Applying Behavioral Science to Wearing Masks and Social Distancing

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Challenge

• Universal masking policies in hospitals
• Suboptimal compliance, especially in administrative offices, shared work rooms, and break rooms (Advani et al., 2020)
• Why? How change?
• Some pieces of the puzzle

\[ \text{ExpCost (mask)} = \Pr(\text{infected} | \text{mask}) \times (\Pr(\text{ill} | \text{infected}) \times \text{Cost(ill)} + \text{Cost(infected)}) + \text{Cost(discomfort)} \]

\[ \text{ExpCost (no mask)} = \Pr(\text{infected} | \text{no mask}) \times (\Pr(\text{ill} | \text{infected}) \times \text{Cost(ill)} + \text{Cost(infected)}) + 0 \]
**Homo economicus**

\[ \text{ExpCost(mask)} = \text{Pr(infected | mask)} \times (\text{Pr(ill | infected)} \times \text{Cost(ill)} + \text{Cost(infected)}) + \text{Cost(discomfort)} \]

\[ \text{ExpCost(no mask)} = \text{Pr(infected | no mask)} \times (\text{Pr(ill | infected)} \times \text{Cost(ill)} + \text{Cost(infected)}) + 0 \]

Perceived severity of disease ~ vaccination:
small-moderate \((r = .16)\); smaller \((r = .14)\) for medical personnel

Perceived likelihood of contracting disease ~ vaccination:
moderate \((r = .25)\); small \((r = .07)\) for medical personnel

Brewer et al., 2007
• Brain
• Unconscious
• “Hardwired”
• Usually correct
\[ \text{ExpCost}(\text{mask}) = \Pr(\text{infected}|\text{mask}) \times (\Pr(\text{ill}|\text{infected}) \times \text{Cost}(\text{ill}) + \text{Cost}(\text{infected})) + \text{Cost}(\text{discomfort}) \]

\[ \text{ExpCost}(\text{no mask}) = \Pr(\text{infected}|\text{no mask}) \times (\Pr(\text{ill}|\text{infected}) \times \text{Cost}(\text{ill}) + \text{Cost}(\text{infected})) + 0 \]

\text{Homo economicus}

\begin{align*}
\text{Present, certain} & \quad \Pr(\text{infected}|\text{mask}) \times (\Pr(\text{ill}|\text{infected}) \times \text{Cost}(\text{ill}) + \text{Cost}(\text{infected})) + \text{Cost}(\text{discomfort}) \\
\text{Future, uncertain} & \quad \Pr(\text{infected}|\text{no mask}) \times (\Pr(\text{ill}|\text{infected}) \times \text{Cost}(\text{ill}) + \text{Cost}(\text{infected})) + 0
\end{align*}

Lee, Kiesler, & Forlizzi, 2011

33% → 65%

Tomorrow

PRECOMMITMENT

Masks/distancing?

PRESENT BIAS
Some pieces of the masks/distancing puzzle

- Real people vs *Homo economicus*
- System 1 vs system 2
- Present bias, precommitment
- Implementation intentions
**Decision Fatigue**

Decisions can become more difficult as the day progresses, leading to a decrease in the proportion of favorable decisions.

1. President
2. U.S. Senator
3. (L) U.S. Representative
4. (L) State Assemblyman
5. Superior Court Judge
6. (L) Palomar Community College
7. (L) Escondido City Council
8. (L) Escondido City Treasurer
9. (L) Palomar Health System
10. State Proposition 32
11. State Proposition 33
12. State Proposition 34
13. State Proposition 35
14. State Proposition 36

... 
28. (L) City Proposition R

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**Default Bias**

Decisions may be influenced by default options, leading to inertia in decision-making.

1. President
2. U.S. Senator
3. (L) U.S. Representative
4. (L) State Senator
5. (L) State Assemblyman
6. Superior Court Judge
7. (L) Palomar Community College
8. (L) Local School Board
9. (L) Local School Board
10. (L) Local School Board
11. (L) Local School Board
12. (L) Escondido City Council
13. (L) Escondido City Treasurer
14. (L) Palomar Health System
15. State Proposition 32
16. State Proposition 33
17. State Proposition 34
18. State Proposition 35
19. State Proposition 36

... 
33. (L) City Proposition R

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**Inertia**

The 10AM break and lunch break times are marked on the graph, showing how decisions decline during these periods due to decision fatigue.

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[Graph showing proportion of favorable decisions versus ordinal position with marked breaks at 10AM and lunch break]
Persson et al., 2019

Dai, Milkman, Hofmann, & Staats, 2015
**Homo economicus**

\[
\text{ExpCost}(\text{mask}) = \Pr(\text{infected} | \text{mask}) \times (\Pr(\text{ill} | \text{infected}) \times \text{Cost(ill)} + \text{Cost(infected)}) + \text{Cost(discomfort)} + \text{Cost(put on)}
\]

\[
\text{Calculation Friction}
\]

\[
\text{ExpCost}(\text{no mask}) = \Pr(\text{infected} | \text{no mask}) \times (\Pr(\text{ill} | \text{infected}) \times \text{Cost(ill)} + \text{Cost(infected)}) + \text{Cost(take off)}
\]

Clark, et al. (CAH)
Convenience enhancements
Descriptive labeling
Evaluative labeling
Healthy eating calls

Hedonic enhancements
Size enhancements
Visibility enhancements
### Cohen's $d$ Interpretation

<table>
<thead>
<tr>
<th>$d$ Value</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$d = 0.0$</td>
<td>No effect</td>
</tr>
<tr>
<td>$d = 0.1$</td>
<td>Trivial effect</td>
</tr>
<tr>
<td>$d = 0.2$</td>
<td>Small effect</td>
</tr>
<tr>
<td>$d = 0.5$</td>
<td>Medium effect</td>
</tr>
</tbody>
</table>

### Percentage Above Control Mean

- **Cognitively-oriented nudges**
  - $d = 0.0$: 50%
  - $d = 0.1$: 54% (+4%)
  - $d = 0.2$: 58% (+8%)
  - $d = 0.5$: 69% (+19%)

- **Affectively-oriented nudges**
  - $d = 0.0$: 50%
  - $d = 0.1$: 54% (+4%)
  - $d = 0.2$: 58% (+8%)
  - $d = 0.5$: 69% (+19%)

- **Behaviorally-oriented nudges**
  - $d = 0.0$: 50%
  - $d = 0.1$: 54% (+4%)
  - $d = 0.2$: 58% (+8%)
  - $d = 0.5$: 69% (+19%)
Some pieces of the masks/distancing puzzle

• Real people vs *Homo economicus*
• System 1 vs system 2
• Present bias, precommitment
• Implementation intentions
• Decision fatigue, breaks
• Default bias, status quo bias, friction
• Cognitive vs affective vs behavioral nudges
**Homo economicus**

\[
\text{ExpCost}(\text{mask}) = \text{Pr}(\text{infected}|\text{mask}) \times (\text{Pr}(\text{ill}|\text{infected}) \times \text{Cost}(\text{ill}) + \text{Cost}(\text{infected})) + \text{Cost}(\text{discomfort})
\]

\[
\text{ExpCost}(\text{no mask}) = \text{Pr}(\text{infected}|\text{no mask}) \times (\text{Pr}(\text{ill}|\text{infected}) \times \text{Cost}(\text{ill}) + \text{Cost}(\text{infected})) + 0
\]

“Hand hygiene prevents **you** from catching diseases” vs
“Hand hygiene prevents **patients** from catching diseases” 45%+

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**Optimism bias**

Lindemans, Zhao (CAH)

Grant & Hoffman, 2011
Cialdini et al., 2006

The vast majority of past visitors have left the petrified wood in the park, preserving the natural state of the Petrified Forest.

Many past visitors have removed petrified wood from the park, changing the natural state of the Petrified Forest.

Please don’t remove the petrified wood from the park, in order to preserve the natural state of the Petrified Forest.

Cialdini et al., 2006

![Graph showing the effect of descriptive and injunctive norms on behavior change.](image-url)
Kidney Allocation for Donors with KDPI 21% - 34% MATCH RESULTS

Stewart et al. (with CAH)

150% CPRA, 0-AOAB mismatch, Latest, blood type identical or permissible

MAKE AN ORGAN OFFER

Candidate Information:
- Age: 44 yrs
- Gender: Female
- AB0: O
- CPRA:
- MIA Antibody: Yes, untwisted antibody
- Donor Match ABO, DR: 0, 0

Organ Offer Information:
- Contact Name: Stewart et al. (with CAH)
- Offer made to: 
- Offer response: 
- Time remaining: 

Provider Information:
- TSA: Texas Organ Sharing Alliance
- Donor Implantation:
  - Name: 
  - Date of Birth: 
  - Age: 70 yrs
  - Gender: Female
  - Current Status: Deceased
  - Cause of Death: 
    - Date of Death: 
    - Mechanism of Injury: Intracranial Hemorrhage
    - Circumstances of Death: Injury to natural causes
  - Donor meets OCA criteria: NO
  - Donor meet organ criteria: NO
  - OPO administered: NO

Medical & Social History:
- History of diabetes: NO
- History of chronic disease: NO
- History of myopericarditis: NO
- History of chronic kidney disease (CKD): NO
- Previous gastroesophageal reflux disease: NO
- Child abuse: NO
- Congenital (yes/no): 0
- Malignancy (yes/no): NO
- Chronic renal failure: NO
- E.G. drug history: NO
- Exogenous (yes/no): NO

Admission source comments:

(No information provided)

Medical & Social History:

(No information provided)
UNOS Labs Offer Simulation Study #1: Provisional Acceptance Rates by Treatment Arm

Overall P-value (Ho: no treatment effects) = 0.10

(A) Baseline (like DonorNet)  
Acceptance OR: 1.00

(B) OPD name hidden  
Acceptance OR: 1.05  
P = 0.86

(C) OPD name, Sequence & Refusal Info Hidden  
Acceptance OR: 1.66  
P = 0.06

(N=34 doctors)  
19/20 = 95%  
63.5%

(N=34 doctors)  
5/20 = 25%
PROBLEM:
95% of Americans support organ donation but only 40% are registered.

INJUNCTIVE NORM

1% registered

5% registered
INJUNCTIVE NORM

Don’t just sit there as he drives dangerously! STAND UP! SPEAK UP! NOW!

1.69  1.82  2.91
4.67  4.81  3.05
5.82  5.06  4.28
6.36  5.19  4.57
Ingroup–outgroup bias

- Conditions
  - Control
  - Shredder
  - And confederate
  - And he wears University of Pittsburg T-shirt

- Result: control (~7) < Pitt T-shirt (~9) < no confederate (~12) < plain T-shirt (~15)

- Universal masking: the 3rd year student who spoke up...
Self-concept maintenance

- Conditions
  - Control
  - Shredder
  - And token

- Result: control (~3.5) < no token (~6) < token (~9.5)

- Categorization malleability

- Universal masking: “We’re 100% compliant. … In break rooms and working rooms it’s sort of half-half.”

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- Real people vs Homo economicus
- System 1 vs system 2
- Present bias, precommitment
- Implementation intentions
- Decision fatigue, breaks
- Default bias, status quo bias, friction
- Cognitive vs affective vs behavioral nudges
- Optimism bias
- Injunctive vs descriptive norms
- Ingroup–outgroup bias
- Self-concept maintenance, categorization malleability