

# Could the laws determine determinism?

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**Assumption: Given the way the world is, laws are the sort of things which determine whether AND COULD DETERMINE THAT the world is deterministic.**

## AIMS

Raise some concern about the assumption

## BASIC ARGUMENT

## FUNDAMENTAL LAWS

Does conditioning on fundamentality help?

## CONSERVATION LAWS

Do conservation laws help?

## CONCLUSION

The laws could not determine determinism.

# Outline

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QM indeterminacies

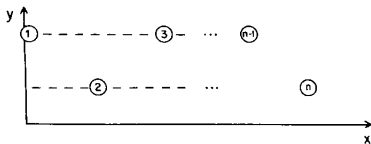
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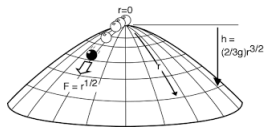
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Space invaders  
(Mather *et al.*)



Infinite Billiard Balls  
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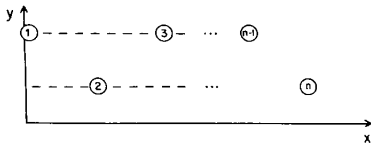
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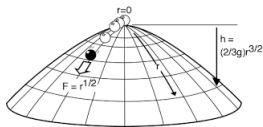
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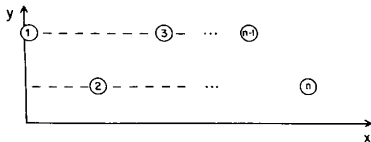
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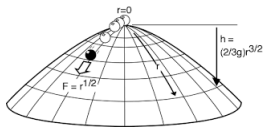
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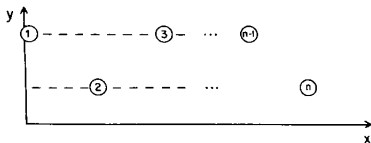
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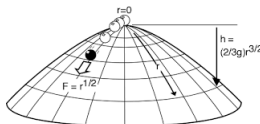
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- But that's for theory-contingent reasons (doesn't show why laws *could not* determine determinism).
- Could be taken as an argument for/against specific theories in favour of determinism (e.g. Bohmian mechanics).

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- So, we've never been justified in considering determinism a live option.
- Bigger fish: problems supporting any kind of cross-temporal causal inference with laws.

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# Premise 1: At-time-conditionals cannot determine determinism

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$$\forall x \forall t (GOLS(x, t) \rightarrow \left[ \text{Live cells with } < 2 \text{ neighbours } @t_i \text{ dies } @t_{i+1} \right] (x, t))$$

## The Basic Argument

- |                    |  |
|--------------------|--|
| <b>Premise 1:</b>  | At-a-time conditional generalisations cannot determine that determinism holds. |
| <b>Premise 2:</b>  | All laws are at-a-time conditional generalisations.                            |
| <b>Conclusion:</b> | Laws could not determine that determinism holds.                               |

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$w_4$ in $\mathcal{W}$	$\neg \exists x (\text{fund'tal}(x))$	fund'tal( $a$ ), so $[\mathbf{F} = \frac{dp}{dt}]$
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# Outline

## AIMS

Raise some concern about the assumption

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## CONSERVATION LAWS

Do conservation laws help?

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The laws could not determine determinism.

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- Fundamental laws might manage prohibition of some inferences, but this does not amount to a satisfactory prohibition of non-lawful inferences (i.e. which token instances occur); and anyway, they don't manage to license time-directed inferences (because they are at-a-time conditionals).
- Conservation laws might manage to achieve suitable time-directed inferences (spec. of inferences about spacial regions identified across time), but arguably not a suitable prohibition of inferences (they don't prohibit spontaneously occurring spatial regions).

Thanks for listening!

AIMS  
○○

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○○○○

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