Organizational Data Literacy and Change

February 7, 11:30 a.m.-12:30 p.m.

Harshil Parikh

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Tuva

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Agenda for the next hour before lunch...

• Introduction
• Data literacy in two unlikely places
• A group quiz
• The need for data literacy – an example
• What does this mean for your organization?
• Questions and Discussion
A bit about Tuva

• Empowering teachers to build data literacy in classrooms
  • 8500+ schools in 90+ countries, 150+ colleges of education

• Data literacy programs for enterprises
  • Technology, talent, and training

• Data literacy and statistical capacity building for sustainable development (Africa, India)

• Working at the intersection of technology, pedagogy, learning science, curriculum, training, and implementation
Data Literacy in Classrooms

Tuva Labs uses local SAT scores for high school data curriculum

Brooklyn middle school students are using data from high schools to explore data analysis, via a new tool released by Tuva Labs. The tool is based on data released by NYC Open Data. It includes 2012 SAT scores from 32 high schools, including the number of SAT test takers by school, critical reading, math and writing scores.
Elementary schools start teaching data literacy

By Mohana Ravindranath  November 16, 2014

Elementary school teacher Lisa Parisi is trying to teach her students a new kind of literacy.

By the time fifth-graders enter her class at Denton Avenue School in New Hyde Park, NY., they are about 10 years old and have developed basic reading, writing, and math skills. They are less comfortable, Parisi found, handling data.
Data Literacy for Sustainable Development
Data Literacy for Sustainable Development
Time for a quiz

- Just 2 questions
- Read the table
- Choose the best answer
- Raise your hands
Question 1

Table 1

<table>
<thead>
<tr>
<th>College students</th>
<th></th>
<th>SEX</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Male</td>
<td>Female</td>
<td>ALL</td>
</tr>
<tr>
<td>Business</td>
<td>60%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td>Economics</td>
<td>10%</td>
<td>50%</td>
<td>30%</td>
</tr>
<tr>
<td>MIS</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>ALL</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

A. 60% of these college business majors are males

B. 60% of these male college students are business majors

C. 60% of these college students are male business majors

D. 60% of these male business majors are college students

E. More than one of the above

F. None of the above
A. 60% of these college business majors are males

B. 60% of these male college students are business majors

C. 60% of these college students are male business majors

D. 60% of these male business majors are college students

E. More than one of the above

F. None of the above
Question 2

Table 2

<table>
<thead>
<tr>
<th>College students</th>
<th>SEX</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Business</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Economics</td>
<td>17%</td>
<td>83%</td>
</tr>
<tr>
<td>MIS</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>ALL</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

A. 75% of these college business majors are males
B. 75% of these male college students are business majors
C. 75% of these college students are male business majors
D. 75% of these male business majors are college students
E. More than one of the above
F. None of the above
Answer 2

Table 2

<table>
<thead>
<tr>
<th>College students Major</th>
<th>SEX Male</th>
<th>Female</th>
<th>ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>75%</td>
<td>25%</td>
<td>100%</td>
</tr>
<tr>
<td>Economics</td>
<td>17%</td>
<td>83%</td>
<td>100%</td>
</tr>
<tr>
<td>MIS</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>ALL</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
</tbody>
</table>

A. 75% of these college business majors are males

B. 75% of these male college students are business majors

C. 75% of these college students are male business majors

D. 75% of these male business majors are college students

E. More than one of the above

F. None of the above
Question 3

A. 25% of non-running smokers are females

B. 25% of females are smokers who are non-runners

C. 25% of female smokers are non-runners

D. 25% of female non-runners are smokers

E. More than one of the above

F. None of the above
Answer 3

A. 25% of non-running smokers are females

B. 25% of females are smokers who are non-runners

C. 25% of female smokers are non-runners

D. 25% of female non-runners are smokers

E. More than one of the above

F. None of the above
Another example

'Rexercise labels' beat out calorie counts in steering consumers away from junk food

December 20, 2011

(Relaxnews) - American health experts are suggesting that junk food and sodas be packaged with "exercise labels" to let consumers know exactly how much exercise is required to burn off the calorie and fat content within the products. A can of soda? Fifty minutes of jogging on a treadmill.

Researchers at Johns Hopkins's Bloomberg School of Public Health in the US observed teenagers at stores where signs displayed either calorie counts, calorie counts as a percent of recommended daily calorie intake, or the time spent jogging that would be needed to burn off the drink.
Another example

One can of cola = one hour's run: Exercise labels could be 'more effective than calorie counts'

By DAILY MAIL REPORTER
UPDATED: 03:24 EST, 15 December 2011

Warning labels that explain how much exercise is needed to run off the calories in junk food are far more effective than traditional counts, researchers say.

It was found that teenagers who were shown the warnings on fizzy drink cans - which stated an hour's run would be needed to get rid of the calories - were half as likely to drink them.
Data Literacy in the real world

HOW STATISTICS CAN MISLEAD

I read with interest the study by Bleich et al. on reducing purchases of sugar-sweetened beverages in low-income Black adolescents using caloric information. The study is relevant, well designed, and has an intriguing hypothesis—that labeling food with “exercise equivalents” is more effective at curbing consumption than using absolute calorie counts. However, the article is misleading because of several problems with the statistical analysis and interpretation.

<table>
<thead>
<tr>
<th>Condition</th>
<th>SSBs, Unadjusted %</th>
<th>Unadjusted Risk Ratio</th>
<th>Adjusted OR</th>
<th>Adjusted Risk Ratio</th>
<th>Adjusted %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preintervention (no information)</td>
<td>93.3</td>
<td>1.00 (Ref)</td>
<td>1.00 (Ref)</td>
<td>1.00 (Ref)</td>
<td>93.3</td>
</tr>
<tr>
<td>Any caloric information</td>
<td>86.7</td>
<td>0.93</td>
<td>0.56</td>
<td>0.95</td>
<td>88.6</td>
</tr>
<tr>
<td>Specific conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute calories</td>
<td>87.5</td>
<td>0.94</td>
<td>0.62</td>
<td>0.96</td>
<td>89.6</td>
</tr>
<tr>
<td>Daily value, %</td>
<td>86.5</td>
<td>0.93</td>
<td>0.59</td>
<td>0.96</td>
<td>89.1</td>
</tr>
<tr>
<td>Physical activity equivalent</td>
<td>88.0</td>
<td>0.94</td>
<td>0.61</td>
<td>0.96</td>
<td>89.3</td>
</tr>
</tbody>
</table>

Sainani criticizes our article for “a needless emphasis on odds ratios” but we present the change in sugar-sweetened beverage rates (Table 2 in original article), odds ratios (ORs; Table 3 in original), and the predicted probability of beverage purchases pre- and post-intervention (Figure 1 in original). Because we acknowledge that the use of odds ratios in certain contexts may be undesirable, we deliberately reported the unadjusted frequencies and predicted probabilities to give an undistorted sense of the effect size. She provides an example of a newspaper misinterpreting what an odds ratio actually means, but we certainly cannot be held responsible for how the media presents our results.
Defining Data Literacy

- Data Collection
  - Observational Studies, Sampling and Experimental Design
- Data Quality and Reliability
- Data Management
- Data Visualization
- Statistical Literacy
  - Correlation vs. Causation
  - Confounders & Lurking Variables
- Statistical Inference
- Working with Messy Data
- Data Privacy
- Data Compliance
- Exploratory Data Analysis
- Data as Evidence
- Data-Driven Decision Making
- Storytelling with Data
Dedicating 2017 to Data Literacy

• Determine your organizational strengths and weaknesses

• Establish areas of high and medium priority

• Identify data literacy needs across all the levels of your organization

• Establish communities of practice for data and statistical literacy learning programs
Thank You!

Harshil Parikh
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