Psychology, nudging, and influence

Rongjun YU
Psychology, NUS
NExT++, NUS
www.rongjunyu.org

NExT++ Workshop 2018 @ Nanjing
OUTLINE

• Profiling

• Nudging

• Influence
Profiling: knowing who you are

- Questionnaires
- Social media
- Psychological tasks
Facebook language predicts depression in medical records

Table 2. Sample Descriptives

<table>
<thead>
<tr>
<th>Sample descriptive</th>
<th>Depressed</th>
<th>Nondepressed</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of subjects</td>
<td>114</td>
<td>569</td>
<td></td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>30.9 (8.1)</td>
<td>29.7 (8.65)</td>
<td></td>
</tr>
<tr>
<td>Female, %</td>
<td>86.8</td>
<td>74.7</td>
<td>**</td>
</tr>
<tr>
<td>Black, %</td>
<td>75.4</td>
<td>69.1</td>
<td></td>
</tr>
<tr>
<td>Mean word count (SD)</td>
<td>19,784 (27,736)</td>
<td>14,802 (21,789)</td>
<td>*</td>
</tr>
<tr>
<td>Median word count</td>
<td>10,655</td>
<td>6,861</td>
<td>*</td>
</tr>
</tbody>
</table>

Eichstaedt et al., PNAS 2018
Facebook language prediction vs. medical records

Screening surveys vs. medical records (Noyes et al., 2011)
Ten language topics most positively associated with a future depression diagnosis

### Depressed Mood & Feeling
- Joy
- Times
- Emotional
- Houston
- Laugh
- Cried
- Crying
- Hurt
- Sad
- Pain
- Tears
- Cry
- Kinda
- Feel
- Hate
- Ugh
- Sick
- Feeling
- Better
- Kinda
- Alil
- Feels
- Feeling
- Hope
- Inside
- Words
- Care
- Someone
- Loved
- Hurt
- Emotions
- How
- Feelings
- Ones
- Feels
- Making
- Inside
- Get
- Makes
- Worse
- Starting
- Hurt
- Someone
- Care

\( \beta = .15^{***} \)
\( \beta = .13^{**} \)

### Loneliness
- Baby
- Missing
- Miss
- Much
- Soon
- Soon
- Daddy
- Miss
- Already
- Dadd
- Alread
- Bab
- Mommy
- Soo

\( \beta = .14^{**} \)

### Hostility
- Rite
- Confused
- Annoyed
- Right
- Now
- Erk
- Now
- Wtf
-irked
- Max
- Snap
- Nervs
- Pi
- Swear
- Piss
- Hand

\( \beta = .15^{***} \)
\( \beta = .12^{*} \)

### Somatic Complaints
- Sick
- Headache
- Stomach
- Feeling
- Flu
- Ugh
- Feel
- Head
- Pain
- Body
- Stomach
- Bad
- Cold
- Fever
- Wornose
- Cough
- Killin
- Tooth
- Feet
- Stomach
- Body
- Pain
- Head
- Hurts
- Tummy

\( \beta = .17^{***} \)
\( \beta = .15^{***} \)

### Medical Refs.
- Hospital
- Doctors
- Nurse
- Pain
- Prayers
- Pressure
- ER
- Surgery
- Blood
- Pray
- Pain
- Health

\( \beta = .20^{***} \)
Negative association

Gratitude & Faith

- everyone, birthday, wishes, guys, every, amazing, dear, blessed, thankful, morning, father, trust, faith, y'all, lord, praise, love
- beta = -0.09*
- beta = -0.12*

Wedding/Prom

- congrats, pictures, amazing, prom, shoot, graduation, wedding, excited, proud
- beta = -0.12**

School & Work

- owm, shift, late, hour, clock, working, till, tomorrow, shift, harry, early, flow, work, running
- school, college, students, proud, elementary, grade, high
- beta = -0.09*
- beta = -0.10*

Fitness

- hit, body, weight, diet, lose, pounds, gym, working, workout
- beta = -0.10**

Music & Media

- ft, beyonce, listening, ross, minaj, nicki, rick, chris, voice, drake, wayne, michael, wiz, song
- beta = -0.09*
- beta = -0.09*
Economic decision making under uncertainty

Pornpattananangkul et al., 2018
**A  Public Goods Game**

Person A receives $20 and must decide how to distribute it equally among herself and Person B. Person B does not make a decision.

**B  Trust Game**

Investor: Person A decides how much to trust Person B, who receives $20.

<table>
<thead>
<tr>
<th>Endowed Amount</th>
<th>Factor R</th>
<th>Amount Sent ?</th>
</tr>
</thead>
<tbody>
<tr>
<td>$40</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>$30</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Trustee (Endowment=$20, factor R=3):

<table>
<thead>
<tr>
<th>Sent by A</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>...</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>B: Send to A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**C  Sequential Prisoner’s Dilemma Game**

Person A decides whether to take the left or right path. If Person A chooses right, Person B follows. If Person A chooses left, Person B chooses right.

- **Left Path:**
  - Person A: $30
  - Person B: $30
- **Right Path:**
  - Person A: $15
  - Person B: $35

**D  Ultimatum Game**

Person A proposes a division of $30. Person B will accept or reject the offer, with the minimum acceptable offer set by Person B.
Ambiguity aversion predicts cooperation (N=2200)

<table>
<thead>
<tr>
<th>DV</th>
<th>Predictors</th>
<th>B (SE)</th>
<th>t/z-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGG (ambiguous situation)</td>
<td>Ambiguity</td>
<td>0.10 (0.02)</td>
<td>4.18</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td></td>
<td>Risk</td>
<td>0.009 (0.02)</td>
<td>0.38</td>
<td>0.70</td>
</tr>
<tr>
<td>TG_Investor (ambiguous situation)</td>
<td>Ambiguity</td>
<td>0.10 (0.02)</td>
<td>4.18</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td></td>
<td>Risk</td>
<td>0.05 (0.02)</td>
<td>2.32</td>
<td>0.02*</td>
</tr>
<tr>
<td>TG_Trustee (certain situation)</td>
<td>Ambiguity</td>
<td>0.10 (0.02)</td>
<td>4.21</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td></td>
<td>Risk</td>
<td>-0.02 (0.03)</td>
<td>-0.82</td>
<td>0.41</td>
</tr>
<tr>
<td>sPDG_First # (ambiguous situation)</td>
<td>Ambiguity</td>
<td>0.10 (0.05)</td>
<td>1.96</td>
<td>0.05*</td>
</tr>
<tr>
<td></td>
<td>Risk</td>
<td>0.01 (0.05)</td>
<td>0.22</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Huang et al. Nature Communications, in revision
Characterizing a psychiatric symptom dimension related to deficits in goal directed control
Nudge: taking advantage of decision biases
Defaults Save Lives?

“opt in”: Not organ donors

“opt out”: Organ donors
The default

Potential outcomes 4s

Stay or switch decision 4s

Actual outcomes 4s

Fixation 2s

Yu et al., Journal of Neuroscience, 2010
Jack is looking at Anne, but Anne is looking at George. Jack is married, but George is not. Is a married person looking at an unmarried person?

A. Yes
B. No
C. Cannot be determined
• Despite concerted efforts to improve medical systems and training, between 55% and 80% of patients with severe injuries who present initially to nontrauma centers are not transferred to a higher level of care, contributing to an estimated 30,000 preventable deaths each year.
Table 1. Description of cases included on virtual simulation

<table>
<thead>
<tr>
<th>Case description</th>
<th>Class of case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient is a 65-y-old female s/p MVC with aortic transection and bilateral lower extremity fractures; presents with hypotension and arrests if not resuscitated Patient is a 36-y-old male s/p GSW to abdomen with liver laceration; presents with hypotension and arrests if not resuscitated</td>
<td>Severely injured: representative case</td>
</tr>
<tr>
<td>Patient is an 80-y-old female s/p ground level fall with multiple rib fractures Patient is a 70 y-old male s/p fall down steps with pelvic fracture and intraparenchymal hemorrhage</td>
<td>Severely injured: representative case</td>
</tr>
<tr>
<td>Patient is an 18-y-old female s/p bicycle collision with closed humerus fracture Patient is an 81-y-old male s/p MVC with no injuries but NSTEMI</td>
<td>Severely injured: nonrepresentative case</td>
</tr>
<tr>
<td></td>
<td>Severely injured: nonrepresentative case</td>
</tr>
<tr>
<td></td>
<td>Minimally injured</td>
</tr>
<tr>
<td></td>
<td>Minimally injured</td>
</tr>
</tbody>
</table>
• psychological tasks
• permission based access to the social media profiles of patients/students
• Cognitive training games
• Neuroimaging analysis (fMRI, e.g. decoding, deep learning)

Visiting students/scholars, interns, RA, RF
• MOE Social Science Research Council (SSRC):
You are what you surf: Characterizing preference and decision-making styles with digital footprints

PhD students:
Yi Huang; Shanshan Zhen; Cuizhen Liu; Weicheng Tao; Jingwen Chai; Avijit Chowdhury; Zher Wen.
THANK YOU

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www.rongjunyu.org

Wechat: Rongjunyu83