Breaking the Cookie Cutter: Modeling Personality, Mood, and Emotion in Characters

Richard Evans – Electronic Arts
Dave Mark – Intrinsic Algorithm
Phil Carlisle – University of Bolton
What is your reaction?

- Want to pet
- Just curious
- Annoyed
- Want to kick
- Want to run screaming
- Want to meet
Now what is your reaction?

- Want to pet
- Want to meet
- Just curious
- Annoyed
- Want to kick
- Want to run screaming
Varieties of Reactions

Want to pet
Just curious
Annoyed
Want to kick
Want to run screaming
Want to meet

Annoyed
Just curious
Want to meet
Want to pet

Want to run screaming

Want to kick
Same Model for All Agents

Extreme Reactions

- Want to meet
- Want to pet
- Want to run
- Screaming
- Want to kick
- Annoyed
- Just curious
- Want to pet
- Want to meet
Different Person = Different Response

- Exact *same* stimulus elicits *different* reactions from different people.
- Reactions are based on individual:
  - Personality
  - History
  - Mood
  - Emotion
- In general, reactions are a function of the individual
Same Person = Same Response

- The *same* person in the *same* situation should *generally* react the same way.

Therefore:
- Random reactions do not work (Person A reacts differently each time)
- Decision “style” must be attached to an individual person
How Does this Help Me?

The addition of simple personality factors that are relevant to the game can have a significant effect on the gameplay.
Case Study
The Old: Identical Units

Some City

It didn’t matter:
• When
• How long
• By what method
• To where

The passengers were:
• Nameless
• Faceless
• Desireless
• Boring!
The Old: Identical Units

Only serve the biggest markets… after all, no one cares.
How do we book flights?

• Origin and destination
• Date to travel on
• Preferences
  – Price
  – Comfort
  – Departure and/or arrival time
  – Total length of itinerary
  – On time rate
  – Loyalty to a brand
By Price
By Length of the Flight
By Departure Time
By Arrival Time
By Class of Service

[Image of an Expedia flight search result for Omaha, NE (OMA) to San Francisco, CA (SFO)]

<table>
<thead>
<tr>
<th>Class</th>
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By Class of Service

### By Class of Service

![Expedia Flight Search](image)

#### Omaha, NE (OMA) to San Francisco, CA (SFO)

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<tr>
<td>Northwest</td>
<td>???</td>
<td>$1,300.99</td>
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</table>

**Notes:** The prices shown are for the flight only; they are inclusive of taxes and include all flight taxes and fees. If your itinerary requires paper tickets there will be an additional charge. Fees do not include baggage fees or other fees charged directly by the airline. These results cover a metro area with several airports. Review your choices carefully.

**Choose a departing flight** or view complete roundtrips.

<table>
<thead>
<tr>
<th>Flight Details</th>
<th>Price</th>
<th>Duration</th>
</tr>
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<tbody>
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<td>Northwest 1691 / 365</td>
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<td>Northwest 2939 / 365</td>
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By Brand Loyalty

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<tr>
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<th>United</th>
<th>Delta</th>
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<td>---</td>
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<td>---</td>
<td>---</td>
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<td>from $258 total</td>
<td>from $312</td>
<td>from $329 total</td>
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<td>from $312 total</td>
<td>$272 total</td>
<td>$303 total</td>
<td>$356 total</td>
<td>$373 total</td>
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Prices are per person for roundtrip travel.

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Omaha, NE (OMA) to San Francisco, CA (SFO)

<table>
<thead>
<tr>
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<th>All Results</th>
<th>Continental</th>
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<td>from $1362</td>
<td>from $1403 total</td>
<td>from $1403 total</td>
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<tr>
<td>2+ stops</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Prices are per person for roundtrip travel.
One Trip – Many Choices

- By Price: $231.50
- By Duration: $272.39
- By Departure Time: $391.00
- By Arrival Time: $341.40
- Business Class: $1403.90
- First Class: $1114.90
- My Brand: $312.90
Types of Passengers

- Business
- Leisure
- “VFR” (Visiting Friends and Relatives)
- Institutional (Government, University, etc.)

Each type has its own general traits.
Types of Passengers
Weekly Pax Demand

Week of Year

January  February  March  April  May  June  July  August  September  October  November  December

TOTAL

GDC 2009
Distance Traveled
Preferred Day to Travel

Business

Visiting Friends & Relatives

Leisure

Institutional
Preferred Time to Travel

Business Passenger Preferred Travel Time

Leisure Passenger Preferred Travel Time
Destination

Orlando, FL
- Business: 22%
- Leisure: 66%
- VFR: 8%
- Institutional: 4%

New York, NY
- Business: 41%
- Leisure: 18%
- VFR: 25%
- Institutional: 16%

Washington, DC
- Business: 24%
- Leisure: 30%
- VFR: 16%
- Institutional: 30%

Omaha, NE
- Business: 53%
- Leisure: 21%
- VFR: 17%
- Institutional: 9%
Passenger Characteristics

- Type (Business, Leisure, etc.)
- Origin
- Destination
- Day and Date (up to 8 weeks in advance)
- Preferred Departure Time
- 6 Preferences
Passenger Preferences

- Price
- Comfort
- Total Length of Itinerary
- Nearness to Preferred Departure Time
- On-time Rate
- Brand Loyalty

Preferences are scored 0..3
Preferences

• 6 preferences × 4 possibilities each  
• $4^6 = 4096$ possible configurations
Personality ➔ Preferences

Price Preference

Occurrence

Preference

Inst. VFR Leis Bus

0 1 2 3

0 1 2 3

0 1 2

0 1 2
Personality ➔ Preferences

Comfort Preference

Preference

Occurrence
Personality ➔ Preferences

Schedule Preference

Preference: 0, 1, 2, 3

Occurrences: 0, 1, 2, 3

Preferences: Inst., VFR, Leis, Bus
Satisfaction Curves

Departure Time

Relative Price Satisfaction

On-Time Rate

Length of Trip (Compared to Best Possible)

Brand Loyalty
Satisfaction Curves

Relative Price Satisfaction

Satisfaction Value

Percent of Median Price

AI Summit
GDC 2009
Satisfaction Curves

Satisfaction is the same for everyone…
Same stimulus, same reaction
Satisfaction x Preference

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>x</th>
<th>Preference</th>
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<th>Score</th>
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<tbody>
<tr>
<td>50</td>
<td>x</td>
<td>1</td>
<td>=</td>
<td>50</td>
</tr>
<tr>
<td>50</td>
<td>x</td>
<td>3</td>
<td>=</td>
<td>150</td>
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<tr>
<td>50</td>
<td>x</td>
<td>0</td>
<td>=</td>
<td>0</td>
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Satisfaction is the same for everyone…
Same stimulus, *different* reaction
### Satisfaction x Preference

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>$\times$</th>
<th>Preference</th>
<th>$=$</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>-70</td>
<td>$\times$</td>
<td>1</td>
<td>$=$</td>
<td>-70</td>
</tr>
<tr>
<td>-70</td>
<td>$\times$</td>
<td>3</td>
<td>$=$</td>
<td>-210</td>
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<tr>
<td>-70</td>
<td>$\times$</td>
<td>0</td>
<td>$=$</td>
<td>0</td>
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Satisfaction is the same for everyone…

Same stimulus, *different* reaction
### Satisfaction x Preference

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<tr>
<td>Price</td>
<td>3</td>
<td>x</td>
<td>50</td>
<td>=</td>
<td>150</td>
</tr>
<tr>
<td>Comfort</td>
<td>1</td>
<td>x</td>
<td>-30</td>
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<tr>
<td>Duration</td>
<td>1</td>
<td>x</td>
<td>80</td>
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<td>80</td>
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<tr>
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<td>2</td>
<td>x</td>
<td>25</td>
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<tr>
<td>On-Time %</td>
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<td>x</td>
<td>-100</td>
<td>=</td>
<td>0</td>
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<tr>
<td>Loyalty</td>
<td>2</td>
<td>x</td>
<td>50</td>
<td>=</td>
<td>100</td>
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</table>

**Total:** 350
## Satisfaction x Preference

<table>
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<th>Satisfaction</th>
<th>$=$</th>
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<tbody>
<tr>
<td>Price</td>
<td>3</td>
<td>$x$</td>
<td>50 100</td>
<td>$=$</td>
<td>150 300</td>
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<tr>
<td>Comfort</td>
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<td>$=$</td>
<td>-30 -80</td>
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<tr>
<td>Duration</td>
<td>1</td>
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<td>80</td>
<td>$=$</td>
<td>80</td>
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**Total:** 350 450
## Satisfaction x Preference

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<td>50</td>
<td>$=$</td>
<td>150 50</td>
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<tr>
<td>Comfort</td>
<td>1 3</td>
<td>$x$</td>
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<td>2</td>
<td>$x$</td>
<td>50</td>
<td>$=$</td>
<td>100</td>
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Total: 350 190
People Are Different
Choices of How to Play

Discount

Regular

Upscale
Choices of How to Play

Low Fare & Lower Comfort

&

Higher Fare &

Higher Comfort
Choices of How to Play

Broad Route Structure (i.e. all types of cities)

Targeted Route Structure (e.g. leisure markets only)
Choices of How to Play

Fewer Flights with Larger (comfortable) Planes

Frequent Flights with Smaller (cramped) Planes
Old Method

**Identical Units**
- Everyone’s the same!

**Simple Game Decisions**
- Move the most units possible…
  - Shuttle “A to B”
  - Outprice Competitor
- Shallow, Repetative Gameplay
- Unrealistic Interaction
“Airline Traffic Manager” Method

Individual Units

• Goals
  – Destination
  – Day
  – Time
• 6 Preferences
  – Price
  – Comfort
  – Duration
  – Departure Time
  – On-Time %
  – Loyalty

Many Gameplay Decisions

• Types of Service
  – Seats
  – Meals
  – Entertainment
• Route Selection
  – Different Markets
  – Underserved Markets
• Schedule Creation
  – Week of Year
  – Day of Week
  – Time of Day
Benefits of Modeling Personality

• Breaks “cookie cutter” monotony
• More accurately simulates real human (or whatever) behavior
• Enables automated creation of large numbers of agents
• Enables design decisions
• Provides more choices for the player
Enabling Design Decisions

“A game is a series of interesting choices.”
Enabling Design Decisions

Interesting choices require interesting options.
Enabling Design Decisions

“Creating believable and relevant variety in game characters can provide interesting options for the player.”