

AI

ARTIFICIAL
INTELLIGENCE
— SUMMIT —

FLAME RETARDANT AI:

Stopping AI Fires Before They Ignite

Andrea Schiel

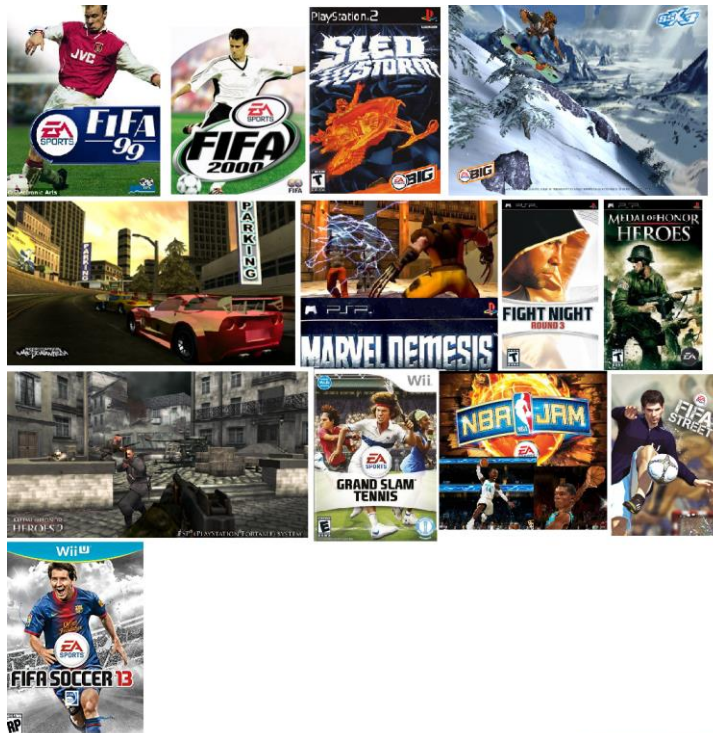
Principal Engineer Microsoft

GDC

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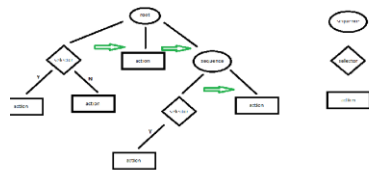
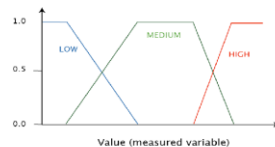
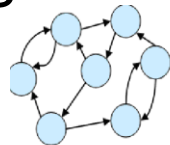








- FSMs, hFSMs, Fuzzy SMs
- Production & Expert Systems
- Behavior Trees & Decision Trees
- Scripted Systems
- Utility Function Based
- Neural Networks
- Adaptive AI



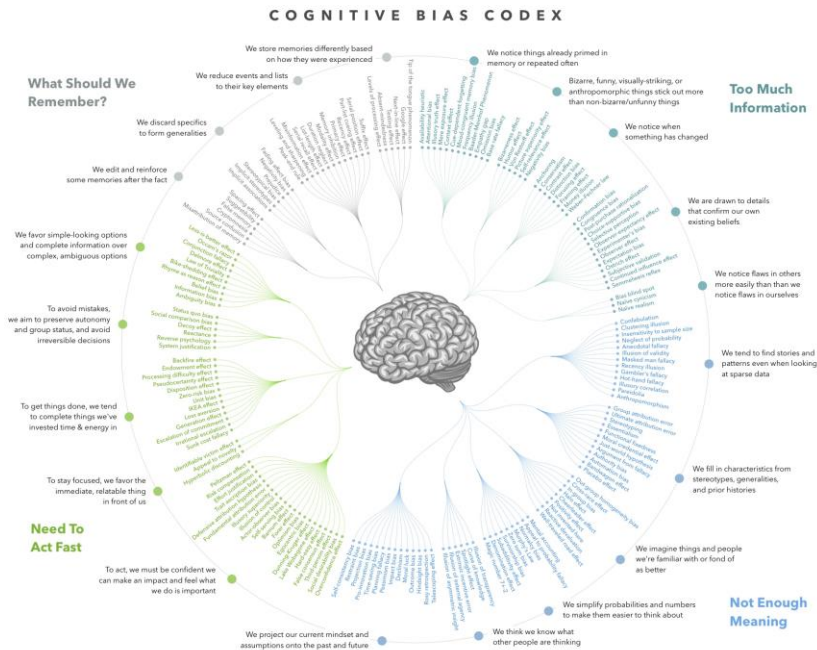








Not in code - approach to AI



DESIGNHACKS.CO - CATEGORIZATION BY BUSTER BENSON - ALGORITHMIC DESIGN BY JOHN MANOGIAN III (JM3) - DATA BY WIKIPEDIA
By JM3 - Own work, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=51528798>

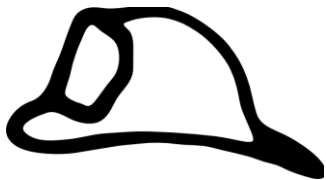
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Top 3 Firestarters



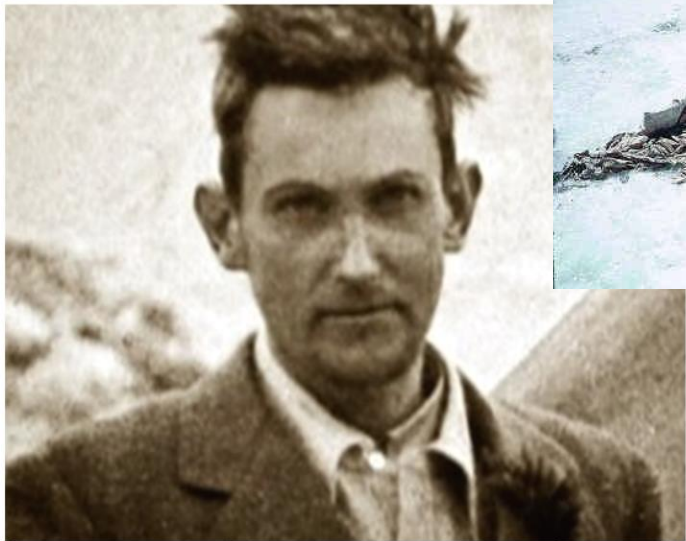
Because It's There

Beware The Goalie Playing Out



Too Many Heroes

Because It's There



Common Reasons

- Why reinvent the wheel?
- We don't have time to build a new AI
- A new AI would be risky

Cognitive Bias

- Anchoring Bias
- Loss Aversion
- Sunk Cost Fallacy
- Well Travelled Road

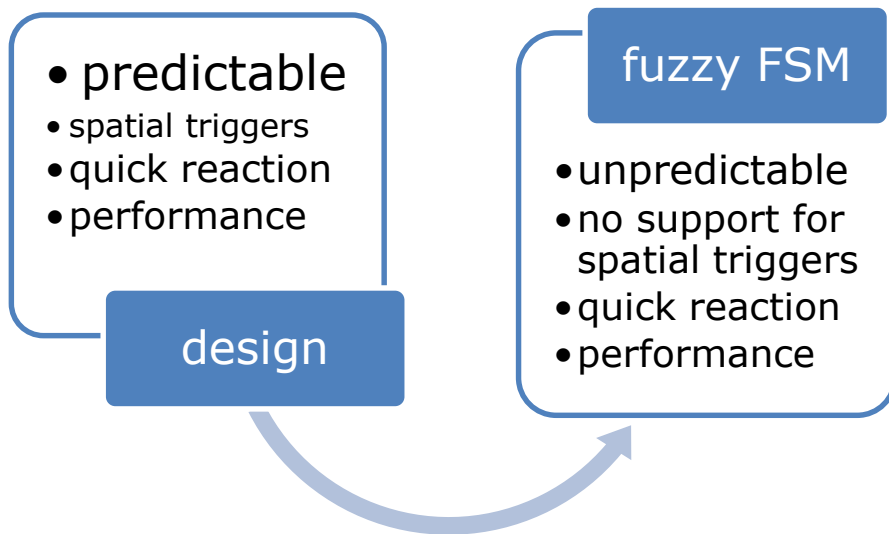


Medal of Honor™ Heroes 2

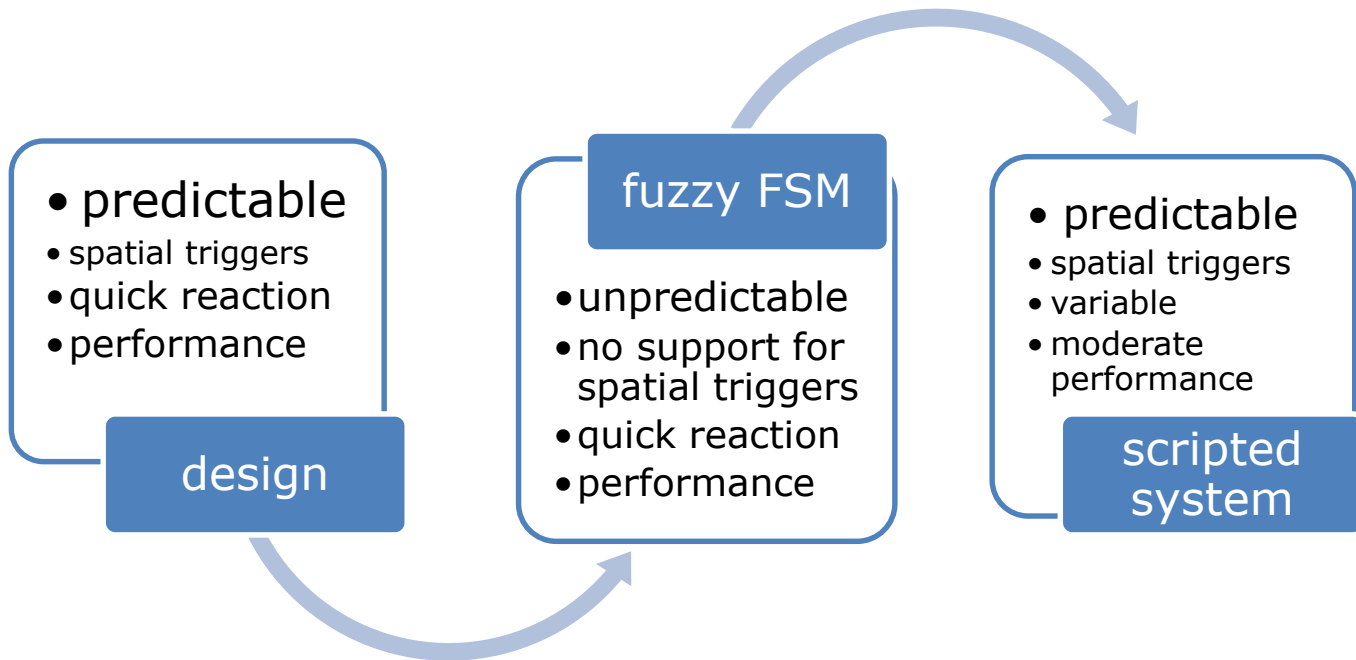
- predictable
- spatial triggers
- quick reaction
- performance

design

Medal of Honor™ Heroes 2



Medal of Honor™ Heroes 2



The Signs of Fire



ATTITUDE

It's not the problem that's the problem.
Your attitude about the problem is the problem. Savy?

- Hacks to the system:
'new functionality'
- Bypassing advantage
of the system
- Lots of interrupts
- Constant tuning

AI System	Reactive Speed	Stateful	Emergence / Unpredictable	Opportunistic Behavior	How it Scales with World State Complexity	How it Scales with Number of Agents	Easy to Create Variants	Runtime Performance with Large Data	Easy for Anyone to Author Data	Planning
Decision Tree	high	no	none	low	high	moderately	no	low	yes	no
Utility Function	high	variable	variable	high	high	yes	yes	high	moderately	no
Fuzzy System	high	yes	moderate	low	moderate	yes	yes	high	hard	no
Neural Network	high	no	high	high	moderate	not well	no	high	hard	no
Production Rules	high	no	high	high	moderate	moderately	yes	high	moderately	variable
GOAP	low	yes	high	high	moderate	not well	no	low	hard	yes
Behavior Tree	medium	yes	low	high	moderate	not well	yes	medium	moderately	no
FSM / hFSM	medium	yes	none	low	low	yes	no	high	yes	no
Partial Order Planner	medium	no	high	high	moderate	moderately	no	high	hard	yes
HTN Planner	medium	yes	high	high	moderate	moderately	no	medium	hard	yes
Script System	variable	variable	none	low	low	not well	variable	low	yes	no

Overcoming the Bias



- **Consciously** compare your system to the requirements
- **Quantitatively** assess the cost of fighting the current system and **quantitatively** assess the cost of developing a new system
- **Remove subjectivity** from the comparison

Beware The Goalie Playing Out



Beware The Goalie Playing Out



Common Reasons

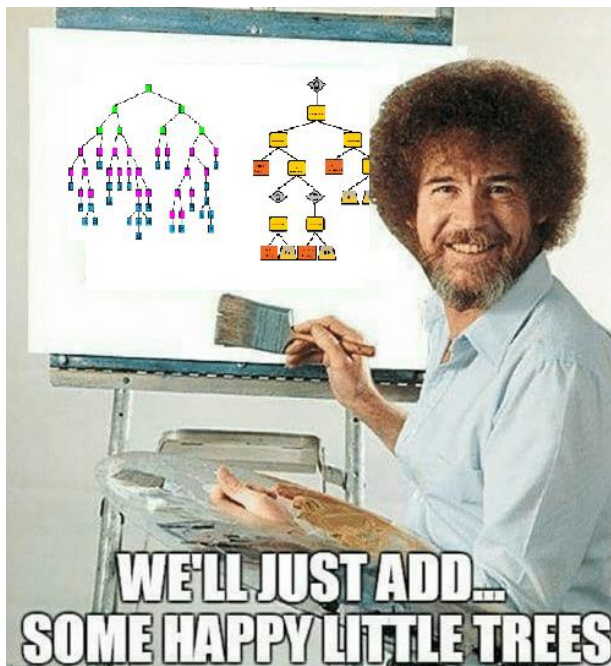
- I know what I'm doing
- I understand the problem space
- The AI needs to act the same way as before

Cognitive Bias

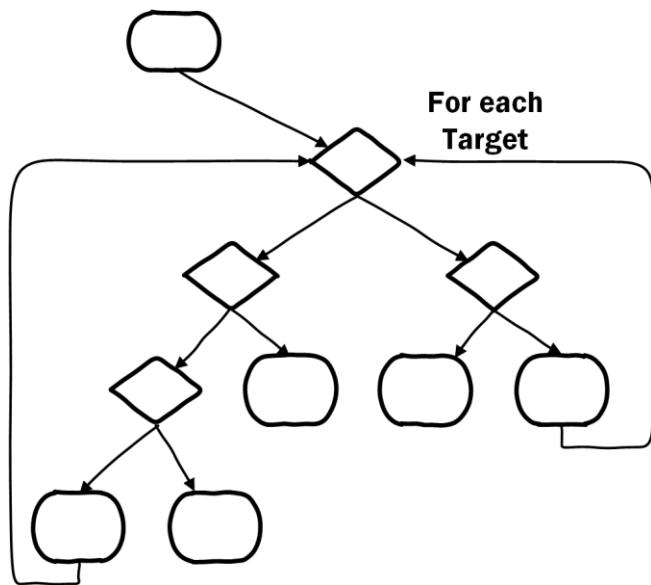
- Blind Spot Bias
- Attentional Bias
- Confirmation Bias



Third person action



Targeting in a behavior tree



- Added looping to behavior tree
- Interrupted the whole tree to force update
- Only used selector nodes and was very long

Behavior $\neq$ Decision

- Only use selector nodes
- Interrupt to get the tree to rerun
- End nodes are decisions; not states (behaviors)
- Tree always succeeds or fails; never in progress
- Overuse of services (UE)

The Signs of Fire

- Hacks and interrupts
- Data looks the same as before
- Sense of familiarity – it shouldn't be
- Performance issues – sudden spikes
- Inability to get results

Overcoming the Bias

- Take a small problem, author the data both in the old way and in the new: it should be different.
- Take a new problem, author the data with the new system – try to think in its terms
- Consult an expert in the new system. Have them review your data.

Too Many Heroes



Common Reasons

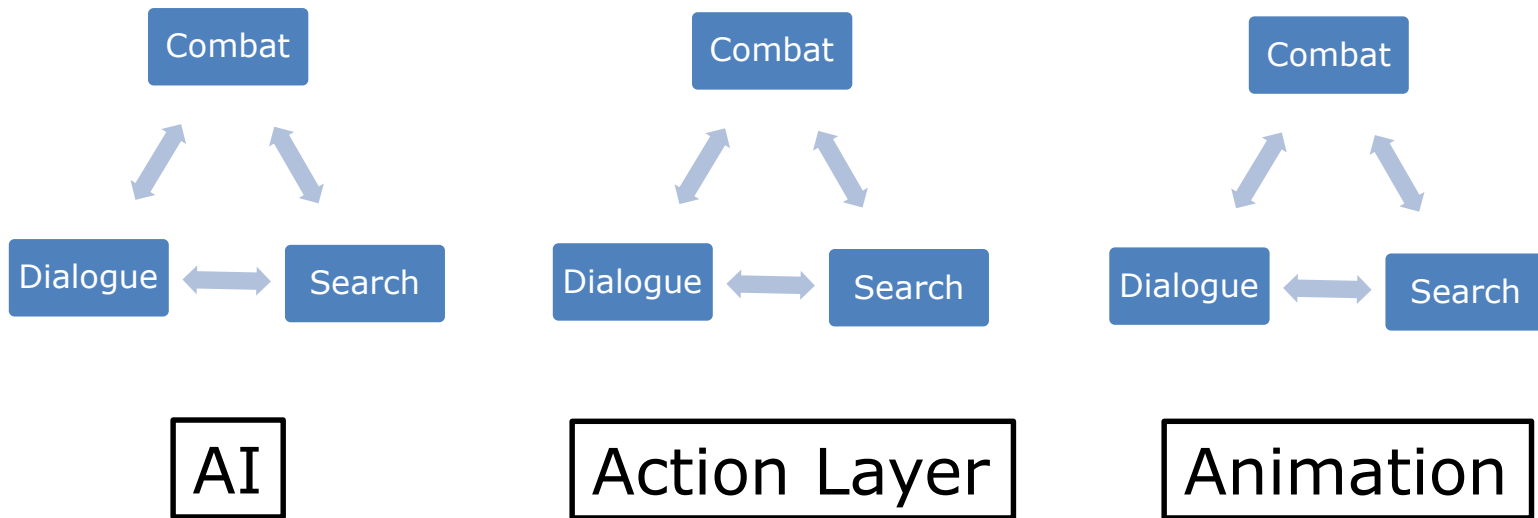
- This is an AI feature
- This is how we do it in Animation
- Production assigned this task to me
- I don't know anything about the Animation system

Cognitive Bias

- System justification
- Pro-Innovation Bias
- Law of the Instrument – “I have a hammer, that must be a nail”



Narrative game



Without a map...



The Signs of Fire

- Duplicated structure, enums, functionality
- Indirect breaking of data encapsulation
- Modules need to stay “in synch”
- AI programmer(s) that don’t know the animation system and vice versa

Overcoming the Bias

- Multiple discipline scrums
- Learn how the other systems work: AI, audio, input
- Consider making the AI classification of the world state shared / common
- Have an architectural diagram: UML 4 the WIN

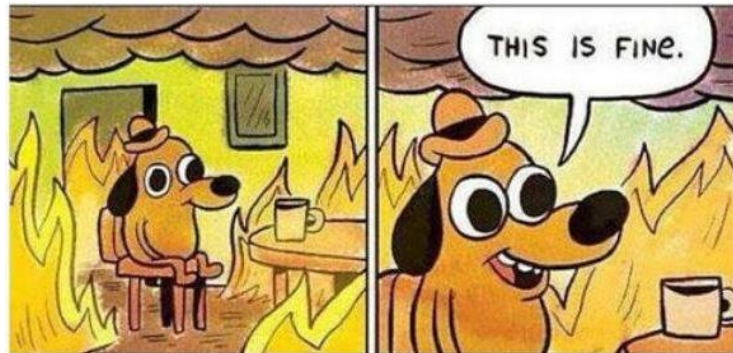
Overcoming the Recency Bias

- Don't silo yourself or your code: Too Many Heroes. Know your architecture.
- Rewire your brain and don't fight your AI: Beware The Goalie Playing Out
- Choose your AI system based on requirements: Because It's There



Know the signs

- Hacks & a lot of interrupts
- Bypassing advantage of the system
- Constant tuning
- It's a new system and the data looks laid out incorrectly
- Performance issues – sudden spikes
- Inability to get results
- Duplicated structure, enums, functionality
- Modules need to stay “in synch”
- AI programmer(s) that don't know the animation system and vice versa



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