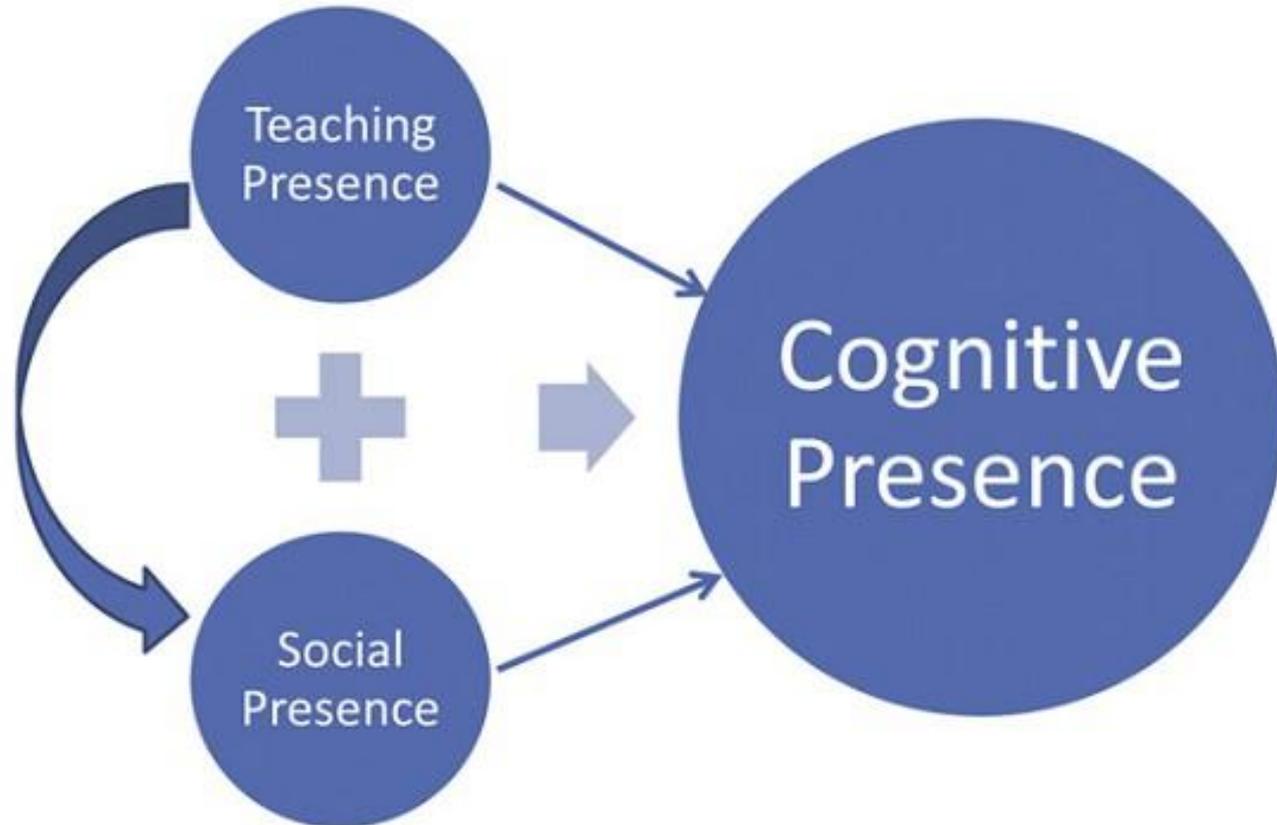
© 2006 Elsevier Inc. All rights reserved.

*Keywords:* Online learning; Community; Teaching presence; Study; Higher education; Learning environments; Inter-institutional research; Community of inquiry model; Classroom community index; Teaching presence scale

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# Methods: Survey and interaction analyses

## EFA, CFA, SEM, QCA, SNA



*Figure 2.* Relationship between teaching, social, and cognitive presences (Shea & Bidjerano, 2010).

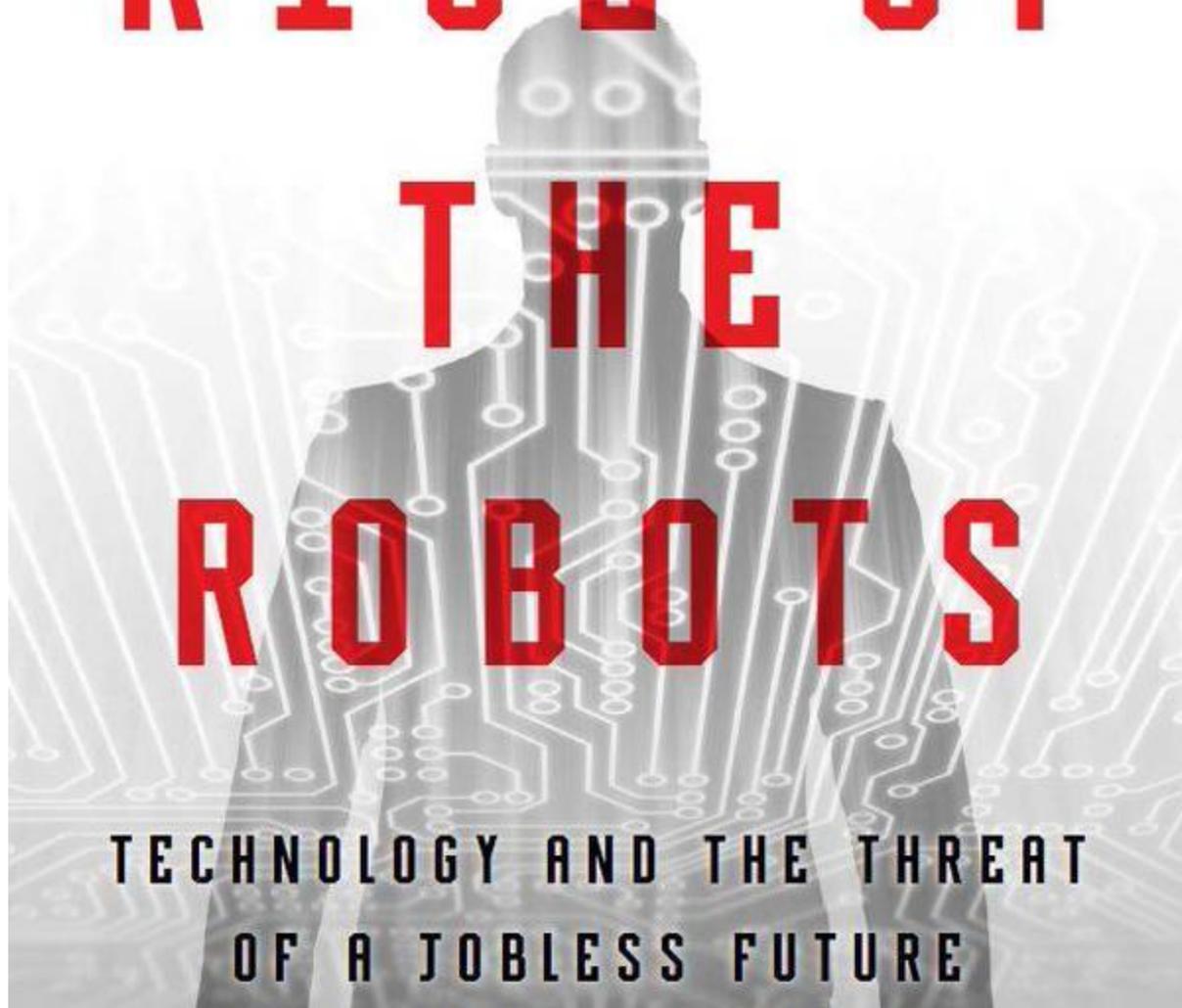
Some sources

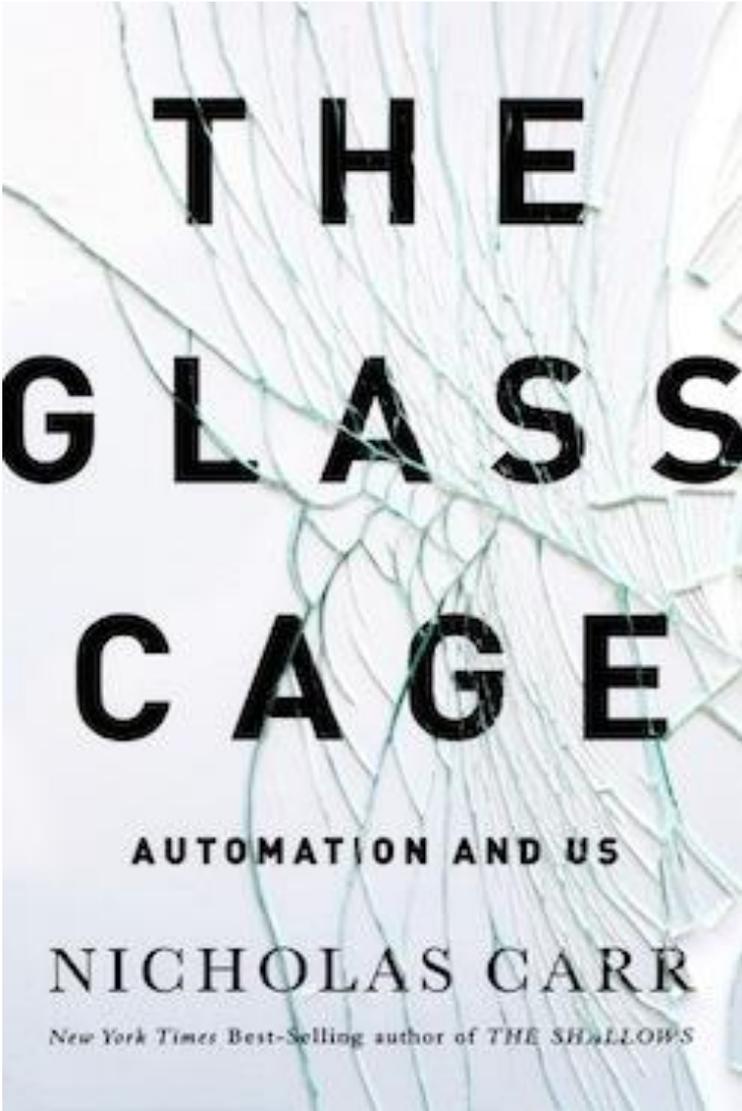
**RISE OF**

**THE**

**ROBOTS**

**TECHNOLOGY AND THE THREAT  
OF A JOBLESS FUTURE**



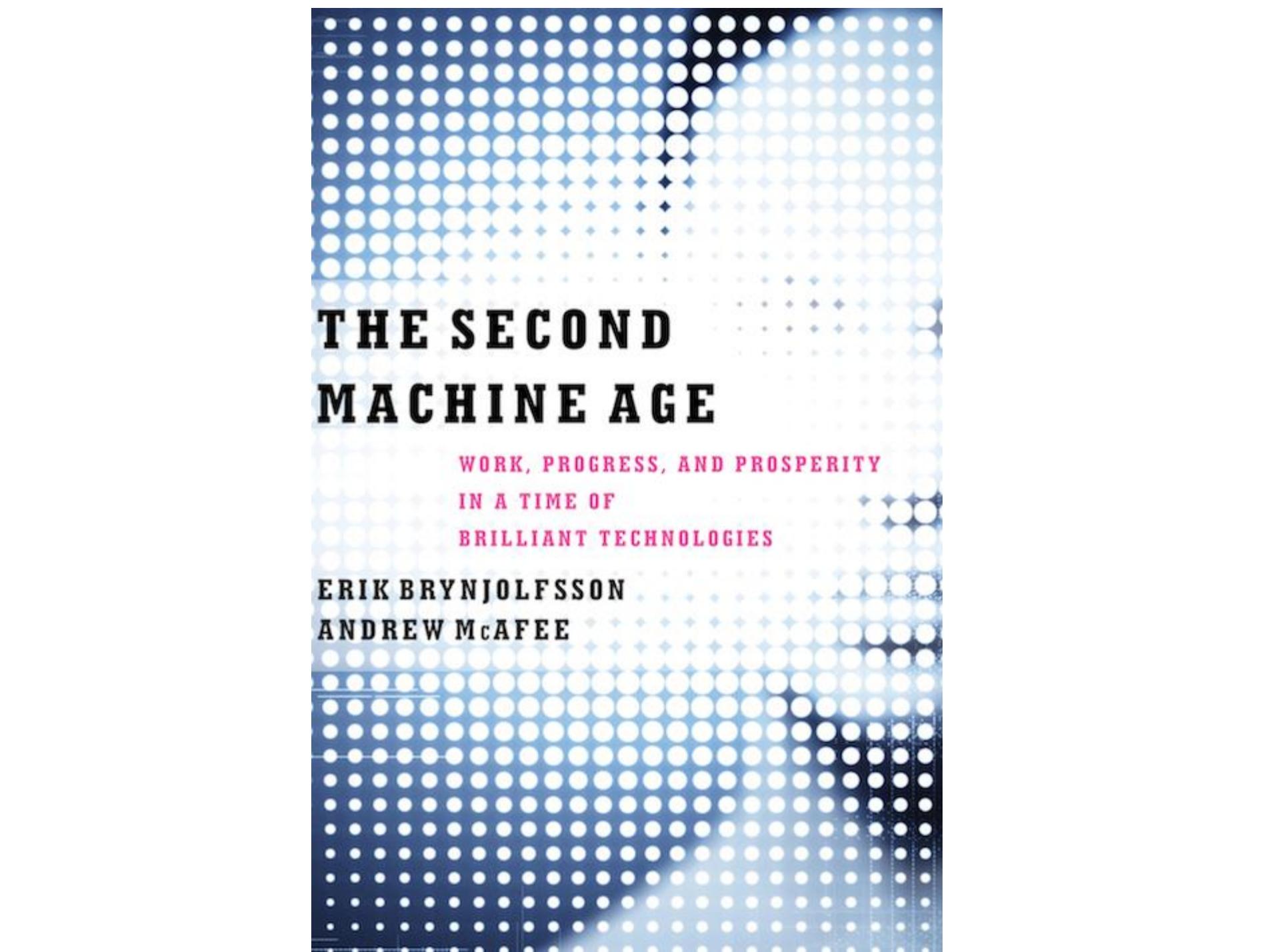


**THE  
GLASS  
CAGE**

**AUTOMATION AND US**

**NICHOLAS CARR**

*New York Times Best-Selling author of **THE SHALLOWS***



# **THE SECOND MACHINE AGE**

**WORK, PROGRESS, AND PROSPERITY  
IN A TIME OF  
BRILLIANT TECHNOLOGIES**

**ERIK BRYNJOLFSSON  
ANDREW McAFEE**



So, computers can learn – here are  
some newer things machines can do

# Newer things computers can do

Reading &  
Writing

Speaking &  
Listening

Looking at  
things

Integrating  
knowledge

- Driving cars
- Preparing food
- Diagnosing disease
- Finding legal precedents
- ...



**\$2,400**

Ken

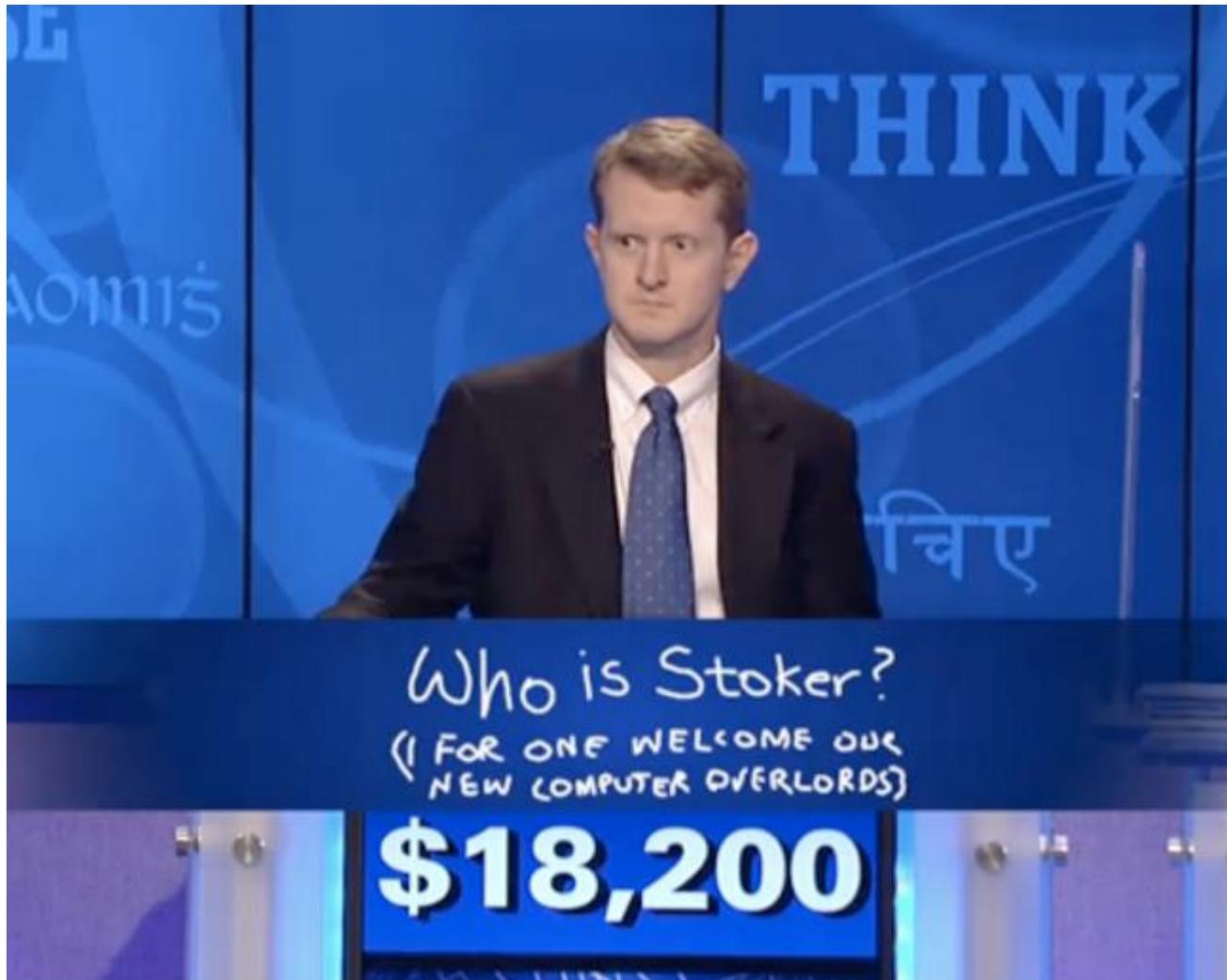
**\$36,681**

WATSON

**\$5,400**

BRAD

THE ANCIENT "LION OF NIMRUD" WENT MISSING FROM THIS CITY'S NATIONAL MUSEUM IN 2003 (ALONG WITH A LOT OF OTHER STUFF)



Who is Stoker?

(1 FOR ONE WELCOME OUR  
NEW COMPUTER OVERLORDS)

**\$18,200**

 TechRepublic

## How IBM Watson AI scales tech support for thousands

IBM is using Watson, the artificially intelligent data analytics processor to scale tech support to thousands of clients across 170 countries.

6 days ago



 Diagnostic and Interventional Cardiology (press release) (blog)

## DiA Joins with IBM Watson Health to Arm Clinicians with its AI ...

"IBM Watson Health is proud to announce a collaboration with DiA Imaging," said Anne Le Grand, General Manager, Imaging, Life Sciences ...

2 days ago



 MarTech Series

## IBM Watson Health Demonstrates Global Imaging Market ...

Hardin Memorial Health First to "Go Live" with IBM Watson Imaging Patient Synopsis. IBM Watson Health™ highlighted its recent clients and ...

1 week ago



 Fast Company

## IBM Watson rediscovers 2,000-year-old cartoon in Peru

Using aerial imagery, IBM employed its Watson Machine Learning AI to pick a possible humanoid figure out of a landscape that to the naked ...





The original aerial image (left) and reconstruction using AI and human surveying. [Photos: courtesy of IBM]



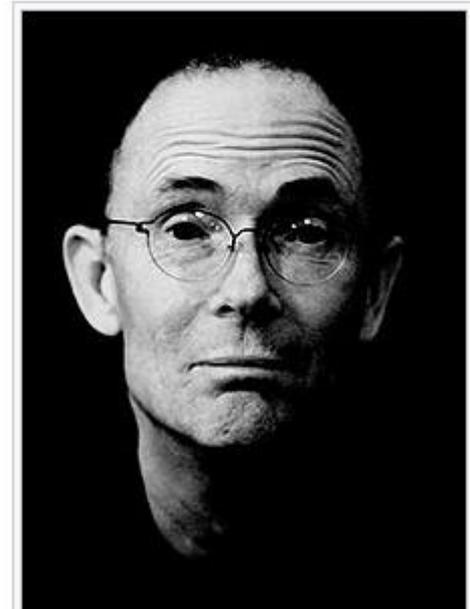
## TECHNOLOGY

# Google's Driverless Cars Run Into Problem: Cars

By MATT RICHTEL and CONOR DOUGHERTY SEPT. 1, 2015



- “The future has arrived — it’s just not evenly distributed yet.”
  - William Gibson (probably)



# Waymo celebrates first year of self-driving taxi service



*Credit: Waymo*

## AUTHOR

[Jason Plautz](#)

[@Jason\\_Plautz](#)

## PUBLISHED

## Dive Brief:

- To mark the one-year anniversary of its commercial autonomous taxi service, Waymo announced it will expand the ridership base of Waymo One. That includes releasing its app on the iOS store, rather than keeping it

MAJOR LEAP

# WAYMO IS TAKING THE SAFETY DRIVERS OUT OF ITS AUTONOMOUS TAXIS



WAYMO

# UPS Has Been Delivering Cargo in Self-Driving Trucks for Months And No One Knew



Jennings Brown

8/15/19 12:50PM • Filed to: AUTONOMOUS VEHICLES ▾



843.0K



402



4



# An Autonomous Semi-Truck Just Drove Across America To Deliver Butter



**Sebastian Blanco** Contributor 

Transportation

f

🐦

in





**Customer Driven Design:**  
Imaging the Next Generation Digital Workspace

WATCH VIDEO

Presented by  
**CITRIX**

Want to go ad free?

COMPUTING NEWS

11 COMMENTS



# Facebook Creates Software That Matches Faces Almost as Well as You Do

Facebook's new AI research group reports a major improvement in face-processing software.

By Tom Simonite on March 17, 2014

Asked whether two unfamiliar photos of faces show the same person, a human being will get it right 97.53 percent of the time. New software developed by researchers at Facebook can score 97.25 percent on the same challenge, regardless of variations in lighting or whether the person in the picture is directly facing the camera.

That's a significant advance over previous face-matching software, and it demonstrates the power of a new approach to artificial intelligence known as deep learning, which Facebook and its competitors have bet heavily on in the past year (see "[Deep Learning](#)"). This area of AI involves software that uses networks of simulated neurons to learn to recognize patterns in large amounts of data.

"You normally don't see that sort of improvement," says Yaniv Taigman, a



**EmTech**  
**DIGITAL**

June 1-2, 2015



**John Maeda**

Design Partner, Kleiner Perkins  
Caufield & Byers  
*Technology and Design in the  
Digital Era*

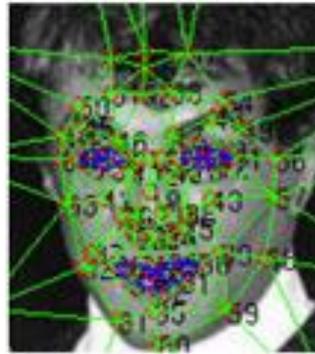
WHY IT MATTERS



(a)



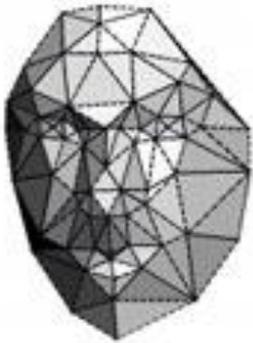
(b)



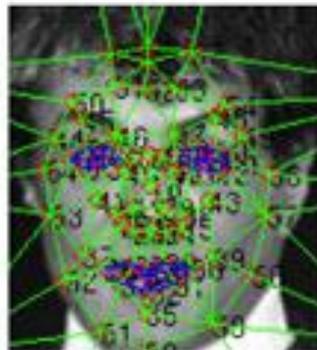
(c)



(d)



(e)



(f)



(g)

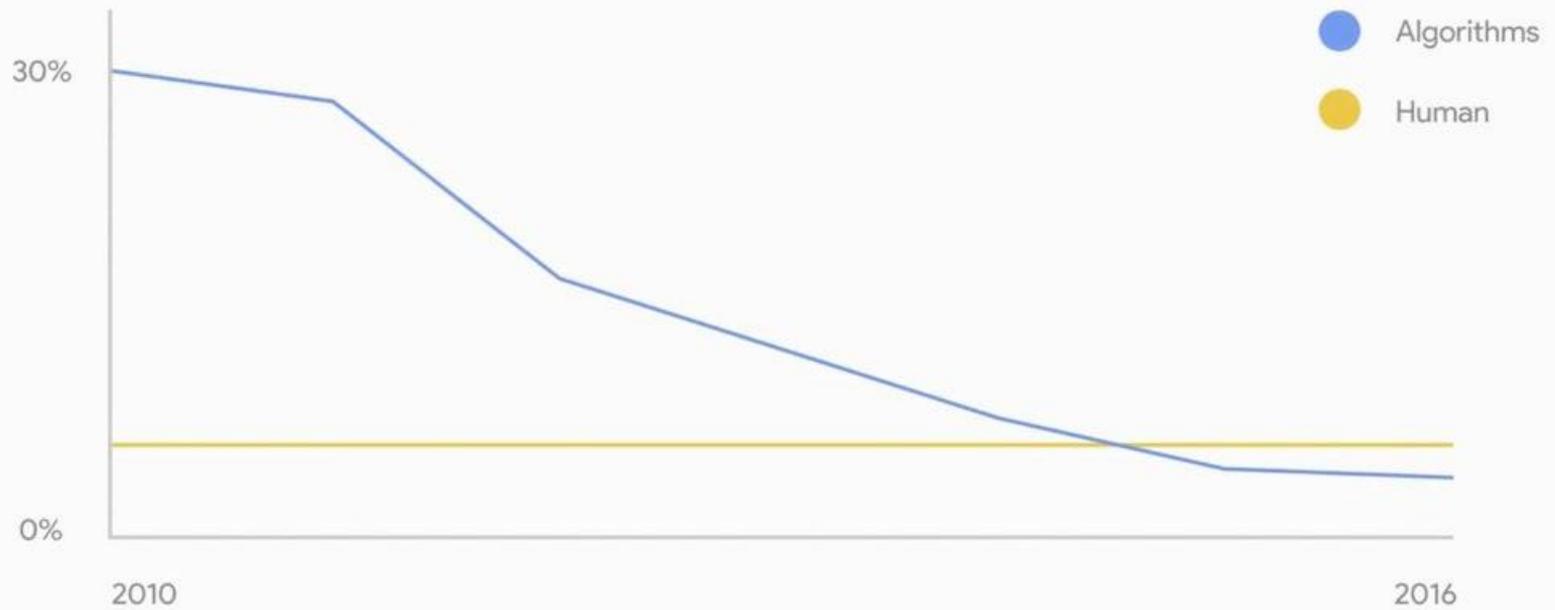


(h)

**Head turn:** DeepFace uses a 3-D model to rotate faces, virtually, so that they face the camera. Image (a) shows the original image, and (g) shows the final, corrected version.

# Image Recognition

## Vision Error Rate





## PREVENT RETAIL CRIME

Face recognition is currently being used to instantly identify when known shoplifters, organized retail criminals or people with a history of fraud enter retail establishments. Photographs of individuals can be matched against large databases of criminals so that loss prevention and retail security professionals can be instantly notified when a shopper enters a store that prevents a threat. Face recognition systems are already [radically reducing retail crime](#). According to our data, face recognition reduces external shrink by 34% and, more importantly, reduces violent incidents in retail stores by up to 91%.



## UNLOCK PHONES

A variety of phones including the latest iPhone are now using face recognition to unlock phones. This technology is a powerful way to protect personal data and ensure that, if a phone is stolen, sensitive data remains inaccessible by the perpetrator.



## SMARTER ADVERTISING

Face recognition has the ability to make advertising more targeted by making educated guesses at people's age and gender. Companies like Tesco are already planning on installing screens at gas stations with face recognition built in. It's only a matter of time before face-recognition becomes an omni-present advertising technology.



## FIND MISSING PERSONS

Face recognition can be used to find missing children and victims of human trafficking. As long as missing individuals are added to a database, law enforcement can become alerted as soon as they are recognized by face recognition—be it an airport, retail store or other public space. In fact, 3000 missing children were discovered in just four days using [face recognition in India](#)

# Big Brother is watching: Chinese city with 2.6m cameras is world's most heavily surveilled



# China's social credit system 'could interfere in other nations' sovereignty'

**System, criticised as an Orwellian tool of mass surveillance, is shaping behaviour of foreign businesses, report says**



▲ The Chinese government says its social credit system – whereby people can be blacklisted for transgressions such as failing to pay fines – is a way of encouraging moral behaviour by its citizens. Photograph: Thomas Peter/Reuters

China's social credit system, a big-data system for monitoring and shaping business and citizens' behaviour, is reaching beyond China's borders to impact foreign companies, according to new research.

18,030 views | Feb 8, 2019, 11:41am

# Did A Robot Write This? How AI Is Impacting Journalism



**Nicole Martin** Former Contributor

AI & Big Data

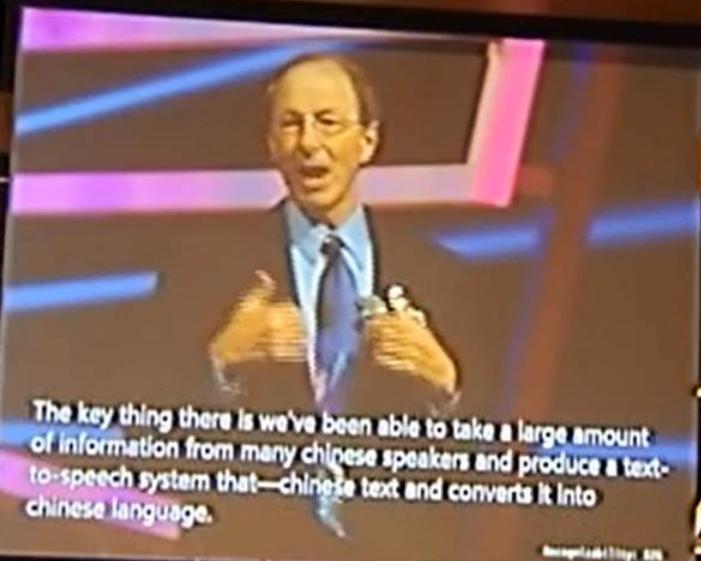
*I write about digital marketing, data and privacy concerns.*



Robot concept or robot hand chatbot pressing computer keyboard enter industry photo

Washington Post robot reporting program Heliograf produced 850 articles in its first year. Readers do not know which stories are written by humans.

# Research



The key thing	关键
there is	是
we	我们
've	我们
been able to	能够
take	人们
a large amount of	大量的
information	信息
from	来自
many chinese	许多
speakers	发言者
and produce	文字语音
a text-to-speech	系统
system	，
that	中文文本

关键是我们能够把大量的信息，中国许多发言者和制作文字语音系统，中文文本并将其转换为中文。

计算，二十一世纪的  
自然语言

Computing in the  
21<sup>st</sup> Century  
自然语言  
Computing, Natural

# Machine Intelligence LANDSCAPE

## CORE TECHNOLOGIES

### ARTIFICIAL INTELLIGENCE



### DEEP LEARNING



### MACHINE LEARNING



### NLP PLATFORMS



### PREDICTIVE APIS



### IMAGE RECOGNITION



### SPEECH RECOGNITION



## RETHINKING ENTERPRISE

### SALES



### SECURITY / AUTHENTICATION



### FRAUD DETECTION



### HR / RECRUITING



### MARKETING



### PERSONAL ASSISTANT



### INTELLIGENCE TOOLS



## RETHINKING INDUSTRIES

### ADTECH



### AGRICULTURE



### EDUCATION



### FINANCE



### LEGAL



### MANUFACTURING



### MEDICAL



### OIL AND GAS



### MEDIA / CONTENT



### CONSUMER FINANCE



### PHILANTHROPIES



### AUTOMOTIVE



### DIAGNOSTICS



### RETAIL



## RETHINKING HUMANS / HCI

### AUGMENTED REALITY



### GESTURAL COMPUTING



### ROBOTICS



### EMOTIONAL RECOGNITION



## SUPPORTING TECHNOLOGIES

### HARDWARE



### DATA PREP

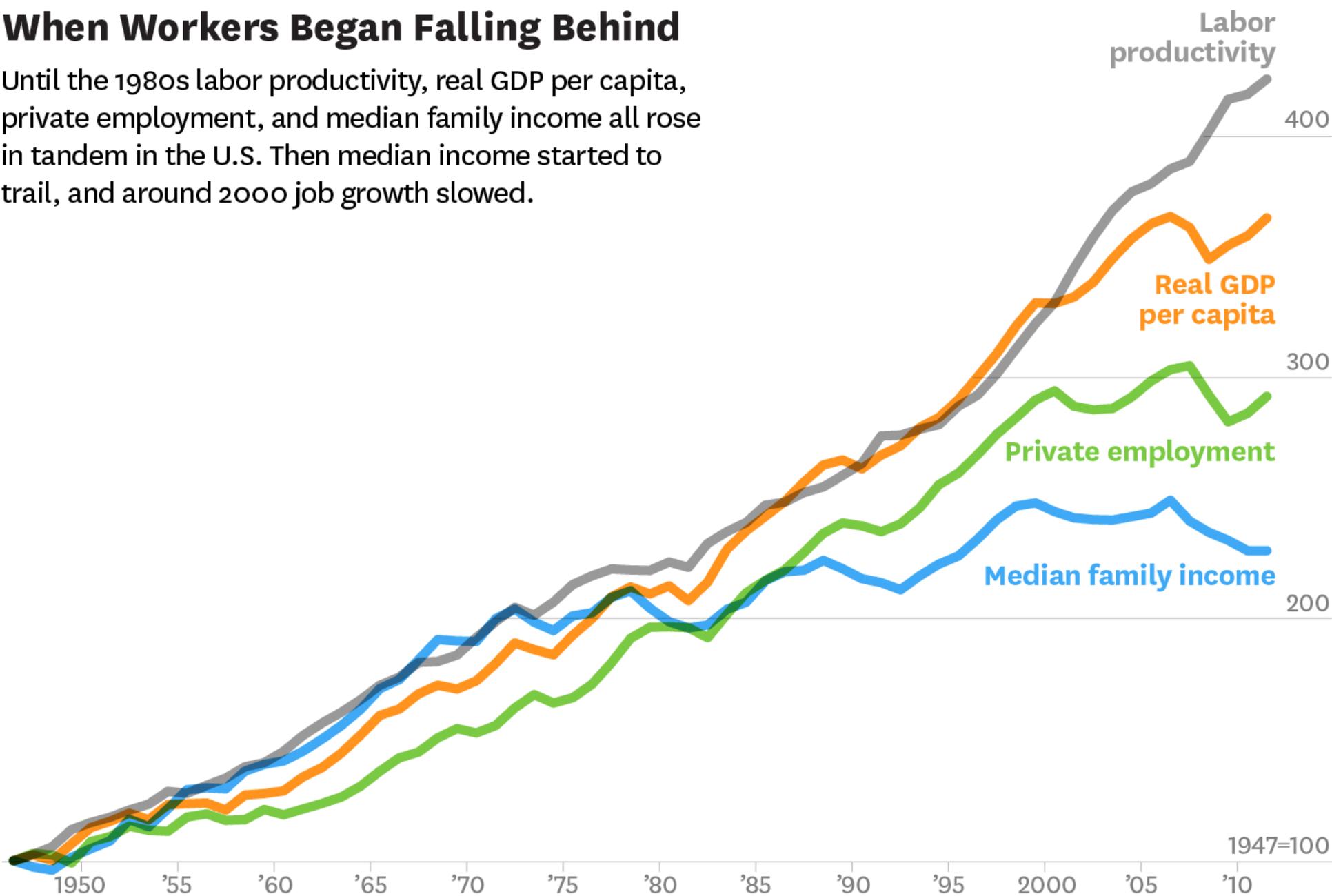


### DATA COLLECTION



# When Workers Began Falling Behind

Until the 1980s labor productivity, real GDP per capita, private employment, and median family income all rose in tandem in the U.S. Then median income started to trail, and around 2000 job growth slowed.



SOURCE FEDERAL RESERVE BANK OF ST. LOUIS; ERIK BRYNJOLFSSON AND ANDREW MCAFEE  
FROM "THE GREAT DECOUPLING," JUNE 2015

© HBR.ORG

Leaving that aside...

Problem: Newer things that computers can do are what humans get paid to do...

Reading & Writing

Speaking & Listening

Looking at things

Integrating knowledge

- Driving cars
- Preparing food
- Diagnosing disease
- Finding legal precedents
- ...

- So, not online learning, right?

# Udacity

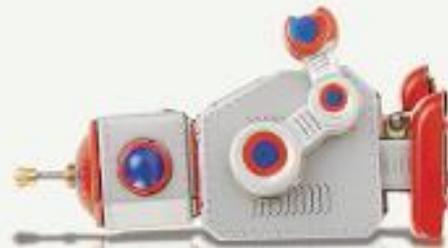
- Udacity is my response to the development of AI. The mission I have to educate everybody is really an attempt to delay what AI will eventually do to us, because I honestly believe people should have a chance.”
  - Sebastian Thrun,
    - Founder Udacity

'EXTREMELY IMPORTANT, HIGHLY PRACTICAL AND EXHILARATING'

Sir Martin Sorrell, CEO, WPP

# HUMANS ARE UNDERRATED

WHAT HIGH ACHIEVERS KNOW  
THAT BRILLIANT MACHINES NEVER WILL



## GEOFF COLVIN

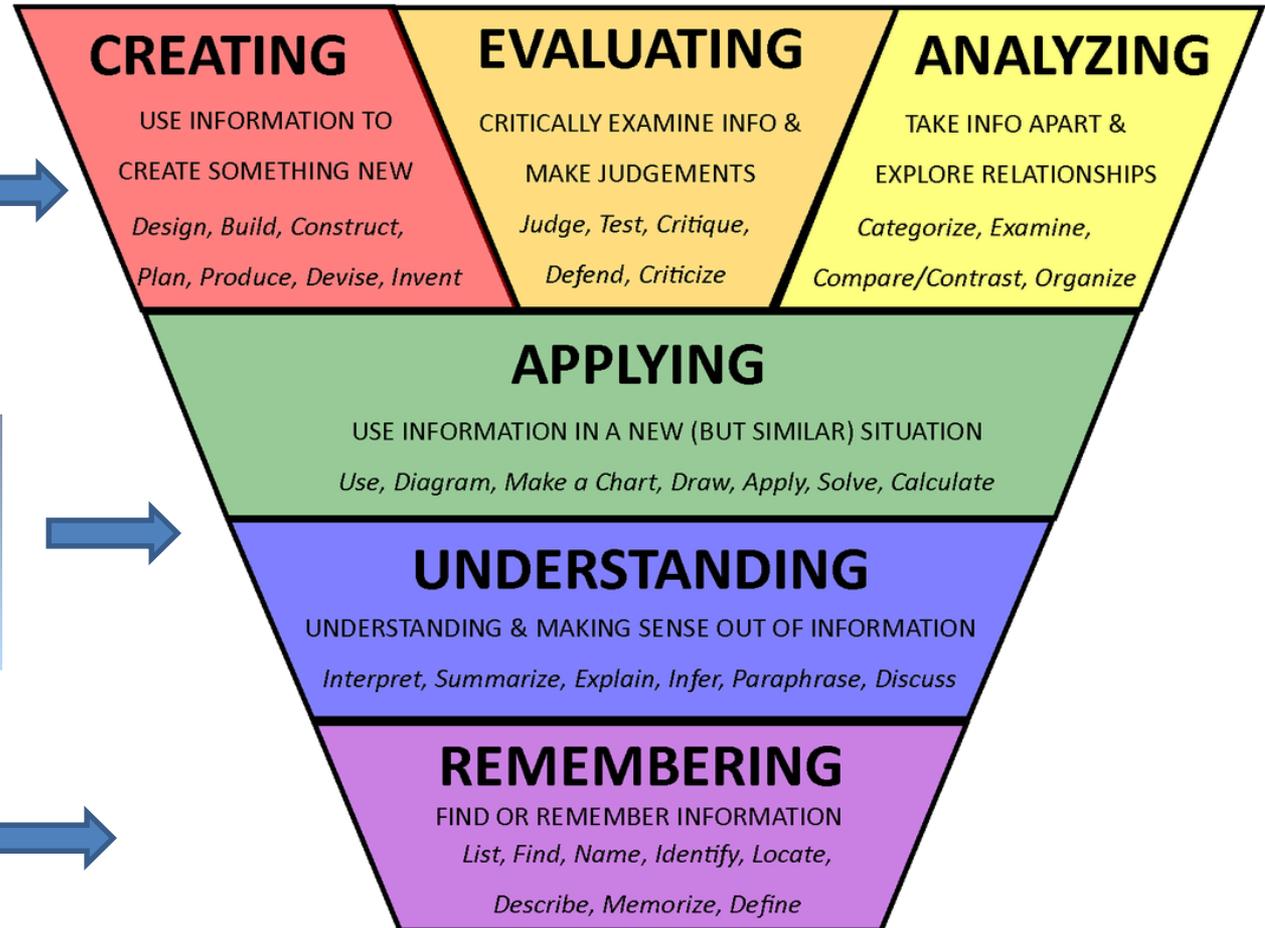
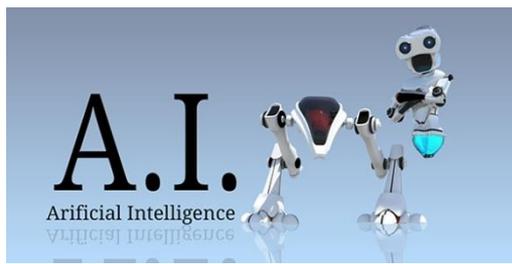
Bestselling author of **TALENT IS OVERRATED**

# What Humans Can Do

- Learning is complex
  - Cognitive
  - Social\*
  - Psychological/Developmental\*
  - Affective/Emotional\*
  - Interpersonal\*
  - Motivational\*

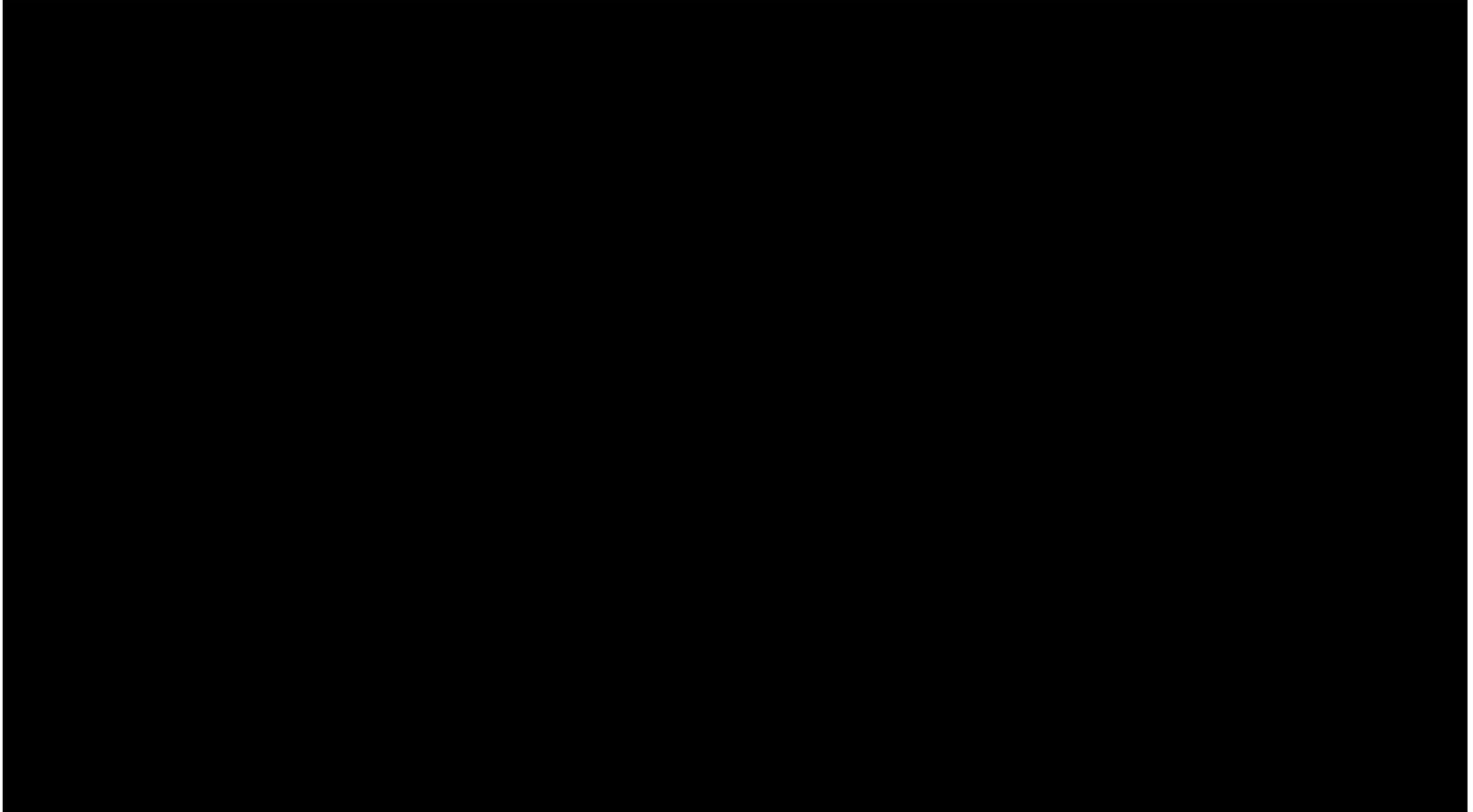
Race with the machines, not against  
them...

# Learning Taxonomy: People and Machines



(Bloom, 1956; Anderson & Krathwohl, 2001)

# An example: Learners as Creators



# Start with ourselves

- We have agency – we can make choices
- Don't accept automation blindly
- Start with our own teaching practice
- Be reflective about the use of technology
- What are we giving up, what are we gaining?

# Humanistic Values for (Online) Learning

- Communities reflect values
- Value of learning can be *Instrumental* or *Generative*
- Learn computation + Get me a job = *Instrumental* values
- Develop students voice, teach them to think, help them contribute, identity - become someone valuable = *Generative* values

# The Influence of Automation on Values

- I think there's a real risk, that we as a society, are going to end up giving too much privilege to the types of knowledge and the types of activity that are most easily evaluated and assessed computationally.

Mitch Resnick, MIT Media Lab

# Scratch Community

- Community teaches skills, strategies, + values



SCRATCH Create Explore Discuss Help Search Join Scratch Sign in

Create stories, games, and animations  
Share with others around the world



TRY IT OUT



SEE EXAMPLES



JOIN SCRATCH  
(it's free)



```
when green flag clicked
repeat 10
  move 10 steps
  change color effect by 25
  play drum 4 for 0.2 beats
  say Welcome to Scratch! for 2 secs
```

A creative learning community with **5,517,281** projects shared

[ABOUT SCRATCH](#) | [FOR EDUCATORS](#) | [FOR PARENTS](#)

# Empathy

- Millions of years of evolution has hardwired us for empathy
- We are empathic – we can't help it
- People (e.g. students) value empathy
- Online educators should prioritize “empathic teaching”

# Teaching with not against Technology

- Does the technology
  - foster creativity and personal expression?
  - develop the learner and contribute to her formation as a person?
  - have the human teacher and/or peer learners at the center
  - consider the whole learner?
  - Is the technology fun and engaging?

(George Siemens, 2015)

# Where Humans Excel

- Digital technologies do a poor job of satisfying most of our social drives...
- Work that taps into these drives will continue to be done by people...
- ...tasks that require empathy, leadership, teamwork, and coaching.
  - Brynjolfsson & McAfee, 2018



# What to do...

Be a (an online) professor who:

1. makes students excited about learning
2. cares about students as people
3. encourages students to pursue their goals and dreams
4. assigns long-term projects
5. encourages jobs or internships where students apply what they are learning
6. is involved in supporting extra-curricular activities

# Why? The Gallup-Purdue Index

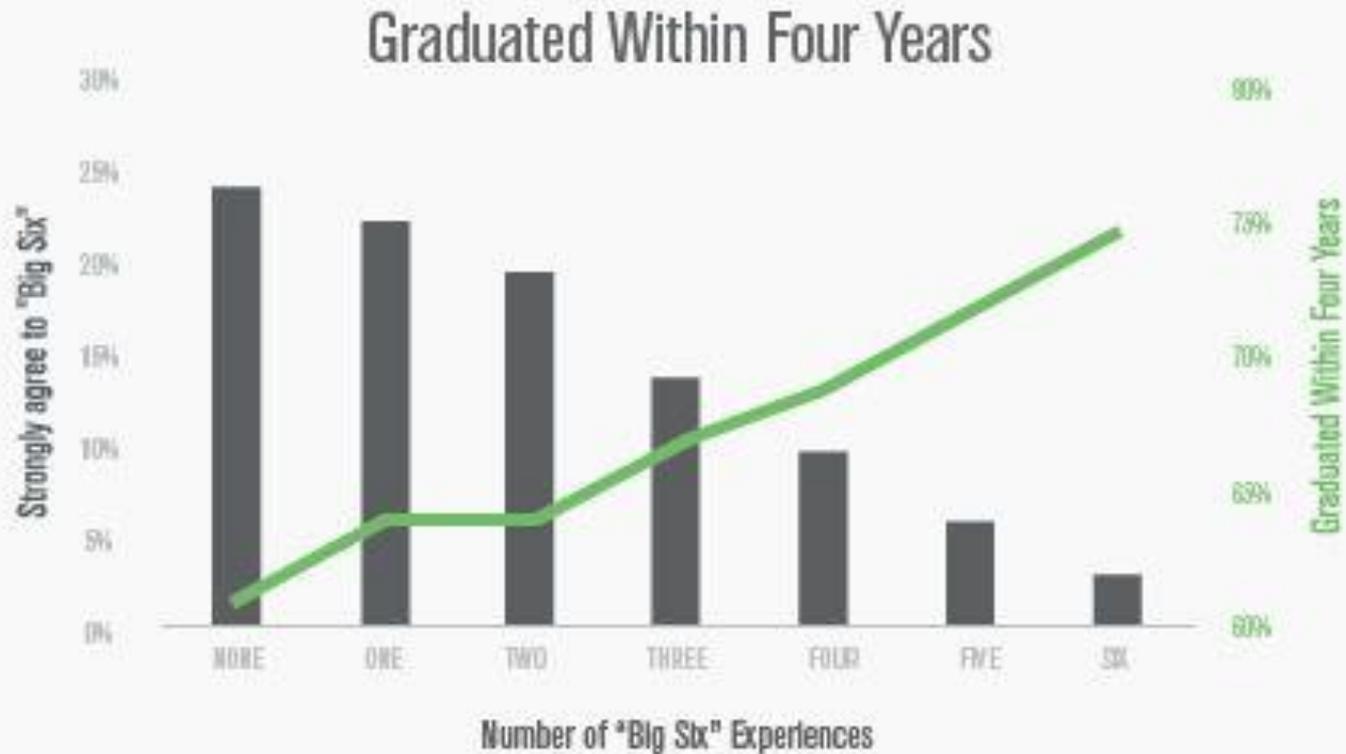
## U.S. College Graduates' Outcomes, by Number of "Big Six" Experiences

	NONE	SIX
Strongly agreed college prepared for life after college	5%	82%
Thriving in all five elements of well-being	7%	17%
Engaged at work	25%	65%
On-time graduation	61%	75%

*Gallup-Purdue Index  
Feb. 4-March 7, 2014*

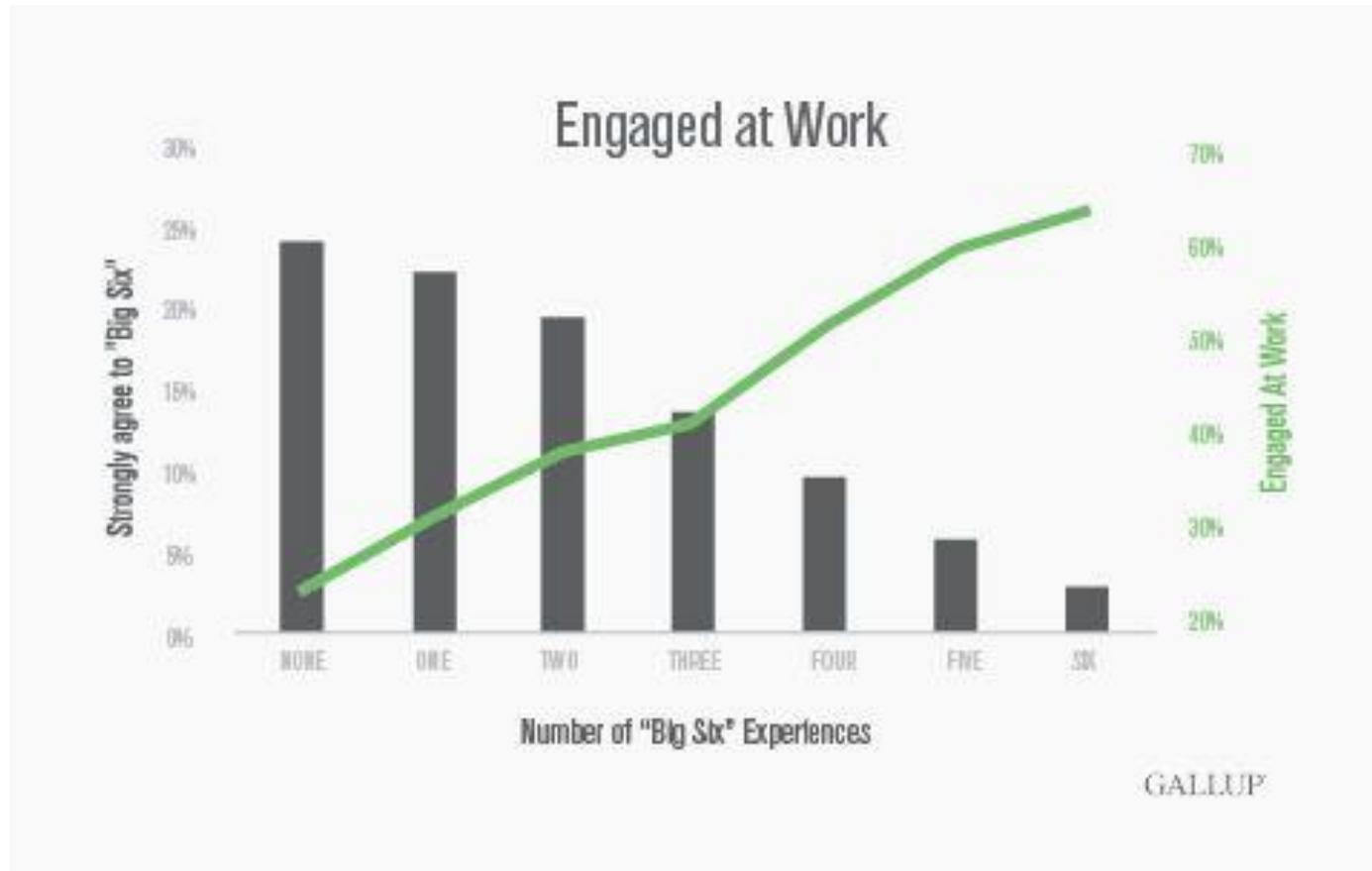
GALLUP

# Time to Degree



GALLUP

# Subsequent Professional Engagement



# Feeling Prepared for Life



GALLUP

# Online Learning

- So what should we do with online learning to make it better than the classroom according to the research literature?
- How do we leverage our human qualities?

# Meta-analytic Evidence

# Zhou et al Meta-analysis

- 2005 Meta-analysis
- What makes a difference? When is DL better?
- Publication year – 1998 is a watershed...why?

**Table 3. Impact of publication year on effectiveness**

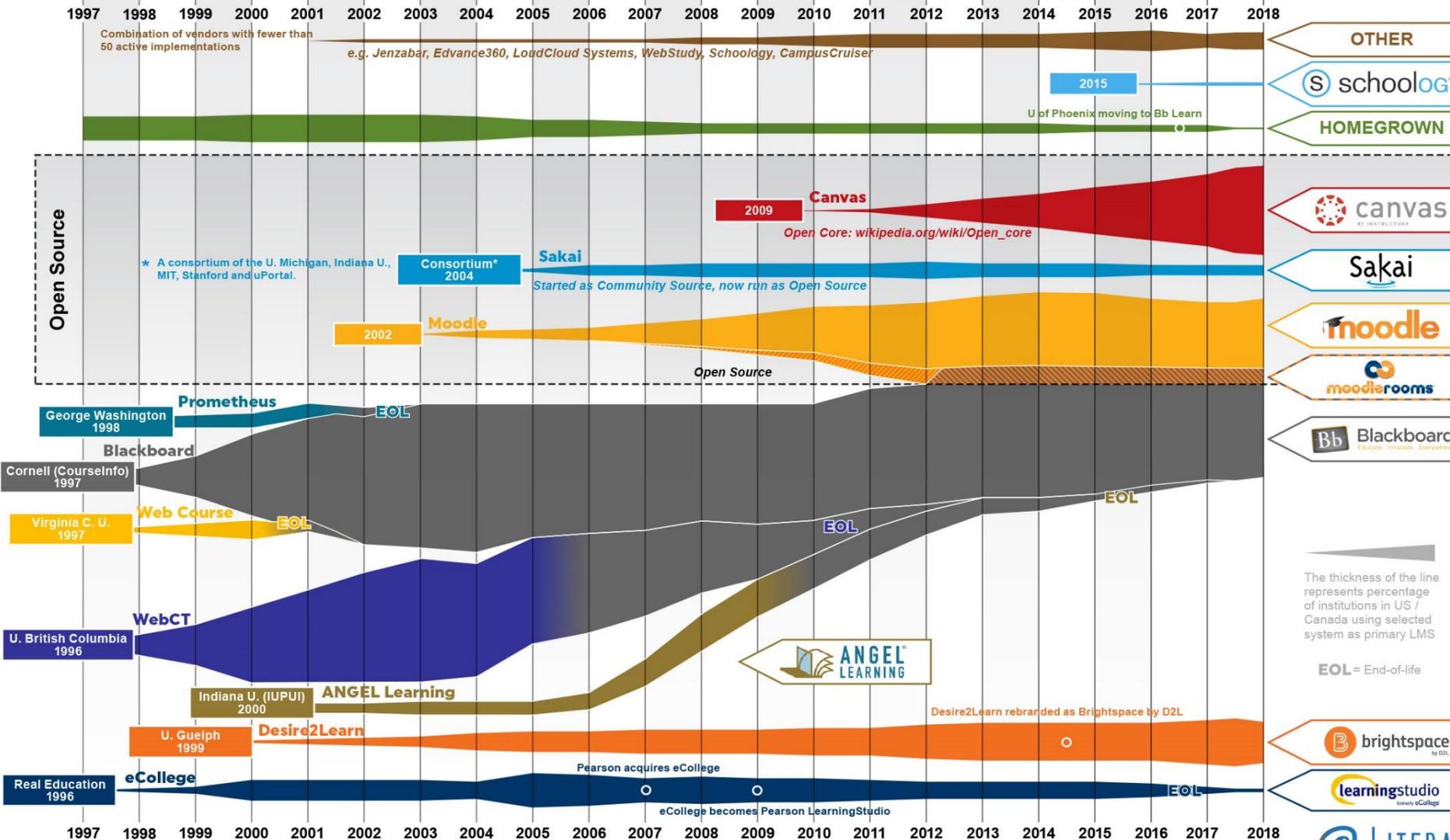
Publication year	<i>k</i>	<i>d</i>	<i>p</i>
Before 1998	20	– .10 ± .11	
1998 or after	77	.20 ± .04	<.001

# LMS Market Share For US & Canadian Higher Ed Institutions

JANUARY 2018 EDITION

LEARNING MANAGEMENT SYSTEM

LEARNING PLATFORM



All data from LISTedTECH LMS database under agreement with MindWires, LLC



# Instructor Involvement

- “Instructor involvement was the most significant moderator among all the identified factors”

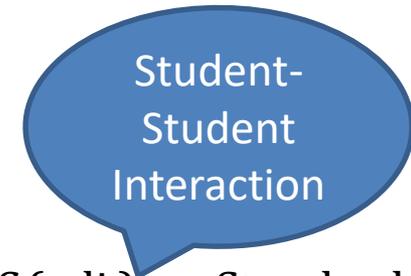
**Table 6. Impact of instructor involvement level on effectiveness**

Groups	<i>k</i>	<i>d</i>	<i>p</i>
Low ( $\leq 40\%$ )	9	$-.24 \pm .14$	$<.001$
Medium (50–70%)	32	$.29 \pm .08$	$<.001$
High (80–100%)	35	$.21 \pm .06$	$<.001$

# Human Interaction

- Studies of distance programs that employed both synchronous and asynchronous means of (mostly human) interaction found distance education to be significantly better than face-to-face education ( $d = .22$ ,  $p < .001$ ).

# Interaction Types



Interaction Categories	Number of Studies	Average <i>ES</i> (adj.)	Standard Error
Student-Student (SS)	10	0.49	0.08
Student-Instructor (SI)	44	0.32	0.04
Student-Content (SC)	20	0.46	0.05
Total	74	0.38	0.03



TEACHING ONLINE PEDAGOGICAL REPOSITORY

Search ...

[HOME](#)[PEDAGOGICAL PRACTICES](#)[FOR CONTRIBUTORS](#)[CONTRIBUTING AUTHORS](#)[EDITORIAL BOARD](#)

## PEDAGOGICAL PRACTICE

**Note:** Online/blended learning pedagogical practices are organized into three categories: [Course Content](#), [Interaction](#), and [Assessment](#). A selection of entries in each category appears below.

**TIP:** Click a linked phrase in order to view full entry. (On each page you may leave a star rating or use the "Leave a Reply" box on the bottom of the page to make comments.)

### Course Content

- Create [Modules](#) to Organize and Present Content and Learning Activities
- [Create Accessible Narrated PowerPoint for Content Delivery Online](#)
- Use [Advance Organizers](#) to present a course/module framework
- Use a [Course Orientation Module](#) or Getting Started Module as an orientation to your online course
- Use [images](#) with the considerations of accessibility and copyright to illustrate online course content
- Use [Screencasts](#) to provide students tutorials or to explain harder to grasp concepts
- Use [Scavenger Hunts](#) to orient students and help them make connections between course materials and their daily lives
- Use [videos](#) to illustrate complicated conceptual knowledge

See all [Course Content](#) entries

# Teaching Online Pedagogical Repository (UCF)

- [Interaction](#)
- Use [Discussion Prompts](#) to facilitate discussions
- [Implement Tuning Protocol to Improve Online Discussion Peer Replies and Assignment Quality](#)
- [Engage adult learners with course-long role play](#)
- Keep students engaged/successful with [Intervention messages](#)
- Use [Social Networking](#) tools to share with students brief supplemental content links and status updates related to course work
- Send a [Welcome Message](#) to students before the class begins

# What we know about OLL

- 15 meta-analyses indicate it is as good or better
- To make it better requires focus
  - Align assessment with instruction
  - Promote interaction
  - Build sense of learning community
  - Support self regulated learning
  - Replace lectures with more active learning
  - Identifying big picture goals/big ideas in discipline
  - Inform faculty about learners status, progress, risk

# AI and Higher Education

## Applications



### **Institutional**

Marketing & Recruiting  
Admissions & Enrollment  
Curricula & Resource Planning



### **Student Support**

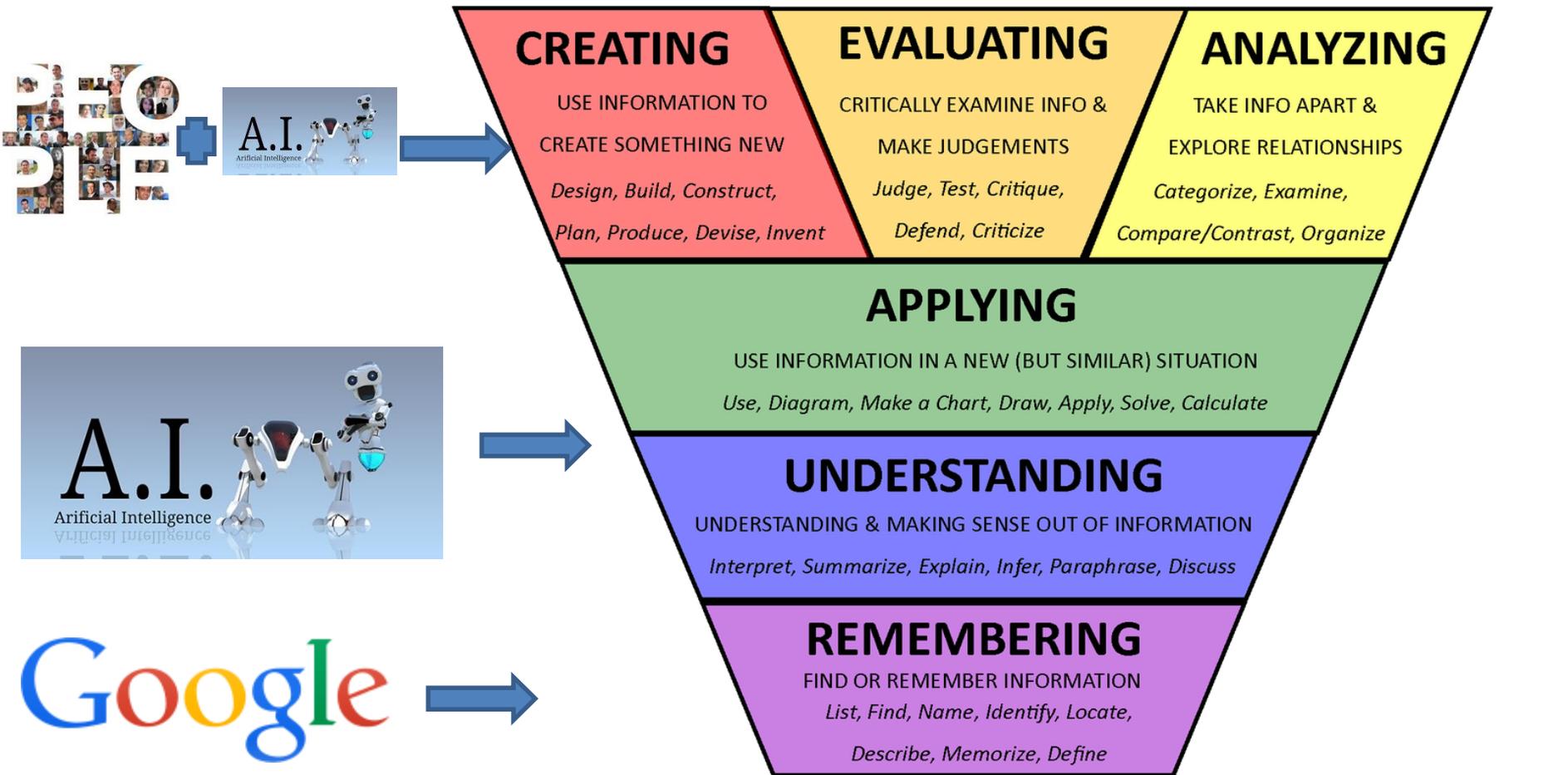
Guidance  
Just-in-Time Financial Aid  
Early Warning



### **Instructional**

Self-Paced Progress  
"Personalized Learning"  
Pedagogical Improvement

# Learning Taxonomy: People and Machines



(Bloom, 1956; Anderson & Krathwohl, 2001)

Questions?