Fifty Minutes with the Five Minute Analyst

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Five-Minute Analyst

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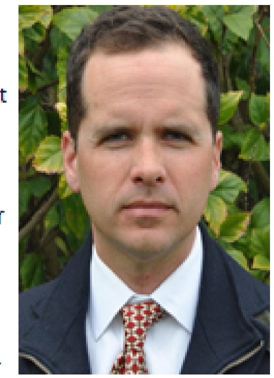
Wikipedia's protest

Why would Wikipedia have a blackout but make it totally ineffective? Answer: Because they're smart.

By Harrison Schramm



On Jan. 18, several Web sites, most notably Wikipedia, took an active stance to protest U.S. government legislation on piracy and the internet – the "Protect IP" and "SOPA" bills. Wikipedia took the most aggressive stance by "blacking out" its Web site for 24 hours. This article not only examines the legislation itself, but also the act of protest from an analytic point of view. I have an interest in this area because it seems that our technology is evolving at a pace that far outstrips our laws and policies.

Protests are dangerous for service providers of any sort; if my favorite coffee shop is closed on Monday to protest legislation, it may raise my awareness of the law. If the coffee shop remains closed on Tuesday, it will raise my awareness that I need another coffee shop. Whatever the leaders of Wikipedia and other Web sites' policy stances, they are savvy enough to know this. Wikipedia went to great lengths in the run-up to the blackout to point out that they would only be offline for one day, and that the extremity of their act – depriving the world of Wikipedia – was matched only by the importance of the legislation. This statement has one gigantic flaw:

Wikipedia did not meaningfully deprive anyone of its services.

I use Wikipedia because I like to take "random walks" through the topic lists; my favorite starting places are 1960s rock bands. These journeys lead, well, everywhere. I do this frequently but mostly through a smartphone app; I rarely access the Web site directly. I discovered when I awoke on Jan. 18 that the wiki blackout did not stop my app and therefore had no effect on me.

I teach a distance learning course on Wednesday mornings, and I made a joke that my students would not be able to "fact check" me in real time since Wikipedia was down. Several of my students immediately responded that they had in fact already found the "secret backdoor" into the Wikipedia blackout – press the esc key as soon as your requested page appears, and you will access it like normal. This backdoor is similar to the 1970s phenomena of phreaking, where a captain crunch whistle was used to get free phone calls [1].

This leads us to the big question: Why would Wikipedia have a blackout but make it totally ineffective? Answer: Because they're smart.

Let's compare the Internet blackout in Wikipedia with the coffee shop example before. Now, I'm a regular

Plan

- Intro
  - 5 min
- Cases
  - 3 x 5 min
  - 2x 10 min
- Wrap-up: what does all this mean? (5 min)

But First… is this art?

Mark Rothko,
Untitled 1953

Intro

- How did this get started?

- Acknowledgments

- Disclaimer
  - I don’t think I have the answer to, well, anything!

Case 1 – DUI Apps
Problem

If there is an app for your Smartphone that allows you to see where (user-reported) DUI Checkpoints are, will this be valuable to would-be drunk drivers?

Case 1 – DUI Apps Analysis

- Consider: Police have same data stream
- Let's think of this in terms of a game

Drunks **/ Police**	**Deploy opposite DUI App**	**Deploy where DUI App says**
Believe DUI App	-1	0
Don't Believe DUI App	0	-1

Notional payoff matrix for the 'DUI Game'. Drunks can do no better playing this game than by simply guessing, making the value of information 'zero'

- Multiple routes…
- Other issues…

Case II – Asthma Attacks Problem

- A patient has asthma attacks on average once every 6 weeks, that are ‘out of the blue’. Their doctor recommends they try some medicine for two weeks and then let him know if it works.

- Should they?
- How long should they take medicine before thinking it actually works?

Case II – Asthma Attacks Analysis

Two possibilities:

- Either the medicine works, or
- They're just lucky
- Assume: Exponential distribution between attacks.
  - (Why) is this an okay assumption?
- How long would they have to go without an attack to conclude that the medicine works?
  - About 18 weeks.

- Useful fact: $e^{-3} \approx .05$

Case III – Budgets and Brinksmanship Problem

- The Federal Budget, August, 2011
- Nobody wants to see the United States actually default.
- … But neither side wants to be the first to yield
- What can Game Theory teach us about the budget process?

Case III – Budgets and Brinksmanship Analysis

This case is different than the DUI-App game

Player 1 \ *Player 2*	*Steady*	*Flinch*
Steady	(**-10**, *-10*)	(**5**, *-5*)
Flinch	(**-5**,*5*)	(**-1**,*-1*)

Notional payoff matrix for the Budget Brinksmanship game. Note that while nobody wants the crash, nobody wants to be the first to ‘give’ either.

Case III – Budgets and Brinksmanship Analysis

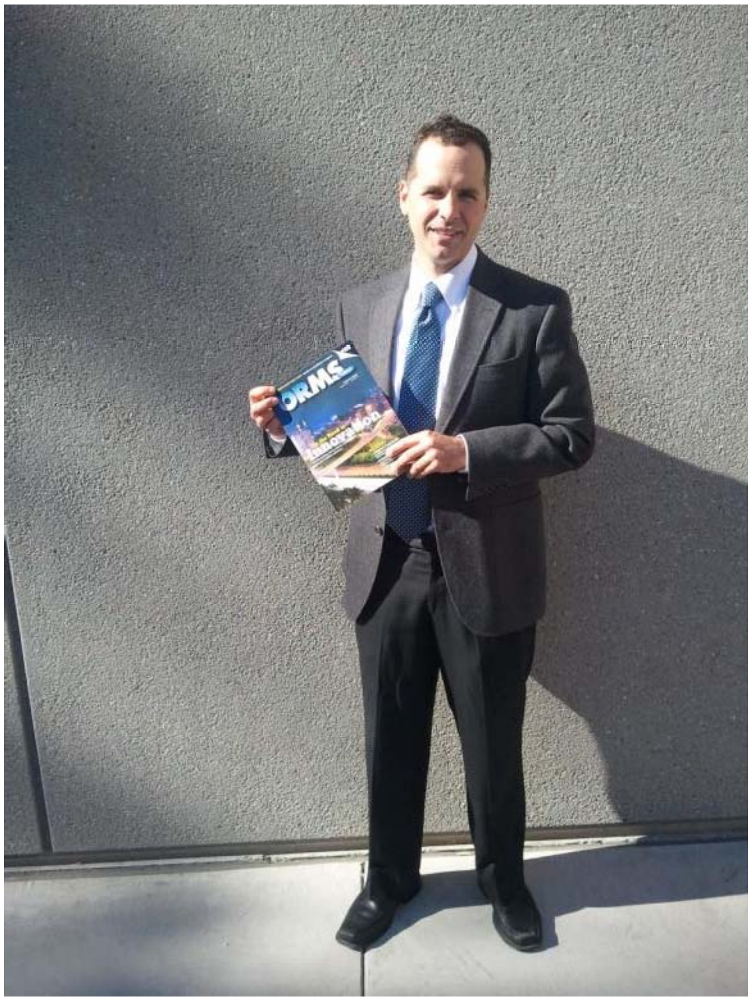
- Optimal Strategy: Figure out how close you are willing to get, and flinch the instant before…

- Or is it?
- Other applications…
- Implications for "Rational" Behavior

Case IV: Airline Seats

- I'm on an airline that doesn't assign seats, but rather gives you a number for which you can choose your seat
- IF there were a 'magic ticket' which would give you your pick of numbers…
  - What's the best number to have if you only care about a particular seat?
  - What's the best number to have if you care about seats *and* your neighbor?

Possible Neighbors



Case IV: Airline Seats

- This could be very hard…

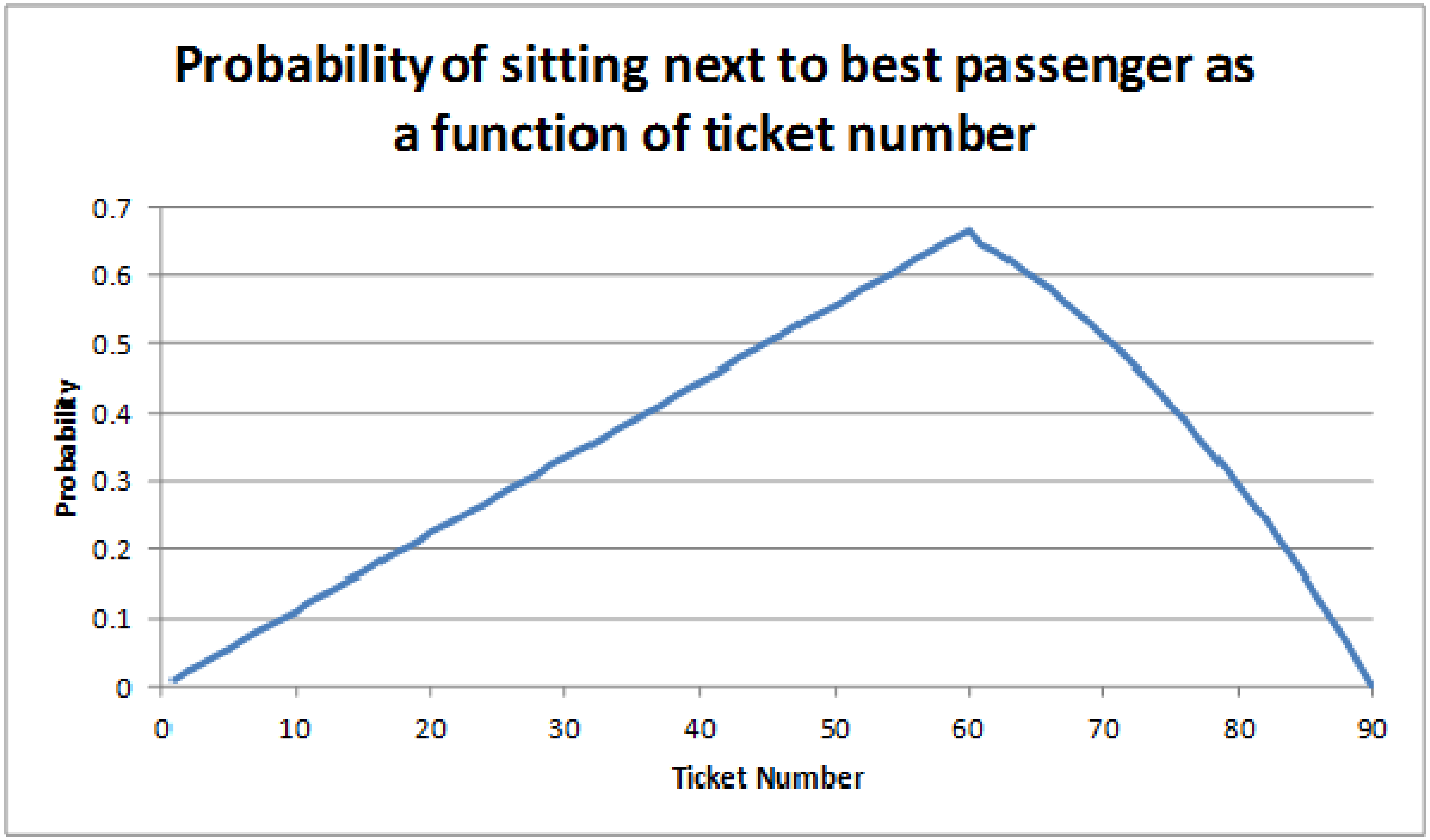
  …Or very easy

- Depending on the assumptions we are willing to make!
- Let's talk about some boundary cases:
  - First Person onboard
  - Last Person onboard

Now, on to the middle…

- Let’s make this easy:
  - Assume that nobody takes a middle seat until one comes available
  - Everyone is ‘alone’

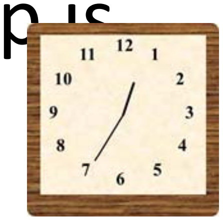
Seat Preference	Required Ticket to Guarantee	Approximate odds of Sitting next to ‘best’ Passenger
Front row Isle	2	2.2%
Window Seat	30	33%
Window or Isle Seat	60	67%



Probability of sitting next to best passenger as a function of ticket number
Probability
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10
20
30
40
50
60
70
80
90
Ticket Number

Case V: Minimum Risk Bike Routes

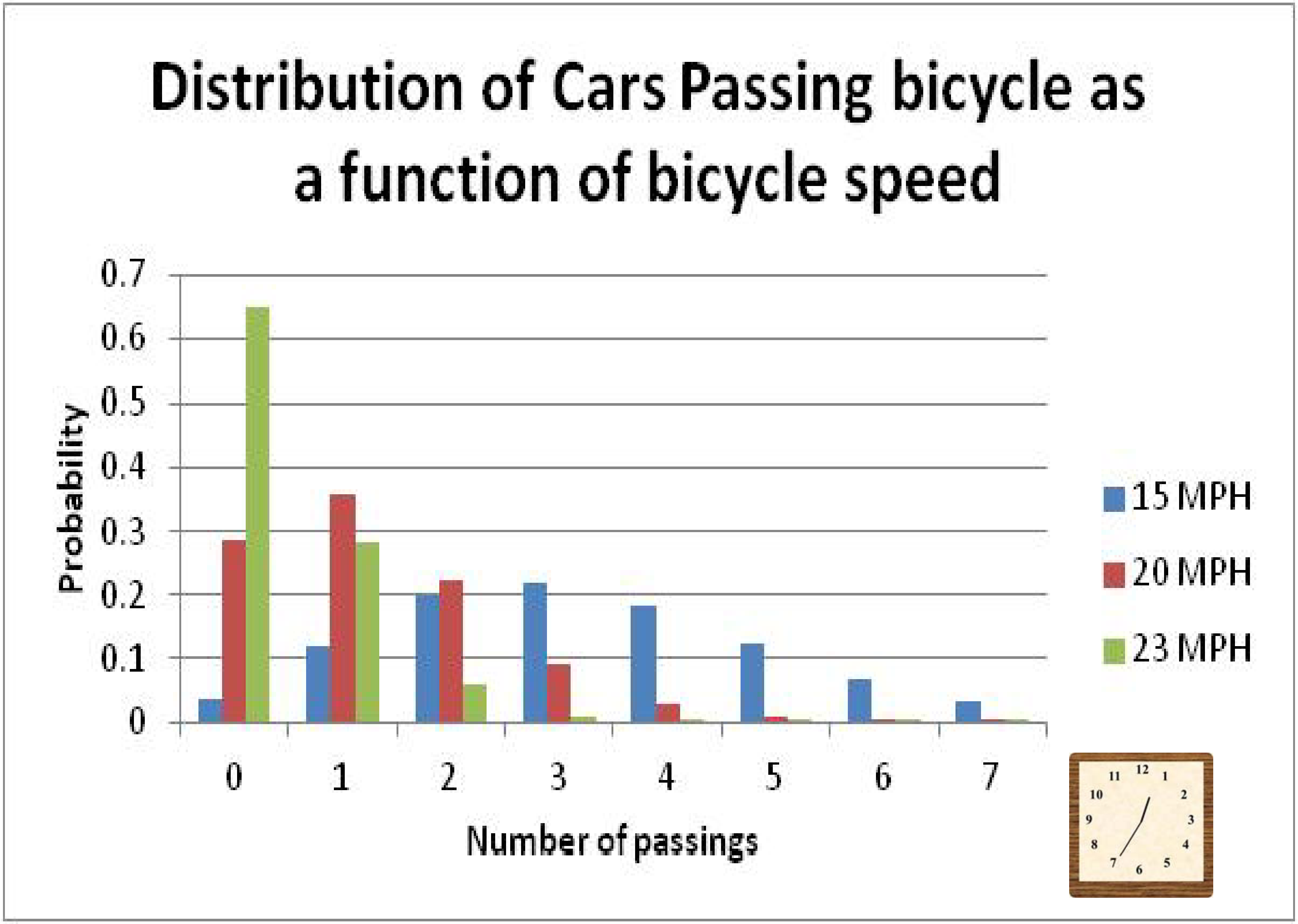
- Two situations we wish to avoid:
  - Crashes involving a car
  - Crashes not involving a car, with no cars around
- This could be hard, or this could be easy
  - (Let’s make it easy ☺)
- Assume that the cars are lined up in a ‘strip’ that passes the bicycle, and the difference in speed determines how quickly the strip is moved.



Mathematically,

- Let:
  - The distribution of individual cars along the ‘strip’ be Poisson with parameter ρ
  - The speed of traffic be S_C
  - The bicycle speed be S_B
  - The distance of the ride be: D
- Then, the distribution of car passings is Poisson with parameter:

$$\lambda = \frac{\rho(S_C - S_B)D}{S_B}$$


Distribution of Cars Passing bicycle as a function of bicycle speed
Probability
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
5
6
7
Number of passings
15 MPH
20 MPH
23 MPH

Wrap up – What does it all mean?

- What mathematics education has done for us – and what we need to do to move it forward

- Don't leave our students
- Colleagues
- Selves
- Halfway up the hill

Was it Art?

Jackson Pollock, Blue Poles #11

Fin.

Markov's Nursery

- A parent with two infant children, which may be in one of two states:
  - Happy, denoted by λ_i
  - Crying, denoted by μ_i
- A minor twist is that the time a child crying is dependent on the probability that the other child is crying
- Another minor twist is that the data is expressed in rates (We assume exponential Distributions

Markov's Nursery

- We could use a Markov Chain…
- But let's use a Generating Function instead!

$$\begin{pmatrix} -\left(\lambda_m + \lambda_n\right) & \lambda_n & \lambda_m & 0 \\ \mu_n & -\left(\mu_n + 2\lambda_m\right) & 0 & 2\lambda_m \\ \mu_m & 0 & -\left(\mu_m + 2\lambda_n\right) & 2\lambda_n \\ 0 & \mu_m / 2 & \mu_n / 2 & -\left(\mu_m / 2 + \mu_n / 2\right) \end{pmatrix}$$

- Which we may evaluate by using $P(t) = e^{t \cdot G}$

Markov's Nursery

- Numerical example: If we let:

$$\lambda_m = .1$$
$$\lambda_n = .125$$
$$\mu_m = \mu_n = .2$$

- We find that:
  - Both children are happy 30% of the time
  - Mary Only is happy 18% of the time
  - Neil only happy 14% of the time
  - Both crying 36% of the time.

Not really a surprise, since
Mary had a little Lambda

FIN

For real this time ☺