

Less A, More I: Using Psychology in Game AI

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IRRATIONALLY HUMAN

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WHY PSYCH?

A popular way of thinking:

*Humans are creatures of higher thoughtfulness. Due to our advanced brains and cultural progress, we make decisions using much more **logic** and **rationality** than other animals.*

WHY PSYCH?

Rational



Logical



Dysfunctional?

WHY PSYCH?

What is our goal when we are making AI controlled entities?

Intelligent Agents? Agents that act rationally, logically, and thus intelligently?

Of do you mean agents that appear to people to act in intelligent ways? If so, then we're imitating Human agents.

Intelligent implies some qualities.

Human implies something subtly different.

WHY PSYCH?

Rationality and Logic? Not usually.

- *Rare behavior. No time in the wild.*
- *Emotions and Heuristics do most of the work*
- *Emotions tied to memory storage/retrieval & motivation*
- *Certain heuristics and behaviors appear in every culture*
- *Read Antonio Damasio, Joseph LeDoux, Daniel Kahneman*

WHY PSYCH?

Not optimal...

- *The adaptive toolbox*
- *Layered rule base*
- *Evolution doesn't discard, it adds to*
- *Simple rules combine to give awesome results, tiny computation time*



...LETS GET TO
THE GOOD
STUFF

Heuristics

Biases (individual and social)



HEURISTICS

- *Take The Best*
- *Availability*
- *Affect*



HEURISTICS

Take The Best

- *Choose option with highest priority cue value*
- *Very much like most game AI, except for the complexity of the priority judgments*
- *Several variants: Dawe's Rule, EBA (eliminate by aspect), Good features*

HEURISTICS

Availability

- *People predict the frequency or proportion of something based on how easy an example can be thought of.*
- *Media coverage affects this. Advertising. Personal anecdotal knowledge.*
- *Simulation: Likelihood is based on how easy something is to simulate mentally. Near misses thus seem worse.*

HEURISTICS

Affect

- *Current “affect” influences decision. Shorter than a mood, involuntary. If something is good, play down the bad parts*
- *First impressions, subliminal images. We store every memory with emotional tags. They linger*

INDIVIDUAL BIASES

- *Status Quo*
- *Priming*
- *Negativity*



INDIVIDUAL BIASES

Status Quo

- *If it ain't broke don't fix it.*
- *Humans quickly find AI exploits.*
- *Cheat codes*
- *Dynamic opponent behavior can help.*
- *Flighty NPCs are bad, Mokay.*

INDIVIDUAL BIASES

Priming

- *Priming: exposure to something influences future responses.*
- *Many different types: repetition, semantics, association, etc.*
- *Priming mostly happens on autopilot.*

INDIVIDUAL BIASES

Negativity Bias

- *Humans seem to feel and weight negativity far stronger than positivity*
- *Evolutionary adaptive*
- *Both information and experiences*

SOCIAL BIASES



- *Reciprocity*
- *Authority*
- *Conformity*
- *Social Proof*
- *Endowment*
- *Investment*

SOCIAL BIASES

Reciprocity

- *If a person feels they've been given something, they will feel very compelled to return the favor*

Authority

- *Authority figures carry more weight, aren't doubted as much. Parents are a special case*

Conformity

- *70+% conformity with public displays. Almost non-existent if anonymous. Based on number in group, strength of group, and immediacy*

SOCIAL BIASES

Social Proof

- *People assume that other's actions are "correct" especially in strange situations*
- *Informational and normative social influence*
- *Operates at many levels of society*
- *Very contextual*

SOCIAL BIASES

Endowment

- *A bird in the hand is worth two in the bush*
- *Ownership is a special concept in human brains*
- *Can somewhat explain player hoarding*

Investment

- *People are hard pressed to abandon things they've invested in.*
- *Escalation: People's ego cause unwise additional investments*

SO WHAT?

Know the rules! Knowledge is POWER

- *Players will be using them. You'll make **more real AIs** by knowing what they are and what that means in terms of user perception.*
- *Players are **unaware of bias**. Humans will intuitively and unconsciously use attribute substitution to replace computationally complex judgments.*
- *They are a list of **exploit bugs** for humans. Know the edge cases!*
- *AI **fails will be more understandable**, more human. Heuristics represent codified “past” and, just like scripting in a game, will fail.*

