



Modeling Selected Deterrent Effects of US Immigration Policy on Undocumented Immigrant Behavior

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The Opportunity:

- **Integrate a technique for exploring behavior inputs to the SBI Immigration Model**
 - Estimate changes in migrant behavior that result from deterrent actions and changes in US policy

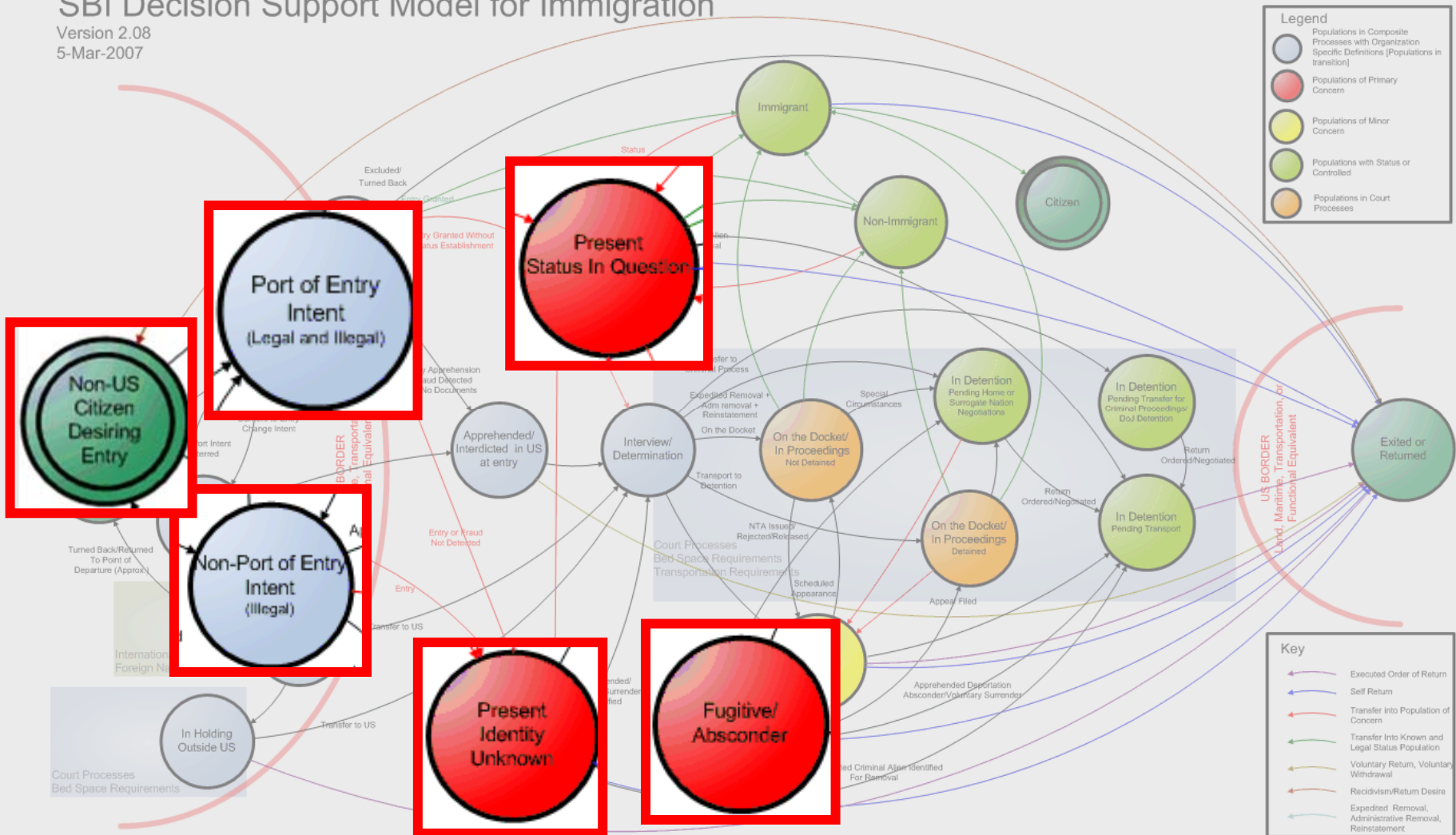
The Objective:

- **Replace engineering judgments with estimated values that are supportable and traceable**
- **Provide more detailed estimates about specific demographic groups within the immigrant population**

Immigration Model behavior

SBI Decision Support Model for Immigration

Version 2.08
5-Mar-2007



Starting with What We Know

- **Population of Mexico- 108,700,891**
CIA World Fact Book, 2007
- **Number of Mexican nationals granted legal status in a year- 173,753**
DHS Yearbook of Immigration Statistics 2006, Table 3, p. 12
- **Approximate number of Mexican nationals living in the US without documentation- 6,570,000**
DHS, Office of Immigration Statistics, 2007

Expected Behavior:



Make Illegal Entry:

$$6,570,000 / 108,700,891 = 6.1 \%$$

Make Legal Entry:

$$173,753 / 108,700,891 = 0.1 \%$$

Remain Home:

$$100 - (6.1 + 0.1) = 93.8 \%$$

Continuing with What We Know

- **Poverty Rate in Mexico- 17.6%**
CIA World Fact Book, 2007
- **Probability of Being Caught Crossing the Border- 30%**
Espenshade, 1994
- **Probability of Dying While Crossing the Border- 2-5 %**
Eschbach, 1999; Mexican Ministry of Foreign Relations; Cornelius, CCIS UCSD
- **Latino Unemployment Rate in the US- 4.5%**
US Bureau of Labor Statistics
- **Latino Poverty Rate in the US- 20.6%**
US Census Bureau
- **Probability of Being Caught while in the US- 2%**
Espenshade, 1994

Given What We Know

We would infer that the average Mexican national with perfect information will exhibit the Expected Behavior:

Remain Home 93.8% Legal Entry 0.1% Illegal Entry 6.1%



My expectation of living in poverty is = 17.6%



My perceived risk of being caught at the border is = 30%

My perceived risk of dying at the border is = 5%



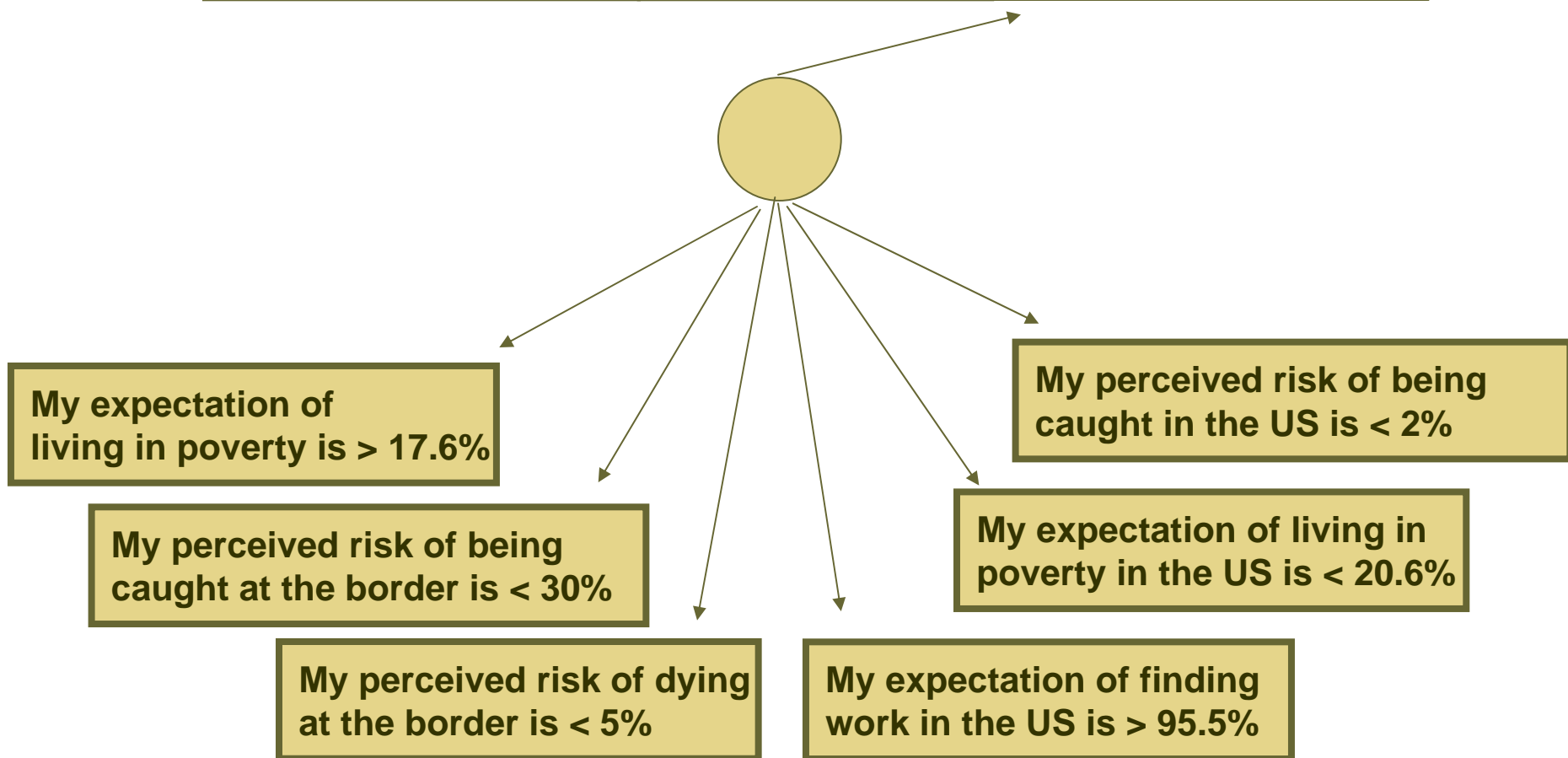
My expectation of finding work in the US is = 95.5%



My perceived risk of being caught in the US is = 2%

My expectation of living in poverty in the US is = 20.6%

Things We Expect to Influence Expected Behavior



Sample of Internal Model Parameters

Output: Proportions of population making migration choices

Migration_Decision		
Remain Home	93.8	
Legal Entry	0.10	
Illegal Entry Intent	6.10	

Actual Likelihood 17.6%

Actual Likelihood 30%

Actual Likelihood 5%

Actual Likelihood 82%

Actual Likelihood 20.6%

Actual Likelihood 98%

Migration_Decision	Yes	No	Not Sure
Remain Home	78.000	2.000	20.000
Legal Entry	88.000	2.000	10.000
Illegal Entry Intent	83.000	2.000	15.000

Avoid_Apprehension		
Yes	33.3	
No	33.3	
Not Sure	33.3	

Poverty_in_US		
Yes	33.3	
No	33.3	
Not Sure	33.3	

Migration_Decision	Yes	No	Not Sure
Remain Home	20.600	54.400	25.000
Legal Entry	18.000	47.000	15.000
Illegal Entry Intent	20.000	60.000	20.000

Find_Employment		
Able	33.3	
Unable	33.3	
Not Sure	33.3	

Family_Influence		
US	50.0	
Mexico	50.0	

Die_at_Crossing		
Yes	33.3	
No	33.3	
Not Sure	33.3	

Apprehended_at_Border		
Yes	33.3	
No	33.3	
Not Sure	33.3	

Migration_Decision	Yes	No	Not Sure
Remain Home	17.600	67.400	15.000
Legal Entry	10.000	85.000	5.000
Illegal Entry Intent	25.000	50.000	25.000

Poverty_at_Home		
Yes	33.3	
No	33.3	
Not Sure	33.3	

Migration_Decision	Yes	No	Not Sure
Remain Home	5.000	75.000	20.000
Legal Entry	5.000	80.000	15.000
Illegal Entry Intent	2.000	85.000	13.000

Migration_Decision	Able	Unable	Not Sure
Remain Home	74.000	6.000	20.000
Legal Entry	80.500	4.500	15.000
Illegal Entry Intent	76.000	4.000	20.000

Candidate Decomposed Layers of Behavior (Non-US Citizen Desiring Entry)

Immigrant Behaviors



Group A

Will I live in poverty if I stay in Mexico?

Can I avoid apprehension during the border crossing?

Will I die attempting to cross the border?

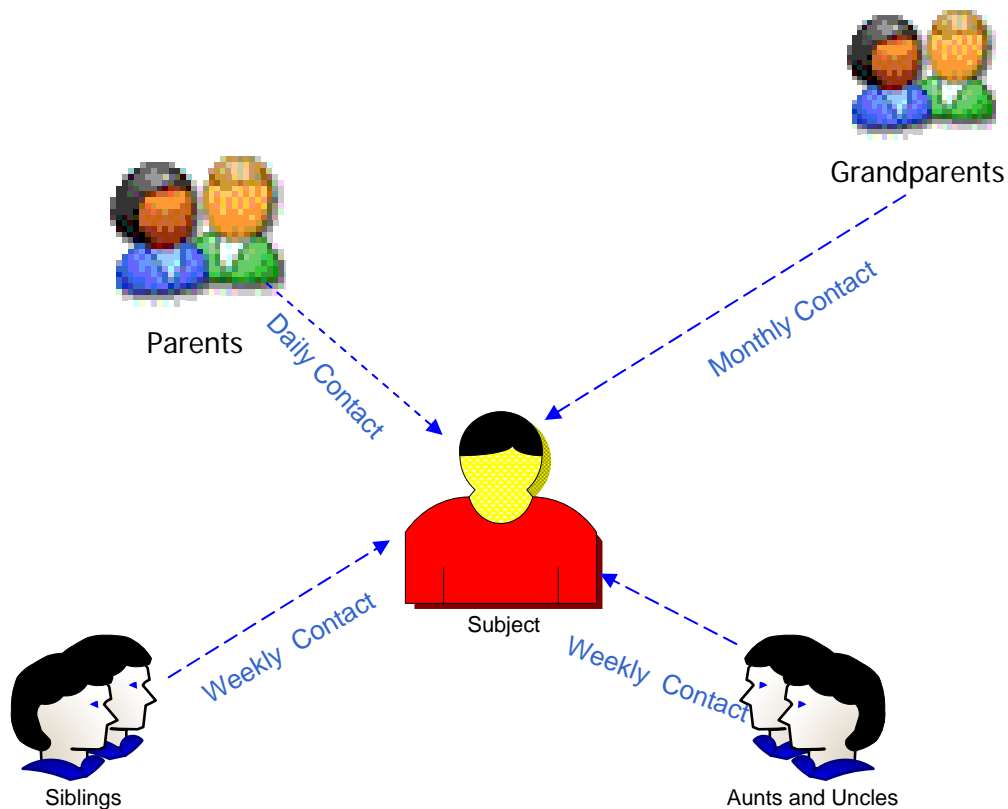
What does my family think?

Can I find employment in the US?

Will I live in poverty in the US?

Can I avoid apprehension while in the US?

Propagating Conclusions Between Family Members



Once each group reaches its own conclusions, their opinions are communicated to the people that they have regular contact with. This communication will be simulated with our Propagate function. Frequency of contact, and the nature of the relationship determines the amount of influence that each communicated opinion has on the recipient.

Propagation Weighting

Value of token is weighted by the sender's relationship to and contact with the receiver:

Relationship	Weighting Factor
Parent	3
Grand Parent	2
Sibling	1

Frequency of Contact	Weighting Factor
Monthly	1
Yearly	0.5
Less Frequent	0.25

Propagation Calculations

Value of Tokens Sent

Stay in Mexico = +1

Go to the U.S. = -1

Impact of Tokens Received

Parent with Monthly Contact who says stay in Mexico

$$\begin{array}{c}
 \text{Token of Preference} \quad \text{Relationship Factor} \quad \text{Contact Factor} \\
 \swarrow \quad \downarrow \quad \swarrow \\
 (+ 1) * 3 * 1 = + 3
 \end{array}$$

Sibling with Infrequent Contact who says go to the U.S.

$$\begin{array}{c}
 \text{Token of Preference} \quad \text{Relationship Factor} \quad \text{Contact Factor} \\
 \swarrow \quad \downarrow \quad \swarrow \\
 (- 1) * 1 * 0.25 = - 0.25
 \end{array}$$



Integrating Family Chatter into the Aggregation Phase

Receiver's Starting Condition

Neutral Position
0

Month 1

Monthly Contact with a Grand Parent preferring Mexico

+ 2

Annual Contact with a Sibling Preferring Mexico

+ 0.5

Infrequent Contact with 3 Siblings Preferring the U.S.

- 0.75

Month 2

Monthly Contact with a Grand Parent preferring Mexico

+ 2

Infrequent Contact with a Grand Parent who prefers the U.S.

- 0.5

Month 3

Monthly Contact with a Grand Parent preferring Mexico

+ 2

Annual Contact with a Sibling Preferring the U.S.

- 0.5

Infrequent Contact with 5 Siblings who prefer the U.S.

- 1.25

Month 4

Monthly Contact with a Grand Parent preferring Mexico

+ 2

Resulting Impact of Family Chatter

0

+ 1.75

+ 1.5

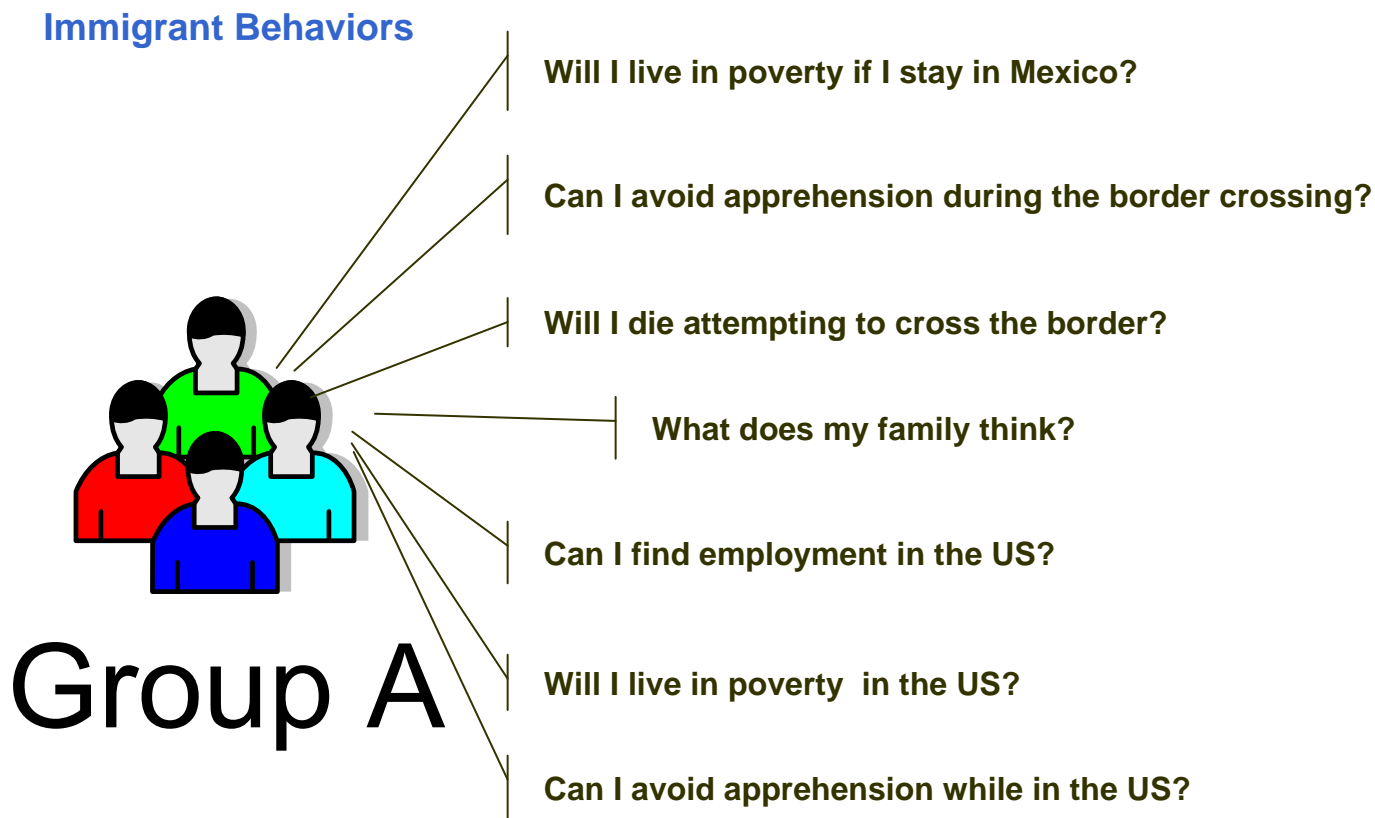
+ 0.25

+ 2

Topic for Discussion

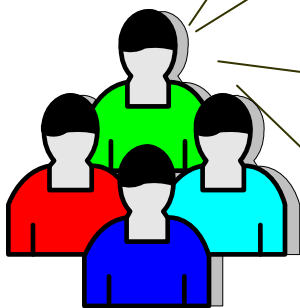
Available Psychological / Social models that can be used to predict perceptions using environmental measures as inputs.

Can we predict the responses to these questions based on measures of the environment?



For Example

Enterprise Behaviors



Group A

Perception

Behavior Model

How do I benefit from this change?

Job Motivation Model
Herzberg

Do I expect this change to be implemented successfully?

DICE Model
Sirkin, Keenan, and Jackson

What have I heard about this change from other people?

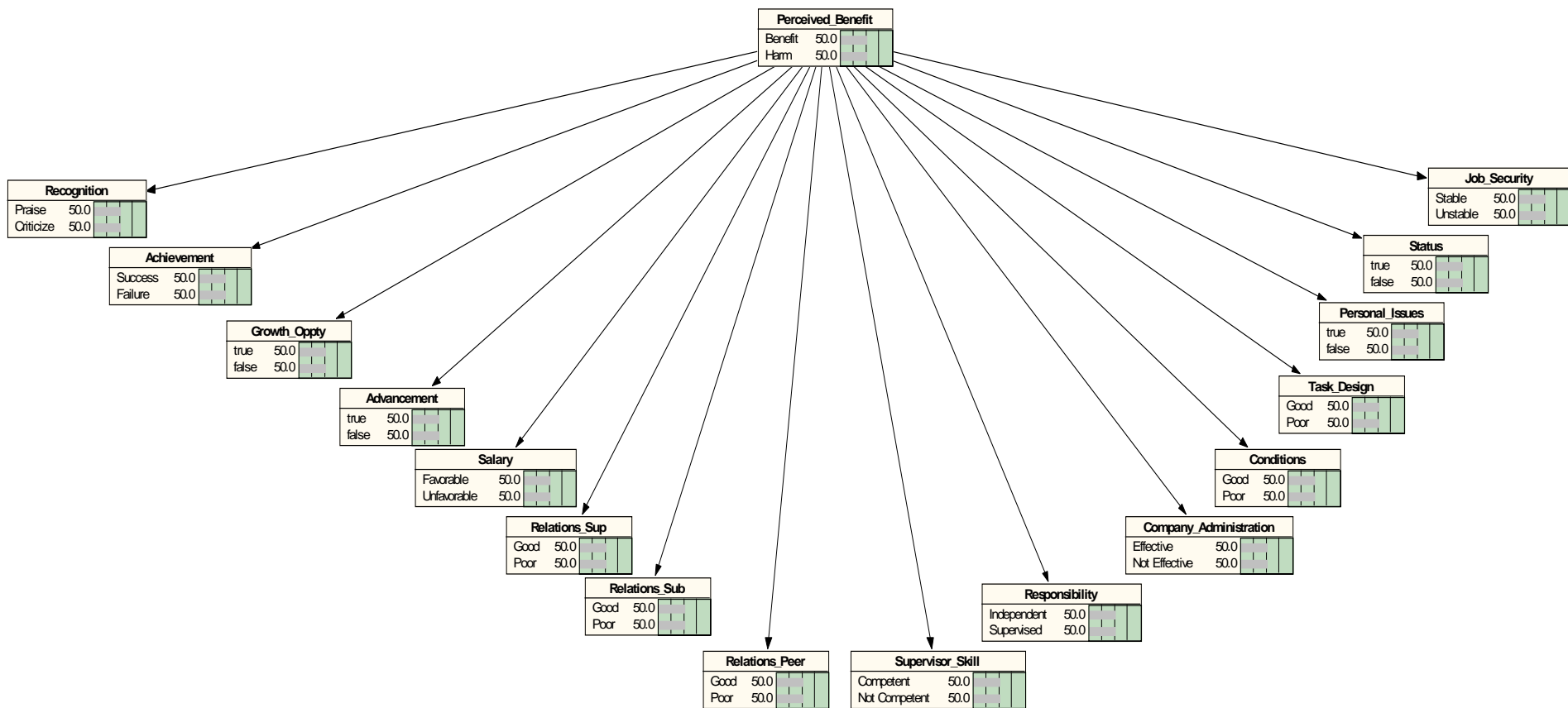
Locally Developed
Summing Algorithm

Am I more inclined to change jobs because of this change?

Stress and Coping Model
Rafferty, and Griffin

- Additional Layers of Behavior are being evaluated for inclusion
- Individual Behavior Models have been validated by calculating the accuracy, precision, and recall observed in previous applications

Herzberg Job Motivation Model



DICE Score

$$\text{DICE Score} = D + 2*(I) + 2*(C1) + C2 + E$$

Where:

D = Duration between project reviews

I = Integrity of project team performance

C1 = Senior management commitment

C2 = Local level commitment

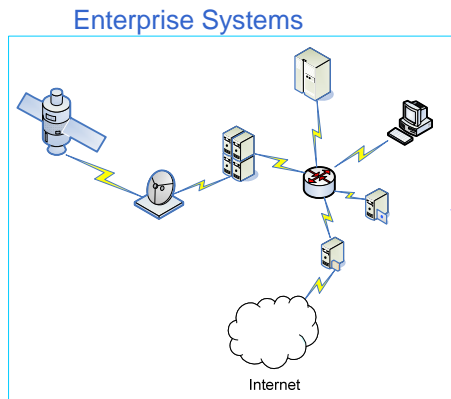
E = Effort required

Summing Algorithm

Vendor Community
+Role : string
+Time in Role : int
+Level of Support for Current Practices : int
+Herzberg Motivation 1
+Herzberg Motivation 2
+Herzberg Nature 1
+Herzberg Nature 2
+Perceived Benefit : int
+Duration [D] : int
+Integrity of Performance [I] : int
+Senior Management Commitment [C1] : int
+Local Level Commitment [C2] : int
+Effort [E] : int
+DICE Score : int = 0
+Magnitude of Change : int
+Planning of Change : int
+Frequency of Change : int
+Turnover Intentions : int
+Social Chatter : int = 0
+Aggregate Support() : int
+Communicate w/ Senior Managers() : int
+Communicate w/ Staff() : int

Senior Manager
+Title : string
+Role : string
+Time in Role : int
+Level of Support for Current Practices : int
+Herzberg Motivation 1
+Herzberg Motivation 2
+Herzberg Nature 1
+Herzberg Nature 2
+Perceived Benefit : int
+Duration [D] : int
+Integrity of Performance [I] : int
+Senior Management Commitment [C1] : int
+Local Level Commitment [C2] : int
+Effort [E] : int
+DICE Score : int = 0
+Magnitude of Change : int
+Planning of Change : int
+Frequency of Change : int
+Turnover Intentions : int
+Social Chatter : int = 0
+Aggregate Support() : int
+Communicate w/ Senior Managers() : int
+Communicate w/ Staff() : int
+Communicate w/ Employee Groups() : int
+Communicate w/ Vendors() : int
+Communicate w/ Community Leaders() : int
+Communicate w/ the Media() : int
+Communicate w/ Congress() : int

Staff Members
+Role : string
+Level of Support for Current Practices : int
+Herzberg Motivation 1
+Herzberg Motivation 2
+Herzberg Nature 1
+Herzberg Nature 2
+Perceived Benefit : int
+Duration [D] : int
+Integrity of Performance [I] : int
+Senior Management Commitment [C1] : int
+Local Level Commitment [C2] : int
+Effort [E] : int
+DICE Score : int = 0
+Magnitude of Change : int
+Planning of Change : int
+Frequency of Change : int
+Turnover Intentions : int
+Social Chatter : int = 0
+Aggregate Support() : int
+Communicate w/ Senior Managers() : int
+Communicate w/ Staff() : int
+Communicate w/ Employee Groups() : int
+Communicate w/ Community Leaders() : int
+Communicate w/ the Media() : int
+Operate Enterprise Systems()



Quarterly Meeting

Periodic Meetings

Daily Contact

Productivity
Error Rates
Employee Turnover
Maintenance Accomplishment Rates

Stress and Coping Model

An implementation of Rafferty and Griffins original formulation:

Leader Support- does leadership protect the interests of staff

- 1 = Leaders give strong consideration to the best interests of staff
- 2 = Leaders give sufficient consideration to the best interests of staff
- 3 = Leaders do not sufficiently consider the best interests of staff

Magnitude of Change- is the change Incremental or Transformational

- 1 = Incremental
- 2 = Transformational

Planning of Change- has the change has been well planned.

- 1 = Well Planned
- 2 = Nominally Planned
- 3 = Poorly Planned

Frequency of Change- change in this enterprise occurs frequently

- 1 = Change Occurs Infrequently
- 2 = Change Occurs Moderately
- 3 = Change Occurs Frequently

**Turnover Intentions = Leader Support + Magnitude of Change +
Planning of Change + Frequency of Change**

Output of the Four Layers

Model	Output Format
Job Motivation	Binary value of “Benefit” or “Harm” with a percent confidence score between 0 and 100
DICE	Integer Score from 7 to 28
Local Summing Algorithm	Real Number
Stress and Coping	Integer Score from 4 to 11

What techniques can you suggest for this domain?

Immigrant Behaviors



Group A

- Will I live in poverty if I stay in Mexico?
- Can I avoid apprehension during the border crossing?
- Will I die attempting to cross the border?
- What does my family think?
- Can I find employment in the US?
- Will I live in poverty in the US?
- Can I avoid apprehension while in the US?



Thank you!

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