Taking Bayesian inference seriously

Andrew Gelman
Department of Statistics and Department of Political Science
Columbia University, New York

Birthdays!

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Short report

Influence of Valentine’s Day and Halloween on Birth Timing

Becca R. Levy*, Pil H. Chung, Martin D. Slade

Yale University, School of Public Health, Division of Social & Behavioral Sciences, 60 College Street, New Haven, CT 06520-8034, United States

A R T I C L E   I N F O

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Holidays
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Biocultural
Birth

A B S T R A C T

It is known that cultural representations, in the form of stereotypes, can influence functional health. We predicted that the influence of cultural representations, in the form of salient holidays, would extend to birth timing. On Valentine’s Day, which conveys positive symbolism, there was a 3.6% increase in spontaneous births and a 12.1% increase in cesarean births. Whereas, on Halloween, which conveys negative symbolism, there was a 5.3% decrease in spontaneous births and a 16.9% decrease in cesarean births. These effects reached significance at \( p < .0001 \), after adjusting for year and day of the week. The sample was based on birth-certificate information for all births in the United States within one week on either side of each holiday across 11 years. The Valentine’s Day window included 1,676,217 births and the Halloween window included 1,809,304 births. Our findings raise the possibility that pregnant women may be able to control the timing of spontaneous births, in contrast to the traditional assumption, and that scheduled births are also influenced by the cultural representations of the two holidays.

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The published graphs show data from 30 days in the year.
Births by Day of Year

Source: National Vital Statistics System natality data, as provided by Google BigQuery. Graph by Chris Mulligan (chmullig.com)
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**BIRTHDAY RANK**

Less common  |  More common
Relative Number of Births

- Trends
- Slow trend
- Fast non-periodic component
- Mean

Day of week effect
- 1972
- 1976
- 1980
- 1984
- 1988

Seasonal effect
- 1972
- 1976
- 1980
- 1984
- 1988

Day of year effect
- New year
- Valentine's day
- Leap day
- April 1st
- Memorial day
- Independence day
- Labor day
- Halloween
- Thanksgiving
- Christmas
The blessing of dimensionality

- We learned by looking at 366 questions at once!
- Consider the alternative ...
The Fluctuating Female Vote: Politics, Religion, and the Ovulatory Cycle

Kristina M. Durante¹, Ashley Rae¹, and Vladas Griskevicius²
¹College of Business, University of Texas, San Antonio, and ²Carlson School of Management, University of Minnesota

Abstract
Each month, many women experience an ovulatory cycle that regulates fertility. Although recent research suggests that this cycle influences women’s mating preferences, we proposed that it might also change women’s political views. Building on theory suggesting that political and religious orientation are linked to reproductive strategies, we investigated how fertility influenced women’s politics, religiosity, and voting in the 2012 U.S. presidential election. Using large and diverse samples, ovulation had drastically different effects on single women and those in committed relationships. Ovulation led single women to become more liberal, less religious, and more likely to vote for Mitt Romney. In contrast, ovulation led women in committed relationships to become more conservative and more likely to vote for Barack Obama. In addition, ovulation-induced changes in political views also differed for women’s voting behavior. Overall, the ovulatory cycle not only influences women’s politics, but also differently for single women than for women in relationships.
1. Exclusion criteria based on cycle length (3 options)
2. Exclusion criteria based on “How sure are you?” response (2)
3. Cycle day assessment (3)
4. Fertility assessment (4)
5. Relationship status assessment (3)

168 possibilities (after excluding some contradictory combinations)
Living in the multiverse
This is what "power = 0.06" looks like.
Get used to it.

Estimated effect size

−30 −20 −10 0 10 20 30

True effect size (assumed)

Type S error probability:
If the estimate is statistically significant,
it has a 24% chance of having the wrong sign.

Exaggeration ratio:
If the estimate is statistically significant,
it must be at least 9 times higher than the true effect size.
Design Sensitivity in Criminal Justice Experiments

It is commonly assumed that increasing the size of a sample provides the most straightforward method for increasing the statistical power of a research design and thus avoiding the possibility that an investigation is biased toward a finding of no difference or no effect (e.g., see sanctions. Contrary to conventional wisdom advocating large sample designs, little relationship is found in practice between sample size and statistical power. Difficulty in maintaining the integrity of treatments and the homogeneity of samples or treatments employed offsets the design advantages of larger investigations.
Coefs predicting change in attitude, given entrance into the penumbra

-0.2 -0.1 0.0 0.1 0.2

Active Military
Immigrant in Past 5 Yrs
Immigrant in Past 5 Yrs
Immigrant in Past 5 Yrs
NRA Member
Abortion in Past 5 Yrs
Lost Job Last Year
Muslim
Muslim
Muslim
Gay/Lesbian
Currently Unemployed
Mortgage Underwater
No Health Insurance
Care for Elder
Gun Owner
Receive Govt Welfare
Serious Health Problem

- Small but nonzero effects
- No effects with cross-predictions, reverse-time predictions
Labor Market Returns to Early Childhood Stimulation: a 20-year Followup to an Experimental Intervention in Jamaica

Paul Gertler, James Heckman, Rodrigo Pinto, Arianna Zanolini, Christel Vermeersch, Susan Walker, Susan M. Chang, Sally Grantham-McGregor

We find large effects on the earnings of participants from a randomized intervention that gave psychosocial stimulation to stunted Jamaican toddlers living in poverty. The intervention consisted of one-hour weekly visits from community Jamaican health workers over a 2-year period that taught parenting skills and encouraged mothers to interact and play with their children in ways that would develop their children's cognitive and personality skills. We re-interviewed the study participants 20 years after the intervention. Stimulation increased the average earnings of participants by 42 percent. Treatment group earnings caught up to the earnings of a matched non-stunted comparison group. These findings show that psychosocial stimulation early in childhood in disadvantaged settings can have substantial effects on labor market outcomes and reduce later life inequality.
My new favorite example

Model:

\[ y \mid \theta \sim N(\theta, 1) \]

\[ p(\theta) \propto 1 \]

Data:

\[ y = 1 \]

Inference:

\[ \theta \mid y \sim N(y, 1) \]

\[ \Pr(\theta > 0 \mid y) = .84 \]

Wanna bet??
My new favorite example

▶ Model:

\[
y \mid \theta \sim \mathcal{N}(\theta, 1)
\]

\[
p(\theta) \propto 1
\]

Data:

\[
y = 1
\]

Inference:

\[
\theta \mid y \sim \mathcal{N}(y, 1)
\]

\[
\Pr(\theta > 0 \mid y) = .84
\]

Wanna bet??
My new favorite example

- Model:
  - $y | \theta \sim N(\theta, 1)$
My new favorite example

- **Model:**
  - $y|\theta \sim N(\theta, 1)$
  - $p(\theta) \propto 1$
My new favorite example

- Model:
  - $y | \theta \sim \mathcal{N}(\theta, 1)$
  - $p(\theta) \propto 1$

- Data:
My new favorite example

- Model:
  - $y \mid \theta \sim N(\theta, 1)$
  - $p(\theta) \propto 1$

- Data:
  - $y = 1$

Wanna bet??
My new favorite example

- Model:
  - $y | \theta \sim N(\theta, 1)$
  - $p(\theta) \propto 1$

- Data:
  - $y = 1$

- Inference:
My new favorite example

- Model:
  - \( y|\theta \sim N(\theta, 1) \)
  - \( p(\theta) \propto 1 \)
- Data:
  - \( y = 1 \)
- Inference:
  - \( \theta|y \sim N(y, 1) \)
My new favorite example

- **Model:**
  - $y|\theta \sim N(\theta, 1)$
  - $p(\theta) \propto 1$

- **Data:**
  - $y = 1$

- **Inference:**
  - $\theta|y \sim N(y, 1)$
  - $\Pr(\theta > 0|y) = .84$

Wanna bet??
My new favorite example

- **Model:**
  - $y|\theta \sim N(\theta, 1)$
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- **Data:**
  - $y = 1$

- **Inference:**
  - $\theta|y \sim N(y, 1)$
  - $\Pr(\theta > 0|y) = .84$

- Wanna bet??
Where to go next?

- Scale-free modeling
- Weakly informative priors
- Prior information wipes out the multiple comparisons problem
- Computational stability and inferential stability; the folk theorem of statistical computing
- Implications for “big data”