# Playing outside cyclic habits wins

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#### Story time:

Once upon a time, there was a girl (or was it a boy I can't remember) named Pandora. She was told not to open the lid of a secret box. But because of (a virtue of) great curiosity, one day she decided to peek, just a little, by opening the lid of the box a single millimeter. The story tells that this was a mistake, because in the box there lived an infinite number of tiny winy devils, and they were longing to sneak out of the box and create a disaster for humanity.

Is there a moral to this story? Is it possible to make such a terrible mistake that can never be undone? We argue that (Pandora's) cyclic habits are more interesting than the terminal ones.



Once upon a time...

Pandora runs into an obstacle.



Wow, that hurts...

Pandora's hope: "I wish it never happens again..." She does not yet understand, just how she got hurt.



Perhaps she was just unlucky, and from now on all will be fine.

As Pandora moved on in life, she found that "Wham!" happened again, and again. so she decided to use a different model.

She closes the arrow to form a cycle, in fact a loop, with one single node, representing the painful moment.



The 11-star represents the *equivalence class* of those types of painful moments.

## 11-star and learning

- The 11-star is a painful moment, but it opens a possibility for change
- This is not a paradox
- The 11-star invites learning
- So, is there a way out of the painful cycle?

### 11-star is a symptom, of what?

- The word "symptom" appears sometimes as a noun, as if it exists on its own; the back pain, the head ache, the sore neck, the depression, the 'slipped' disk, and so on
- But, it is a symptom *of* something else...
- What is this something?
- Pandora aims to understand this 'something'
- Perhaps this can help her to play outside the cyclic habit

## Pandora's wholeness

- Wholeness principle: Pandora's perception reflects all of her reality, not just the hurting part
- So 'the symptom' is a symptom of everything within Pandora's perception
- Assume this wholeness principle
- This still does not explain, specifically, "...a symptom, of what?"

### From another point of view:

- If Pandora holds onto some contradictory belief, it would be good if she could perceive this
- Suppose that Pandora's nature provides this tool; by the evolution of her species, she perceives the effort of any contradictory belief
- She can give various meaning to her experiences

#### Detrimental

Or cyclic



### Habits

Through life, Pandora has acquired many skills

Most benefit her, via learned habits

Others, might be less beneficial

Task: describe habits as functions

### Belief functions

B = set of beliefs, E = set of experiences

Nature:  $\psi: B \to E$ Habit:  $h: E_h \to B$ When is  $\psi(h(x)) = x$ ?

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### Belief functions

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### Does a 'symptom' exist?

### Believer contra Doer, about 'symptoms'



# A Nash equilibrium

- Pandora has learned the following definition of a (pure) Nash equilibrium:
- no player has an incentive to change strategy (unless the other also does so)
- Our diagram has a pure Nash equilibrium in the South East corner; neither the Doer, nor the Believer has any incentive to change
- That is, once Pandora reaches that corner, she will be stuck there, unless...

### An equilibrium: South East



### Another equilibrium: North West



Is it possible to move from South East to North West? A possible marriage between Believer and Doer



### Pandora's revelation:

# There is only one player.

# Rephrasing the question

- So, the constructed split between Doer versus Believer gives an impossible situation
- This split is the symptom, of a contradictory belief
- There is no division between two players
- The 'symptom' is a symptom of misinterpreting the meaning of a symptom
- It is a symptom of having a belief, that it should be removed

### A forced distinction of Believer and Doer



# No move is necessary

- A contradiction has been revealed
- The poor 11-star has been pushed down into the South East corner, by these monsters of disbelief
- Once they are revealed: look the ugly monster into their eyes
- Then, they will loose the grip on Pandora





### In conclusion: diagram explained

The 11-star represents an equivalence class



The intention of removal of 11-star contradicts her wholeness, which is perceived as 11-star.

# Learning

### The next level is easier:



#### Perhaps still, 10-star







8-star













#### 3-star...



# Is there a theorem to prove?

Binary belief functions: testing a non-habitual point of view

B = set of beliefs and questions, $E = \{11 \text{-star, undefined}\}$ 

Nature:	$\psi: B \to E$	
Non-habit:	$\overline{h}: E_h \to B$	

 $\psi(\overline{h}(x)) =$ undefined

Binary belief functions: testing a non-habitual point of view

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Is undefined OK?

# Definition: A belief is fixed if its truth value cannot be questioned

Theorem: Nature returns 11-star if and only if input is a fixed belief on an undefined proposition.

Proof: If the agent fixes a belief on an undefined proposition, then its truth value cannot be questioned. But the proposition is undefined, so it does not have a truth value. Therefore 11-star must alert. If 11-star gives a signal, then, this alerts a contradiction to the fundaments of nature. Nature as a whole is undefined, and can therefore be questioned. Thus for a contradiction it is required a fixed belief.

# To avoid the 'undefined', does a rational solution suffice?

In game theory, there are many known paradoxes of rationality, i.e. the Prisoner's dilemma, Centipede game, etc

Study game theory models!











Therefore we refine the matrix game to general sum, where each agent wants to maximize their own utility (or even the social welfare)

#### No fight

Agent 1

Fight

### Agent 2

No fight Fight

(? <i>,</i> ?)	(?,?)
(? <i>,</i> ?)	(?,?)

By elaborating the ?s, we can model a variety of situations, still satisfying the zero-sum game

### Agent 2

No fight Fight

Agent 1	No fight	(100,100)	(?,?)
	Fight	(?,?)	(-10,-10)

The differences between utilities satisy the zero-sum dame, but the		Age	ent 2
equilibrium has shifted NW		No fight	Fight
Agent 1	No fight	(100,100)	(0,10)
	Fight	(10,0)	(-10,-10)



Potential prot constructed th	olem: we ne games			
conflict oriented game,		Age	Agent 2	
diagrams may not tell us anything useful about		No fight	Fight	
Nature Nature Agent 1	). No fight	(100,100)	(0,10)	
F	ight	(10,0)	(-10,-10)	

#### "Is universe a friendly place?"

-Albert Einstein





No Fight/No Fight is the unique equilibrium for a peaceful Agent, if the universe is a friendly		Nature	
place		No fight	Fight
Agent	No fight	(10,∞)	(10,-∞)
, 29 C I I C	Fight	(-10,-∞)	(-10,∞)

Can an unsure Agent take 'the risk' and leave the SE corner? For sure Nature will not leave, unless the		Na	ture
Agent moves first!		No fight	Fight
Agent	No fight	(10,∞)	(?,-∞)
	Fight	(?,-∞)	(-10,∞)

Can an unsure Agent take 'the risk' and leave the SE corner? For sure Nature will not leave, unless the Agent moves first!

**Fight** 

Agent



Game theory can be used to think about nature, and an agent lives in a universe of questions, rather than a universe with answers. Game theory can be used to think about nature, and an agent lives in a universe of questions, rather than a universe with answers.

Can the use of such fundamental axioms guide us in practical endeavors to escape vicious cycles? Can we stop to reinforce repeated situations where we do not like to be? A world full of questions, and only very few answers



This work continues in the manuscript "Vicious cycles and questions without answers"