

# Intelligent Escalation and the Principle of Relativity

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## 1 Escalation

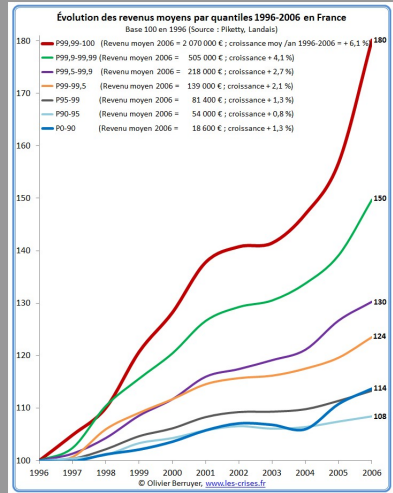
- In 2014
- In 1720
- In 1971 and now

## 2 The Dollar auction

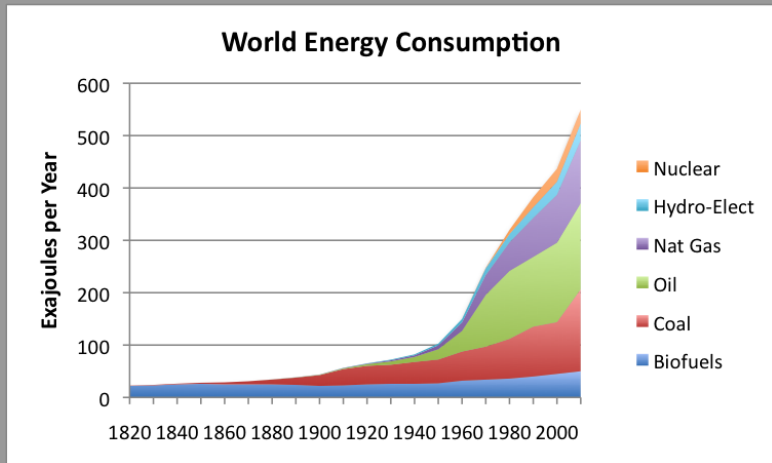
## 3 Escalation and cognitive psychology

## 4 Conclusion

## Incomes



# Energy



1

<sup>1</sup>Source: Gail Tverberg, *World Energy Consumption Since 1820 in Charts*

# South Sea Bubble

*I can calculate the movement of the stars,  
but not the madness of men.*

claimed to be Newton's view  
on the outcome of  
the South Sea Bubble (1720).

# The Dollar Auction

In 1971, in a paper called

The Dollar Auction game:

A paradox in noncooperative behavior and escalation<sup>2</sup>

Martin Shubik described an infinite game.

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<sup>2</sup> *Journal of Conflict Resolution*, 15(1), pp. 109-111

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# The Dollar Auction (*the story revisited*)

For charity, an object is sold on an auction made a special way.  
There is a piggy bank (or a hat).



To bid, each person puts one euro in the piggy bank which is never returned to him.



# The Dollar Auction

Assume

- that there are two bidders (*Alice* and *Bob*)
- that the value of the object is  $v$  € and
- that the bid is always  $b$  €

The payoff is negative after  $\frac{v}{b}$  turns.

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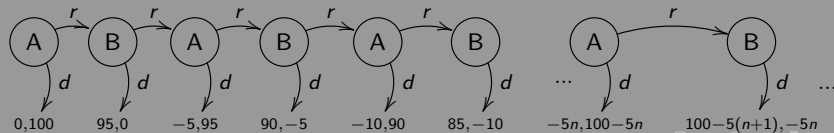
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$v = 100$  c€ and  $b = 5$  c€



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- It should be studied using tools designed for infiniteness. namely **coinduction**.



# Is escalation in the Dollar Auction irrational?

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**Theorem** (using coinduction):

*Escalation among intelligent agents is possible in the dollar auction.*

# Why this discrepancy?

- For Osborne et al. the resources are finite.

*Each person's wealth is  $w$ , which exceeds  $v$ ; neither player may bid more than her wealth.*

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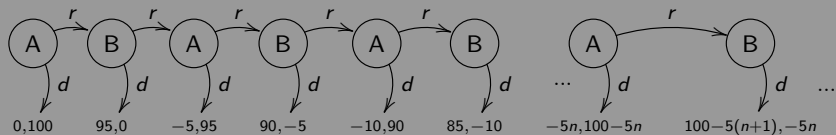
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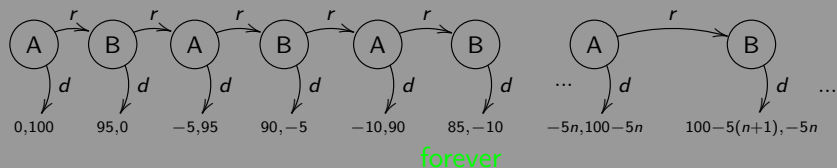
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# The Dollar Auction pictured



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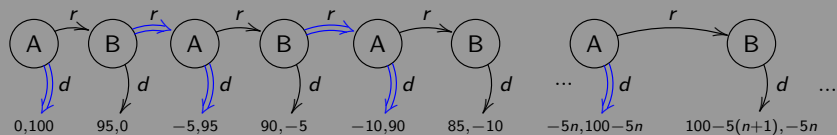
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# Alice abandons

We can prove that the strategy  
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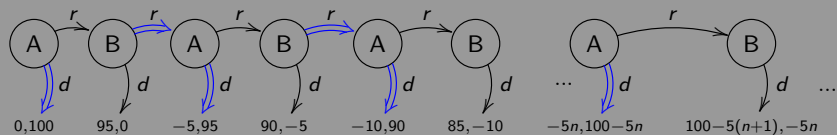


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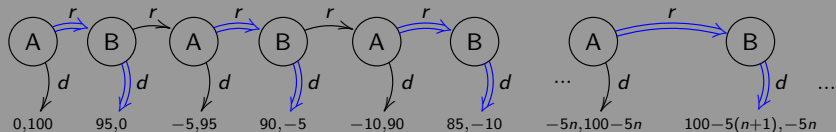


is a **SubGame Perfect equilibrium**.

Alice takes Bob's threat as credible and considers it is better to give up.

# Bob abandons

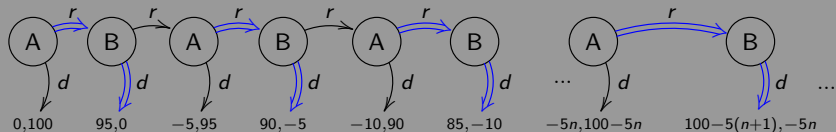
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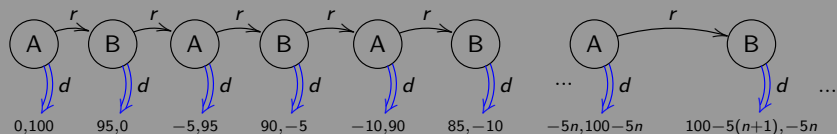


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# Always give up

The strategy always give up



is a not a SubGame Perfect Equilibrium and therefore not a Nash equilibrium.

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Escalation is intelligent in the Dollar Auction game.

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- The point of view of the agent is different from the point of view of the observer: principle of relativity (the answer to Newton).

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## To Jeanne Daum

