Less A, More I: Using Psychology in Game Al

Dave Mark – Intrinsic Algorithm Brian Schwab – Blizzard



"Reducing the world to mathematical equations!"

IRRATIONALLY HUMAN

Brian Schwab

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.

Rational







Dysfunctional?

What is our goal when we are making Al 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.

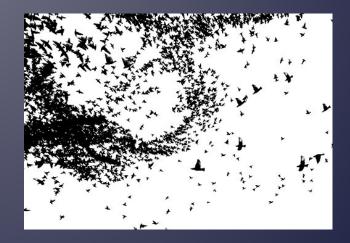
Rationality and Logic? Not usually.

- 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

Not optimal...

- The adaptive toolboLayered 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)





- Take The Best
- Availability
- Affect

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

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.

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

- Status Quo
- Priming
- Negativity



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, Mkay.

Priming

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

Negativity Bias

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



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

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 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

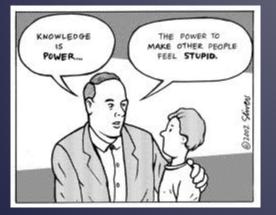
Endowment

- 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 Als 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.