

# BIG DATA: SOURCES, OPPORTUNITIES, AND CHALLENGES

Michael T. Braun, Ph.D.



# Putting the “Big” in Big Data

- Emphasis on the 3 “V’s” in organizational science
  - Volume, variety, velocity

So, what does that really mean?

- It’s really in the name...
  - **Size** matters!





... and big opportunities

# **BIG DATA SOURCES**

# More Traditional Approaches?

- ~~Surveys?~~
  - ...at least not very **often**...



**nVIDIA®**

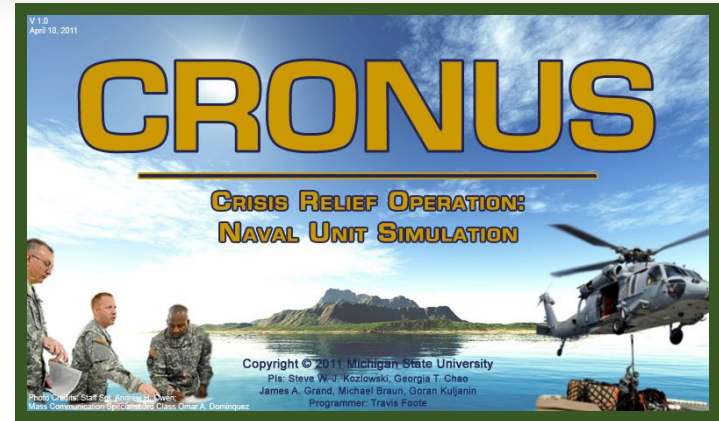


Microsoft

# More Traditional Approaches?

- Lab studies?
  - Far more **promising!!!**
    - » **Shortitudinal** (Dormann & Griffen, 2015)

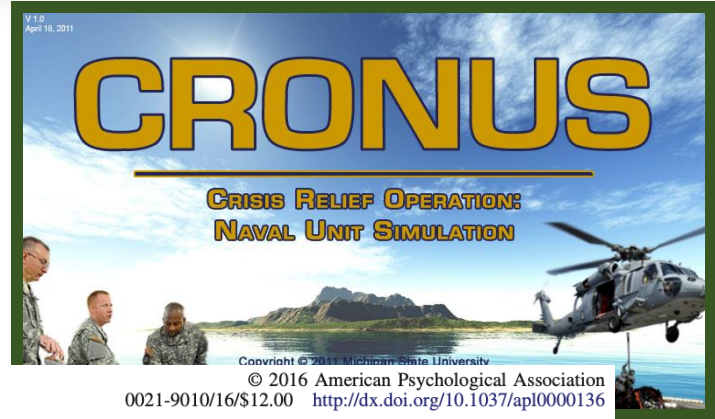
- For each participant...
  - Every mouse click and keystroke
  - 100+ per trial
- Individual-level data:
  - 35 trials per person
  - 250 people
  - Over 875,000 rows
  - 100+ coded actions (columns)
- Team-level data:
  - 3 people per team, 12 trials per session
  - 1000+ teams
  - Over 3,600,000 rows
  - Data file > 5GB





# More Traditional Approaches?

- Lab studies?
  - Far more **promising!!!**
    - » **Shortitudinal** (Dormann & Griffen, 2015)



## MONOGRAPH

### The Dynamics of Team Cognition: A Process-Oriented Theory of Knowledge Emergence in Teams

James A. Grand  
University of Maryland, College Park

Michael T. Braun  
University of South Florida

Goran Kuljanin  
DePaul University

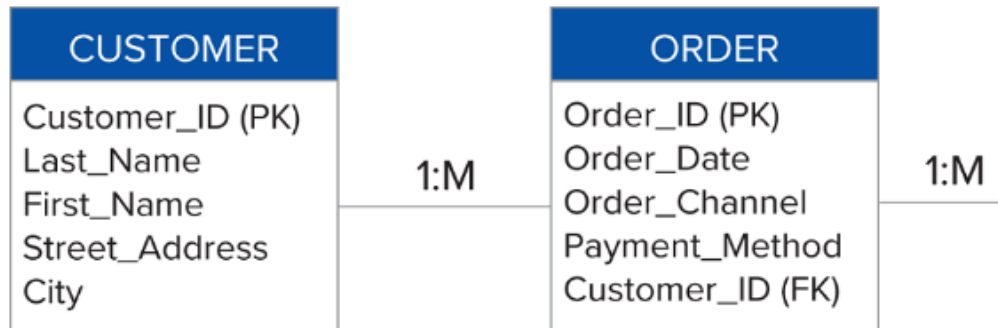
Steve W. J. Kozlowski and Georgia T. Chao  
Michigan State University

Data file > 5GB

# More Traditional Approaches?



- Organizational **Databases?**
  - Definitely!
    - » But tread **carefully**...



a) CUSTOMER table

Customer_ID	Last_Name	First_Name	Street_Address	City	...
1530016	Johnson	Claire	532 Main Street	Los Angeles	...
1531136	Anderson	James	1322 Cary Street	Los Angeles	...
⋮	⋮	⋮	⋮	⋮	⋮
1532160	Smith	Terry	663 Johnson Ave.	Los Angeles	...

b) ORDER table

Order_ID	Order_Date	Order_Channel	Payment_Method	...	Customer_ID
1484001	09/12/2021	Web	Credit/Debit Card	...	1530016
1484212	3/24/2021	Web	Credit/Debit Card	...	1530016
⋮	⋮	⋮	⋮	⋮	⋮
1482141	10/15/2021	Mobile	PayPal	...	1531136

c) ORDER\_DETAIL table

Order_ID	Product_ID	Quantity
1484001	4378	1
1482141	4305	1
⋮	⋮	⋮
1482141	4330	2

d) PRODUCT table

Product_ID	Product_Name	Product_Category	Weight	Price	...
4305	Organic Oatmeal	Cereals	2	2.49	...
4330	Organic Sweet Potato	Produce	1	1.39	...
⋮	⋮	⋮	⋮	⋮	⋮
4378	Gluten-Free Bread	Bakery	1.5	6.99	...

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85TH ANNUAL MEETING



25-29 JULY 2025 | COPENHAGEN, DENMARK



1:M

Last\_Name  
First\_Name  
Street\_Address  
City



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CONFERENCE**

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# More Novel Approaches

You've  
**Got**  
Mail

- Emails and chats



500,000+ emails between top executives discussing illegal and unethical practices!

# More Novel Approaches

You've  
**Got**  
Mail

- Emails and chats



<http://pubsonline.informs.org/journal/mnsc/>

## Enculturation Trajectories: Language, Cultural Adaptation, and Individual Outcomes in Organizations

Sameer B. Srivastava,<sup>a</sup> Amir Goldberg,<sup>b</sup> V. Govind Manian,<sup>b</sup> Christopher Potts<sup>c</sup>

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<https://doi.org/10.1287/mnsc.2016.2671>

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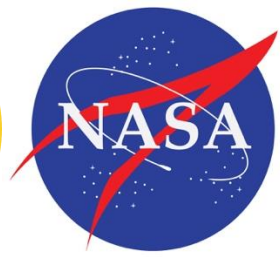
**Abstract.** How do people adapt to organizational culture, and what are the consequences for their outcomes in the organization? These fundamental questions about culture have previously been examined using self-report measures, which are subject to reporting bias, rely on coarse cultural categories defined by researchers, and provide only static snapshots of cultural fit. By contrast, we develop an interactional language use model that overcomes these limitations and opens new avenues for theoretical development about the dynamics of organizational culture. We trace the enculturation trajectories of employees in a mid-sized technology firm based on analyses of 10.24 million internal emails. Our language-based model of changing cultural fit (1) predicts individual attainment; (2) reveals distinct patterns of adaptation for employees who exit voluntarily, exit involuntarily, and remain employed; (3) demonstrates that rapid early cultural adaptation reduces the risk of involuntary, but not voluntary, exit; and (4) finds that a decline in cultural fit for individuals who had successfully enculturated portends voluntary departure.



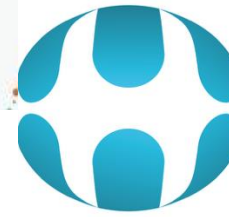
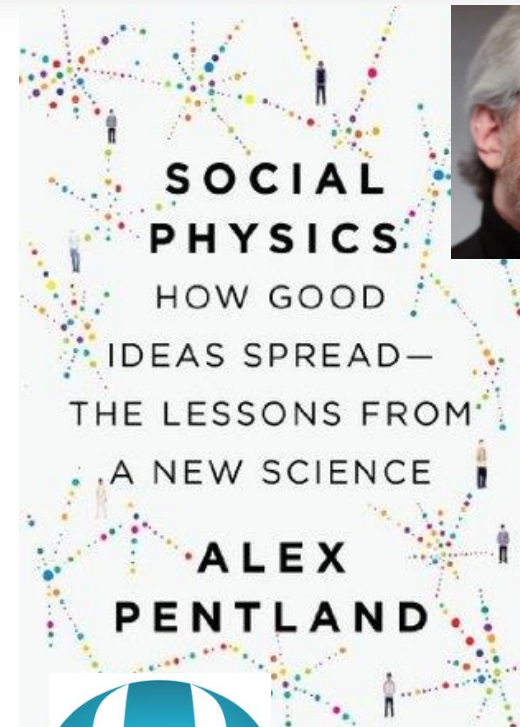
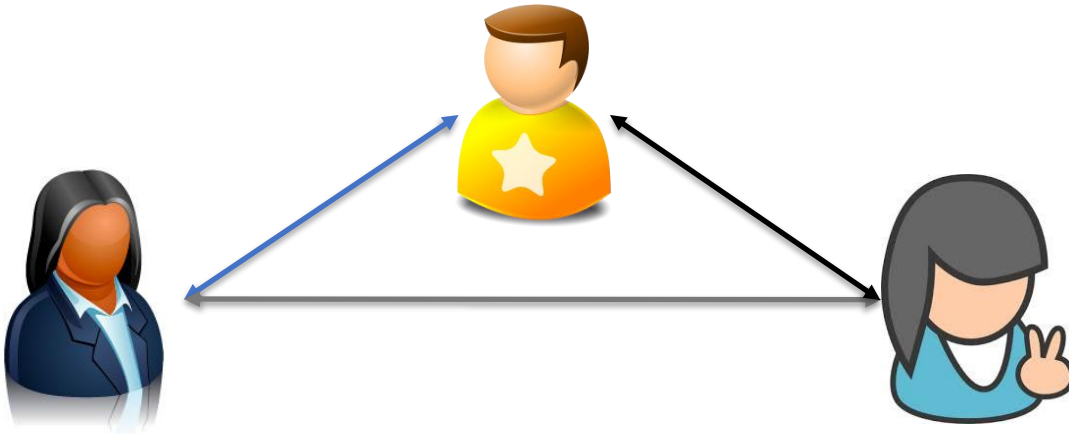
500,000

practices!

# More Novel Approaches



- Sociometric badges
  - Let's get physical (and physiological)!
    - » Heartrate
    - » Vocal amplitude
    - » Acceleration
    - » Blood pressure
    - » **Proximity** to other badges...



# More Novel Approaches

- Social media and the internet
  - Free and **publicly available!**





# More Novel Approaches

- Social media and the internet
  - Free and **publicly available!**

APPLIED PSYCHOLOGY: AN INTERNATIONAL REVIEW, 2016, 65 (2), 355–378  
doi: 10.1111/apps.12065



## Twitter Analysis: Studying US Weekly Trends in Work Stress and Emotion

Wei Wang\*

*University of Central Florida, USA*

Ivan Hernandez

*Northwestern University, USA*

Daniel A. Newman

*University of Illinois at Urbana-Champaign, USA*

Jibo He

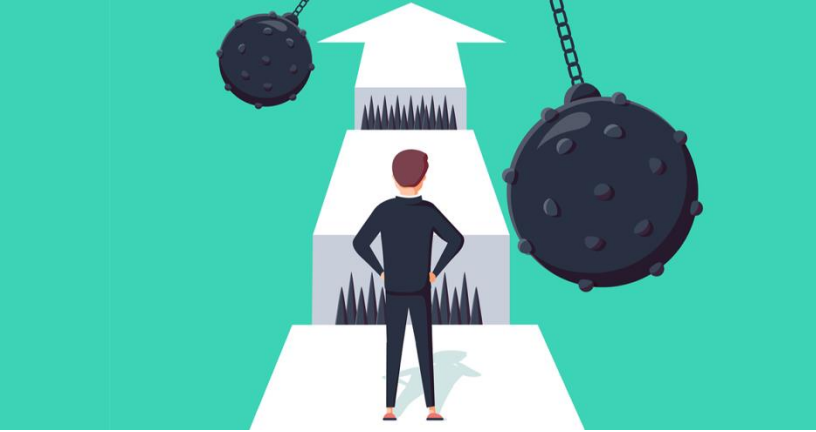
*Wichita State University, USA*

Jiang Bian

*University of Florida, USA*







# BIG DATA CHALLENGES



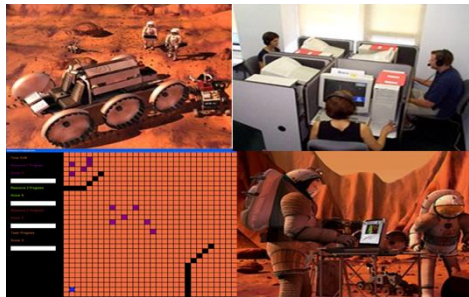
# Construct Validity

## Big Data and the Challenge of Construct Validity

Michael T. Braun  
Virginia Tech

Goran Kuljanin  
DePaul University

- How do we **measure** things like trust, efficacy, communication, coordination, performance, etc.?
- Difficult to interpret what many types of **Big Data** “**mean**” with respect to our common **constructs**
- One of the biggest hurdles to **publishing**, IMO



**Exploring the Dynamic Team Cohesion–Performance and Coordination–Performance Relationships of Newly Formed Teams**

Michael T. Braun<sup>1</sup>, Steve W. J. Kozlowski<sup>2</sup>, Tara A. (Rench) Brown<sup>3</sup>, and Richard P. DeShon<sup>2</sup>

Small Group Research  
1–30  
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DOI: 10.1177/1046496420907157  
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SAGE

# Programming Proficiency

- New **methods**...
- ...new **technologies**...
- ...new **skills**!!!



**XML**

```
<Data>
<Person>
  <Name>Rich</Name>
  <Telephone>419-528-915</Telephone>
  <Salary>160000</Salary>
</Person>
<Person>
  <Name>Benjamin</Name>
  <Telephone>203-991-608</Telephone>
  <Salary>93000</Salary>
</Person>
```

**JSON**

```
{
  "Person": [
    {
      "Name": "Rich",
      "Telephone": "419-528-0915",
      "Salary": "160000"
    },
    {
      "Name": "Benjamin",
      "Telephone": "203-991-3608",
      "Salary": "93000"
    },
    {
      "Name": "Eduardo",
      "Telephone": "618-345-1278",
      "Salary": "187000"
    }
  ]
}
```

**HTML**

```
<table>
<tr>
  <th>Name</th>
  <th>Telephone</th>
  <th>Salary</th>
</tr>
<tr>
  <td>Rich</td>
  <td>419-528-0915</td>
  <td>160000</td>
</tr>
<tr>
  <td>Benjamin</td>
  <td>203-991-3608</td>
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</tr>
<tr>
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  <td>618-345-1278</td>
  <td>187000</td>
</tr>
</table>
```

# Legal Trouble?



- When dealing with third party data
  - Even **publicly available** data!
  - Remember to check **user agreements!!!**



Twitter Terms of Service



## Special Considerations for the Acquisition and Wrangling of Big Data

Organizational Research Methods  
2018, Vol. 21(3) 633-659  
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DOI: 10.1177/1094428117690235  
journals.sagepub.com/home/orm  
SAGE

Michael T. Braun<sup>1</sup>, Goran Kuljanin<sup>2</sup>, and Richard P. DeShon<sup>3</sup>

- **Privacy and confidentiality**



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SOCIETY for  
INDUSTRIAL and  
ORGANIZATIONAL  
PSYCHOLOGY  
SCIENCE FOR A SMARTER WORKPLACE

Income and  
Employment  
Report  
2022

- Be aware of **re-identification!!!**

# The End



# Thank You!

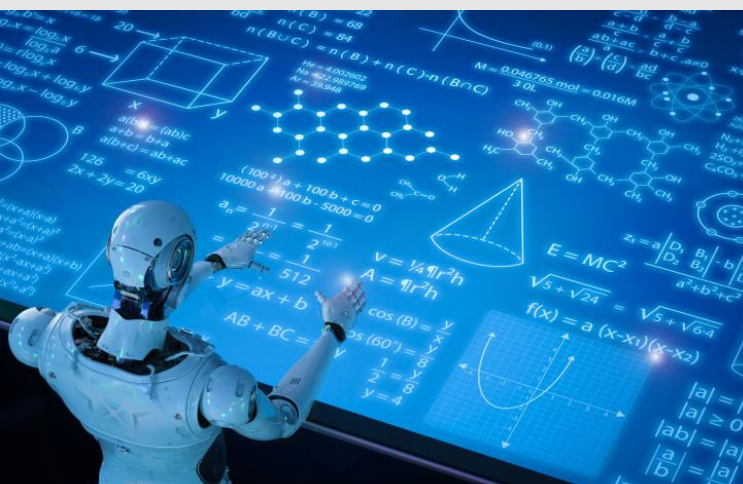
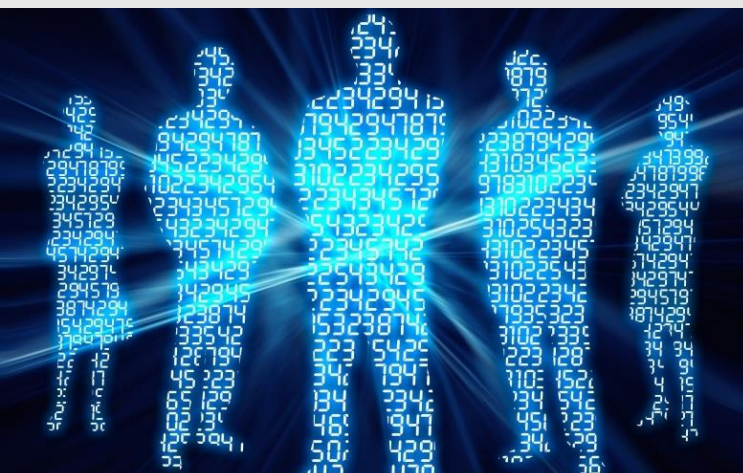
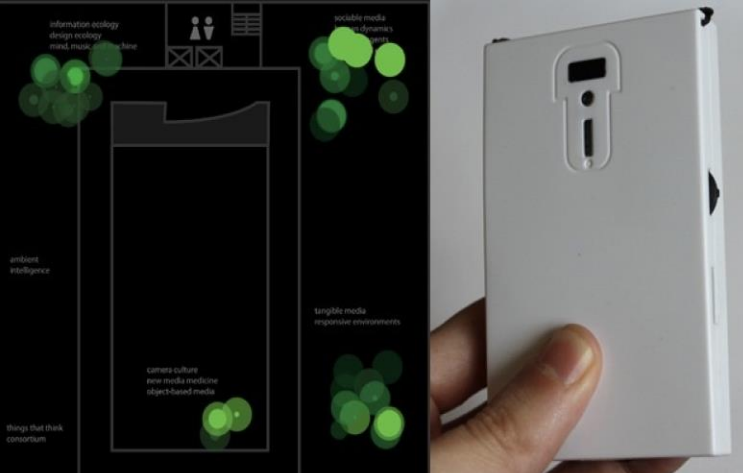
e-mail: [mbraun4@depaul.edu](mailto:mbraun4@depaul.edu)



# References and Resources



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