

Culturally-Affected Human Behavior Modeling and Its Applications to Serious Games

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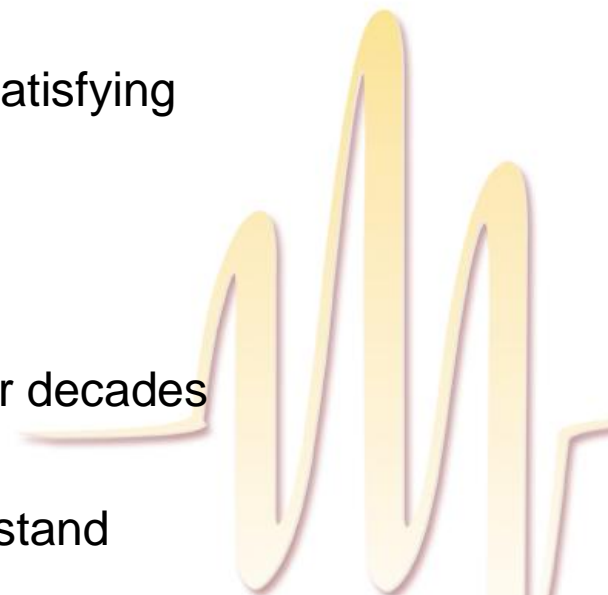


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Social & Cultural Simulation

- Computational models of behavioral phenomena that “make us human”
 - Emotion, trust, culture, stereotyping, personality, humor, love
- Challenges in social & cultural simulation
 - Phenomena are difficult to observe in controlled experiments
 - Variability is high
 - Averaged results over a population are unsatisfying
 - Very difficult to isolate variables
 - Evaluation may be inherently subjective
- But there’s hope
 - Social scientists have been studying this for decades
 - Lots of obvious, good ideas to be explored
 - These are phenomena my mom can understand

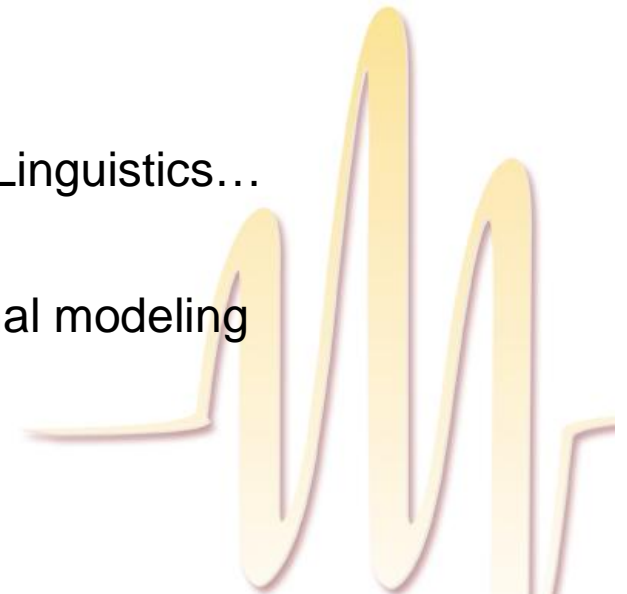


Social Simulation Methodology






- Approaches to social & cultural modeling





- One methodology (as an example)
 - Identify the problem
 - Conduct a literature survey
 - Anthropology, Sociology, Psychology, Linguistics...
 - Select one or more candidate theories
 - Sufficiently formal to allow computational modeling
 - Model the theory computationally
 - Evaluate the model
 - Influence the parent social science?



Related Work

- Social science
 - Hofstede's five dimensions
 - Hofstede & Hofstede 1991
 - Criticism: McSweeney 2002
 - Appraisal theory 
 - Scherer, Schorr & Jonstone 2001
 - Theory of mind 
 - Whiten 1991
 - Shared Symbols 
 - Shweder & LeVine 1984
 - Schema theory 
 - D'Andrade 1992, Quinn & Strauss 2001, DiMaggio 1997
 - Politeness model 
 - Brown & Levinson 1987
- Human behavior modeling
 - Virtual Humans
 - Rickel et al. 2002
 - PsychSim
 - Marsella & Pynadath 2005
 - Culturally-Affected Behavior
 - van Lent 2007
 - Cultural Cognitive Architecture
 - Knudsen et al. 2007
 - Etiquette Engine
 - Miller et al. 2007



MEETING PARTNER  Farid TRUST  5	OBJECTIVE Learn why market is not being used	PREPARATION OBJECTIVE REVIEW MEETING PARTNER INTENDED OUTCOME RESEARCH PREP SHEET BRAINSTORM REQUISITIONS						REHEARSAL REHEARSAL	MEETING MEETING	AAR AAR	FOLLOW-UP FOLLOW-UP
		MEET WITH MEETING PARTNER									
		TIME 25:40	Help			Options			Info		



- | Plan | Text |
|--------------------------|--|
| <input type="checkbox"/> | I'm not here to talk about any of that. I'm here because I hear you've been having some trouble with the market. |
| <input type="checkbox"/> | If you tell me the name of the person who promised you things and make me a list of the things you need, I will look into it as quickly as I can. I'm also hoping you can help me with some information. |
| <input type="checkbox"/> | Is it true that there is trouble with the market? We would like that to stop. |
| <input type="checkbox"/> | I want to help you, and I promise I'll talk to my superiors. Meanwhile, can you give me some information? |

[Compliment locale]

Farid: Do not measure us based on our station. Measure us by the safety of our neighborhoods.

[Compliment host's generosity]

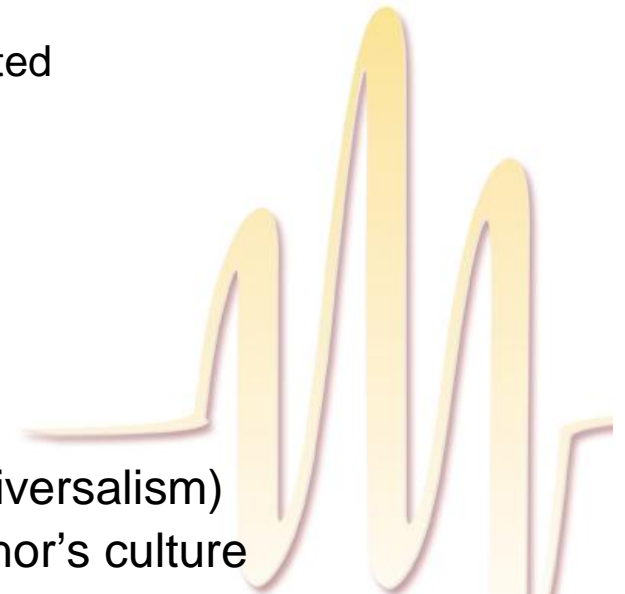
Farid: [Farid nods at your compliment]

Farid: I hope you've come with some good news for me. My department, it is not running well. We have many things that we need. I've had some bad experience with some of the people who came before you. Too many times I've been promised things I do not receive.



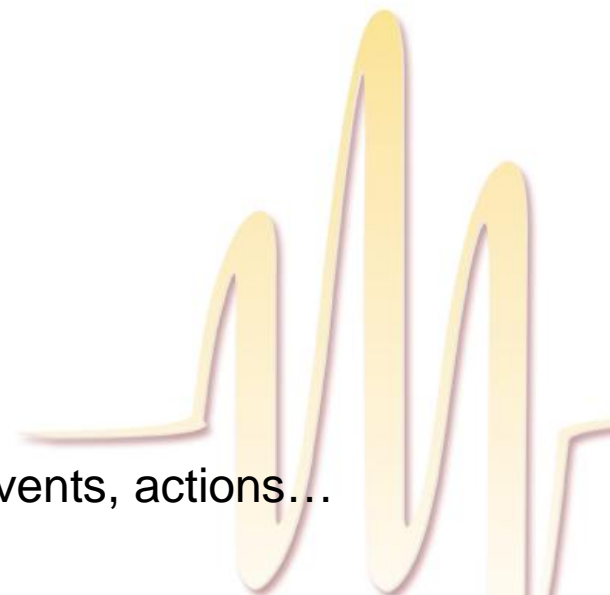
Motivation

- What if we want to meet with Fritz, the German police chief?
 - What changes?
 - Fritz should look different
 - Fritz should talk differently
 - Fritz's body language should be a bit different
 - Fritz might shake hands rather than bow
 - Fritz would be happy to accept a six pack as a gift
 - Fritz might know more about U.S. culture
 - Fritz might be less fearful about being arrested
 - What stays the same?
 - Fritz is still a police officer
 - Fritz still wants to help the community
 - Underlying human behavior architecture
- Why this might be an impossible problem
 - Culture is too pervasive
 - Every culture needs its own model (anti-universalism)
 - Every data model will be biased by the author's culture



What's in a culture module?

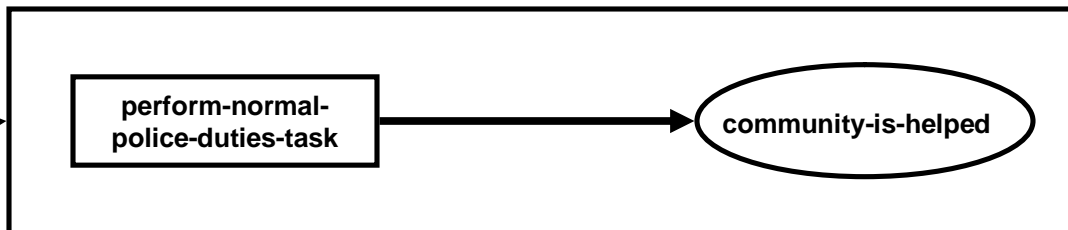
- Character's appearance & surroundings
 - 3D character model
 - Character "skin"
 - Environment models and textures
- Character's external behaviors
 - Language model
 - Voice model with accent
 - Animations (facial & body)
 - Actions schemas
- Internal knowledge & reasoning
 - Reasoning schemas
 - Socio-cultural norms
 - Culturally-specific reactions to situations, events, actions...



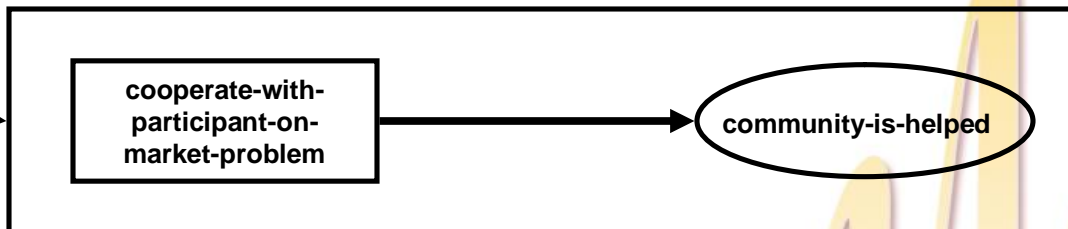
Farid's choice



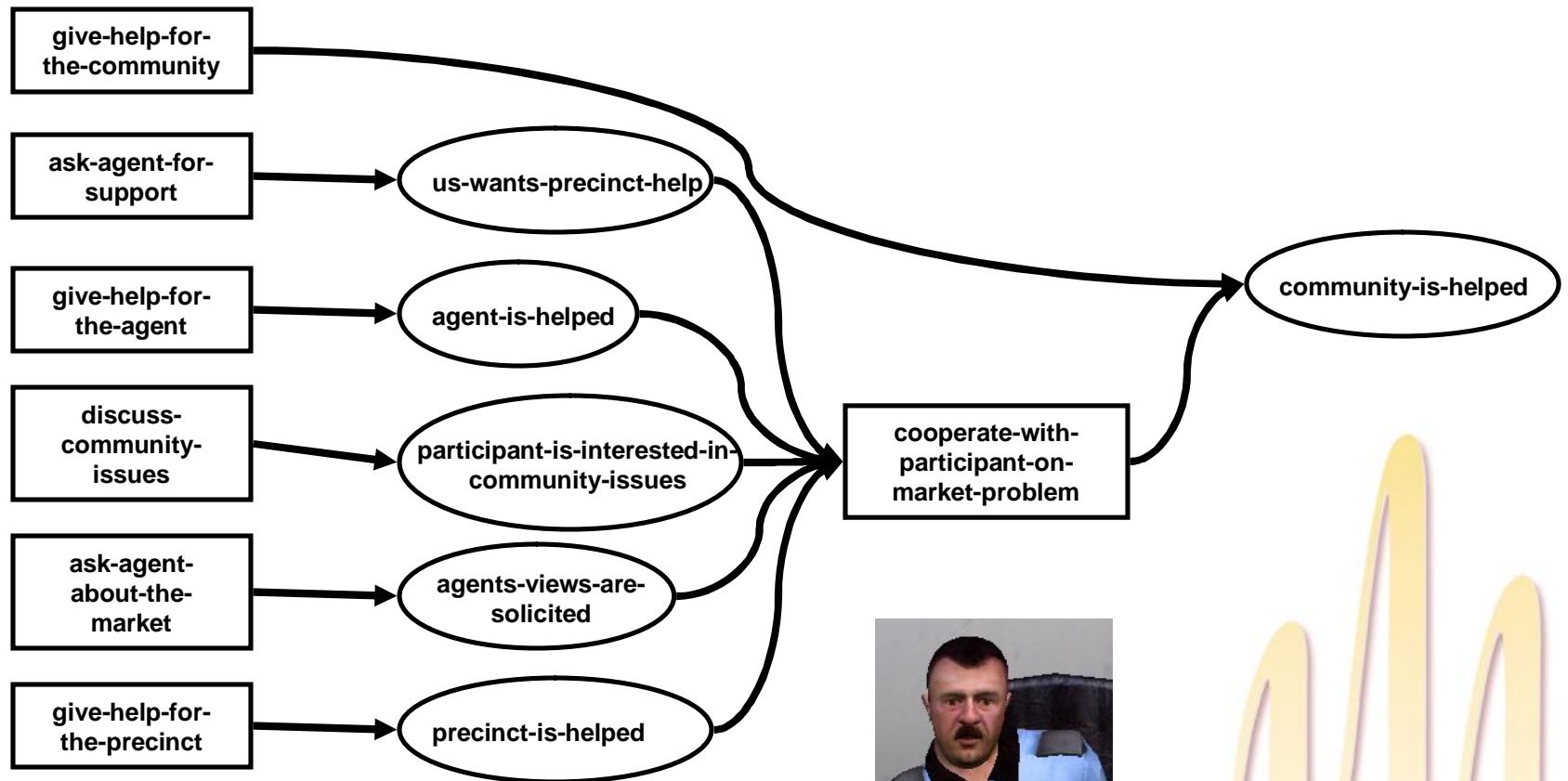
Domain plan 1



Domain plan 2



Player's actions have influence



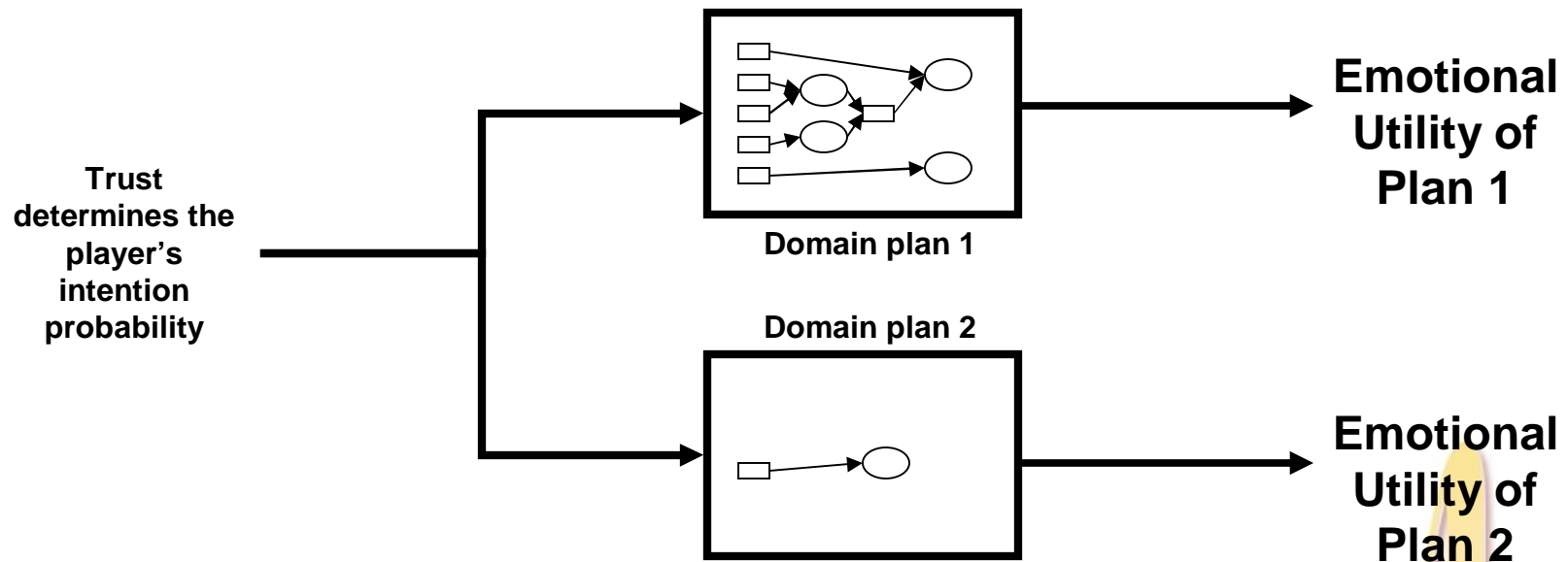
**Work of Swartout,
Gratch & Marsella**

Emotional Utility

- State value and probability let us model emotion:
 - Joy = positive value and 100% probability
 - Hope = positive value and $< 100\%$ probability
 - Fear = negative value and $< 100\%$ probability
 - Distress = negative value and 100% probability
 - ...
- These emotional values have many uses:
 - Emotional utility used to select among plans
 - Emotions influence facial expression, body language, language generation, tone of voice, willingness to continue the interaction
 - Emotions trigger coping strategies

**Work of Swartout,
Gratch & Marsella**

How does Farid choose?



- Trust is determined by:
 - Credibility
 - Solidarity
 - Familiarity(Bickmore & Cassell 2001)
- Utility is the sum over all states of value of the state \times probability the state will occur

Work of Swartout,
Gratch & Marsella

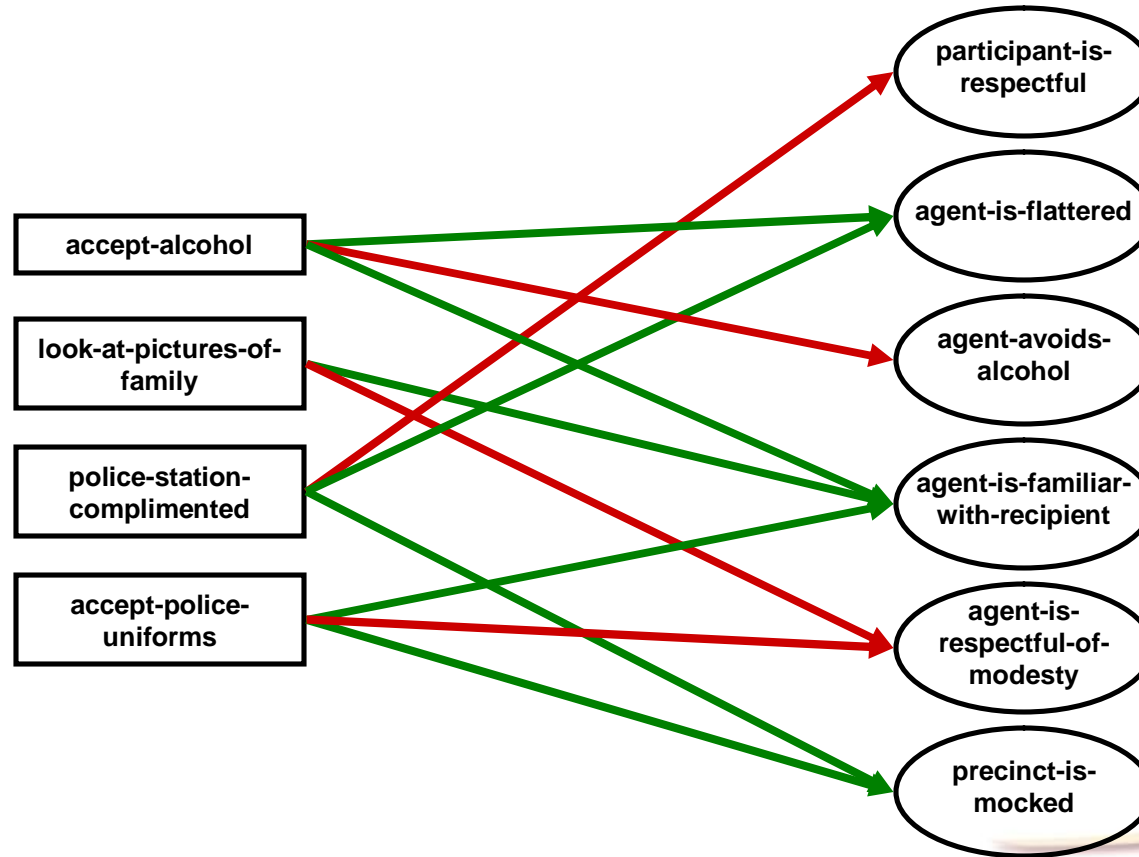
Adding socio-cultural norms

- Add social and cultural norms as states
 - “Agent is respectful of modesty”
 - “Participant feels safe”
 - “Agent is observant of Islam”
- Value of a socio-cultural norm: how important that norm is to the target culture
 - “Agent is observant of Islam” has high value for Farid
 - Assigned once when defining the culture model
- Degree of a socio-cultural norm: how much the current situation adheres to or conflict with that norm
 - “Accept gift of alcohol” decreases “Agent is observant of Islam”
 - Updated every decision cycle based on the current situation
- **Socio-cultural comfort:** the agent's appraisal of the situation against the socio-cultural norms
 - Socio-cultural comfort = Sum over all norms of value × degree

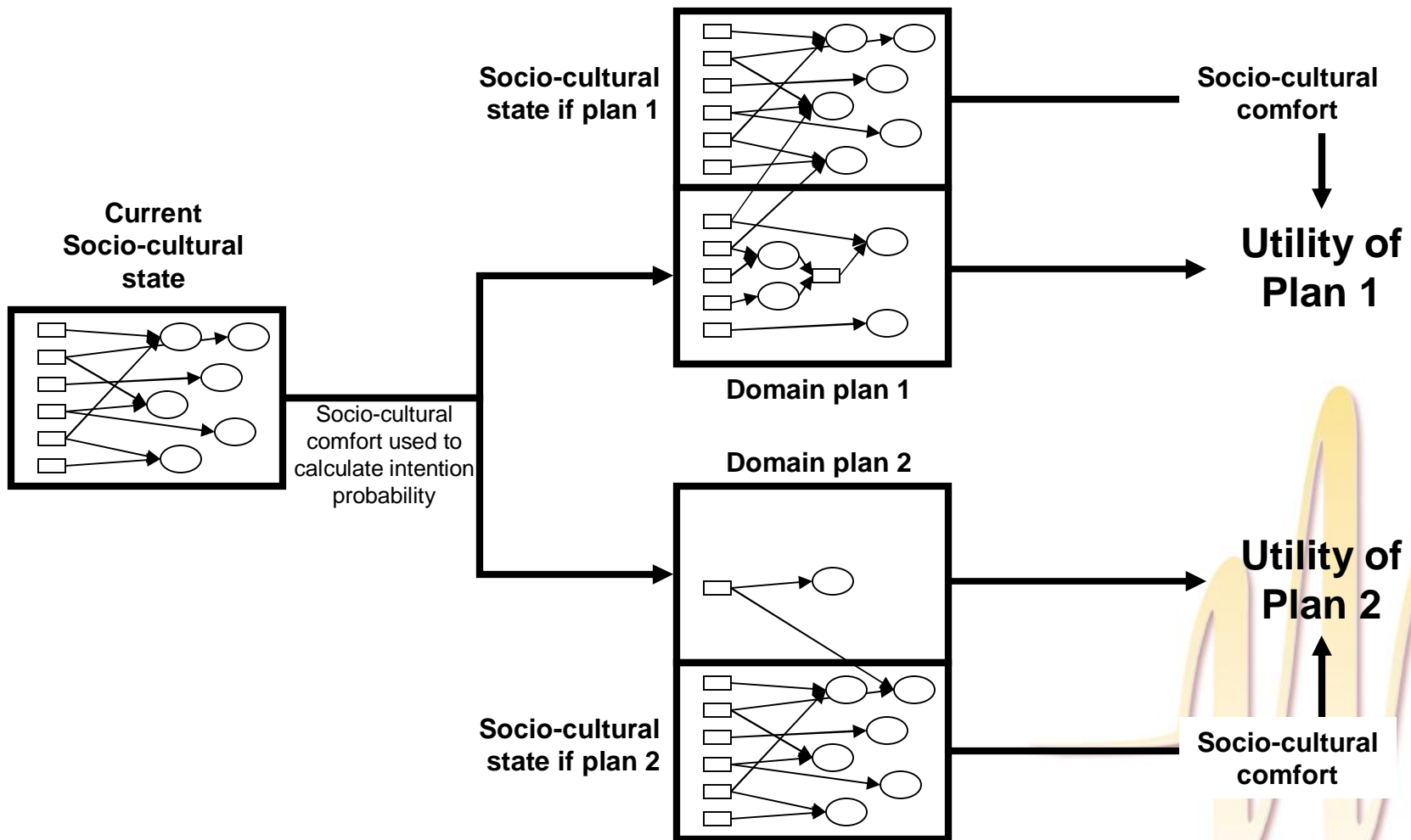




Actions modify degree of socio-cultural norms



Socio-cultural influence

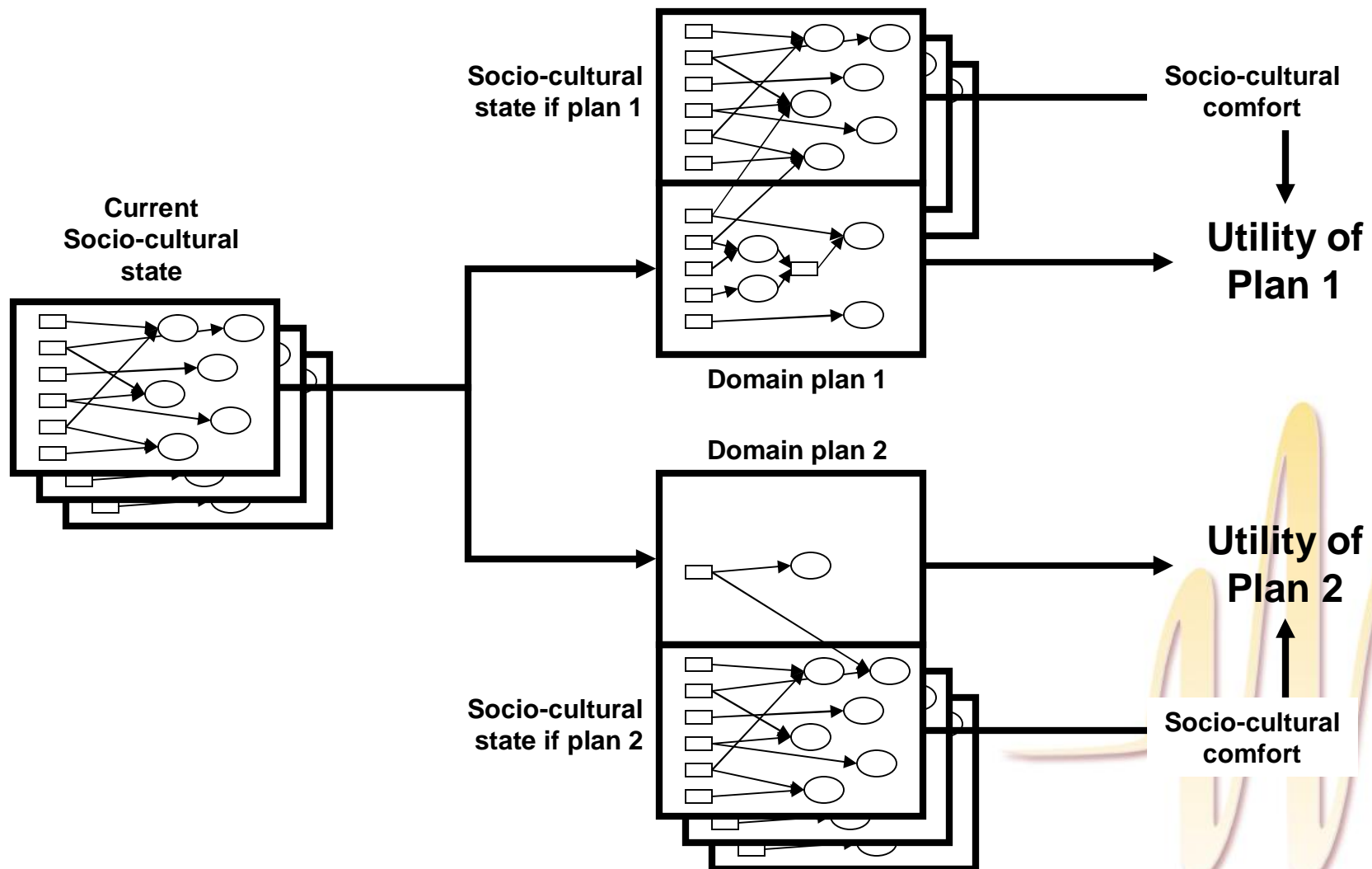


Theory of Mind

- Theory of Mind: decisions we make and the actions we take are influenced by how we believe others will react (Marsella & Pynadeth, 2005)



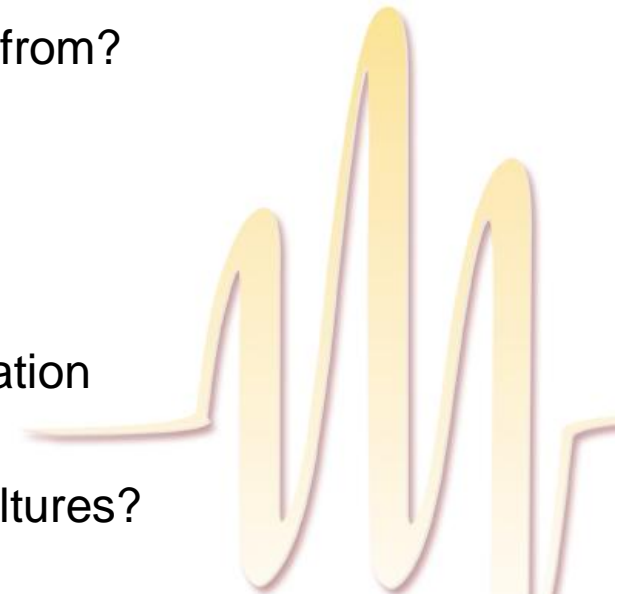
Theory of Mind influence





How will these modules be evaluated?

- Evaluate the behavior
 - Isolate the feature to be varied
 - Culturally neutral appearance
 - Questionnaire
 - Is this culturally appropriate or not?
 - How would it make you feel?
 - Video clip
 - What culture do you feel this person is from?
 - Predict the response of the character
- Evaluate the model
 - Put the subject in the role of the character
 - Rapport building session
 - Measure success as degree of cooperation
- Evaluate the framework
 - Can our framework represent all human cultures?



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