Psychology

Special Interest Group

Ralph Levine & David Lounsbury, Co-Chairs

Roundtable and Business Meeting
27th International Conference of the System Dynamics Society
Albuquerque, New Mexico    28 Jul 2009
Use of Soft Variables in System Dynamics Models

Examples:

- Trust
- Attitude
- Depression
- Anxiety
- Anger
- Satisfaction
Two Kinds of Models

1. Using social and psychological processes to embellish traditional system dynamics models
2. Focus on using system dynamics to test or develop psychological theories
Approaches to Modeling Social & Psych Processes

1. Smooth: First order information delay
2. Treat as conserved process: Bathtub metaphor; First order material delay
3. Co-flow: Dynamic characteristic of a material process
First Order Material Delay

Increase in depression \[\rightarrow\] Depression \[\rightarrow\] Dissipation of depression

Average time of depression
## Operations on the Rate of Change

<table>
<thead>
<tr>
<th>Input Rate</th>
<th>Output Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancing</td>
<td></td>
</tr>
<tr>
<td>Inhibiting</td>
<td></td>
</tr>
</tbody>
</table>

**Diagram:**
- **Stock**
  - Input rate
  - Output rate
- **Average time in stock**
First Order Material Delay Operations

Inhibiting input (e.g., prevention)

Enhancing output (e.g., treatment)

Increase in depression

Depression

Dissipation of depression

Average time of depression

Inhibiting input (e.g., prevention)
¡Warning!

There are differences between the behavior of the smooth and the first order material delay!
Response to Step Change in the Input (Attitude Message)
Smooth Equation

Change = (Goal – State) / Time
In equilibrium, Change = 0/Time = 0

Material Delay Equation

Input rate = Output rate = State / Time
State = Input rate x Time
Co-Flow

Source: J. Hines molecules
Hines Co-Flow

Fundamental quantity

inflow of fundamental quantity

outflow of fundamental quantity

dilution time

Change in characteristic

characteristic of new stuff

Avg characteristic

Source: J. Hines molecules
Plenary Recap: Zimbardo’s Prison Experiment

Launch Zimbardo SPE model
PAR-08-224 *Using Systems Science Methodologies to Protect and Improve Population Health (R21)*

PAR-08-212, -213, -214 *Methodology and Measurement in the Behavioral and Social Sciences (R01, R21, R03)*

RFA-07-079, -080 *Behavioral and Social Science Research on Understanding and Reducing Health Disparities (R01, R21)*

PAR-08-023 *Predictive Multiscale Models of the Physiome in Health and Disease (R01)*

RFA-NR-09-005 *Incorporating Cost-Effectiveness Analysis Into Factors Affecting Quality-of-Life Health Related Research (R01)*

PA-07-427 (R01); PA-07-428 (R21); PA-07-429 (R03) *Research on Alcohol-Related Public Policies such as Those Detailed in the Alcohol Policy Information System*
SIG Business

1. Transition from Chapter to SIG and membership update
2. Proposed SIG project(s)
   - Developing a ‘Call for Papers’ for special issue on psychology and system dynamics modeling for SDR
3. Nomination of new Co-Chairs