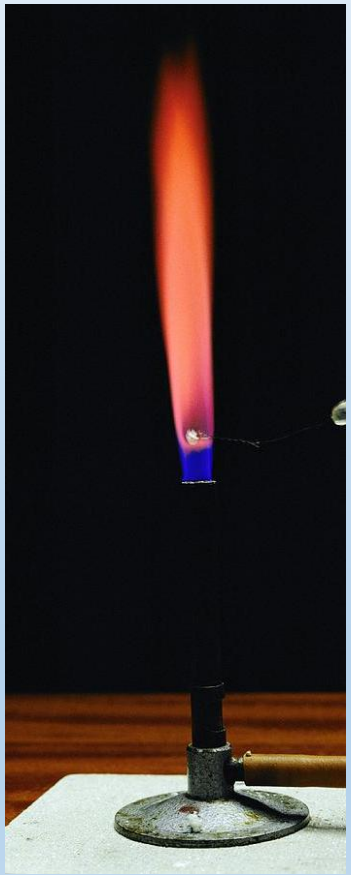
Counterfactual Theories of Causation ("CTCs")

Oxford Philosophical Society Members' Day

August 2018

Michael Donnan

A Minor Mishap in the Chemistry Lab.



An unqualified dependence relation between distinct events

Where ***c*** and ***e*** are distinct events, ***e*** depends (in some way) on ***c*** if and only if: (1) if it were the case that ***c*** occurs, then it would be the case that ***e*** occurs, and (2) if it were the case that ***c*** does *not* occur, then it would be the case that ***e*** does *not* occur.

The Nature of Counterfactuals

A counterfactual conditional sentence –"counterfactual" for short – is a conditional sentence in the subjunctive mood. Typically, it has the form

> "If it were the case that A, then it would also be the case that C".

Symbolically: $A \mathrel{\square\!\!\rightarrow} C$

Counterfactuals – a syntactic variant

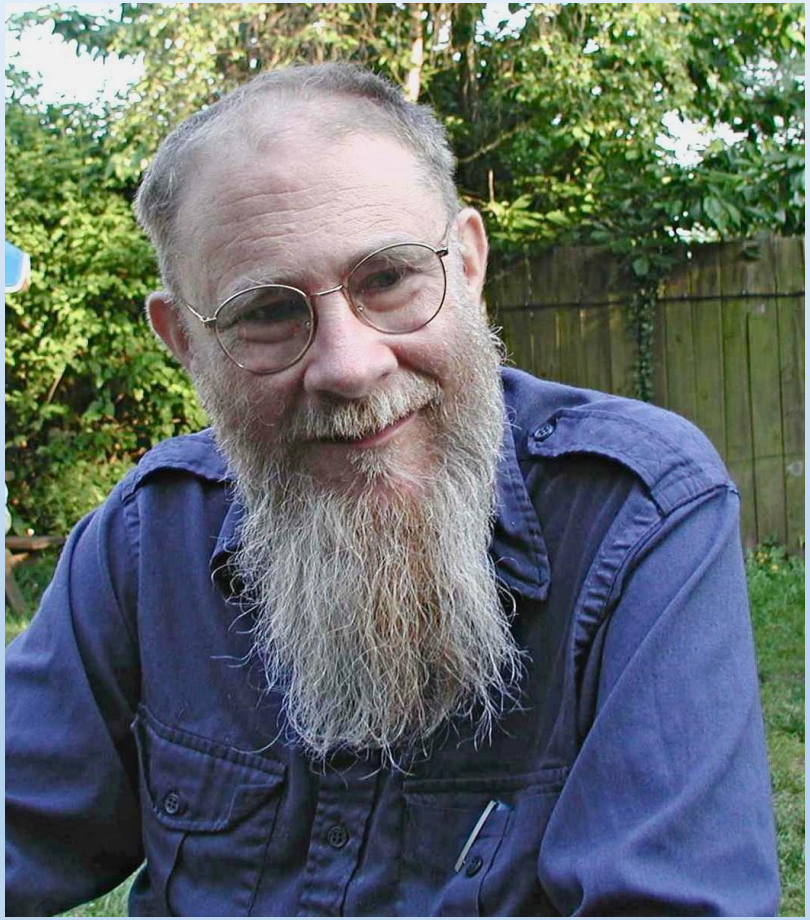
"If kangaroos had no tails, they would topple over."

(David Lewis, *Counterfactuals*, 1973, page1)

Counterfactual Dependence

Where ***c*** and ***e*** are distinct events, ***e*** *counterfactually* depends on ***c*** if and only if: (1) if it were the case that ***c*** occurs, then it would be the case that ***e*** occurs, and (2) if it were the case that ***c*** does not occur, then it would be the case that ***e*** does not occur.

David Lewis (1941 – 2001)



Difference-making and the relation of cause and effect

"We think of a cause as something that makes a difference, and the difference it makes must be a difference from what would have happened without it. Had it [*i.e. the difference-maker or cause*] been absent, its effects – some of them at least, and usually all – would have been absent as well". [Addition to original in italics.]

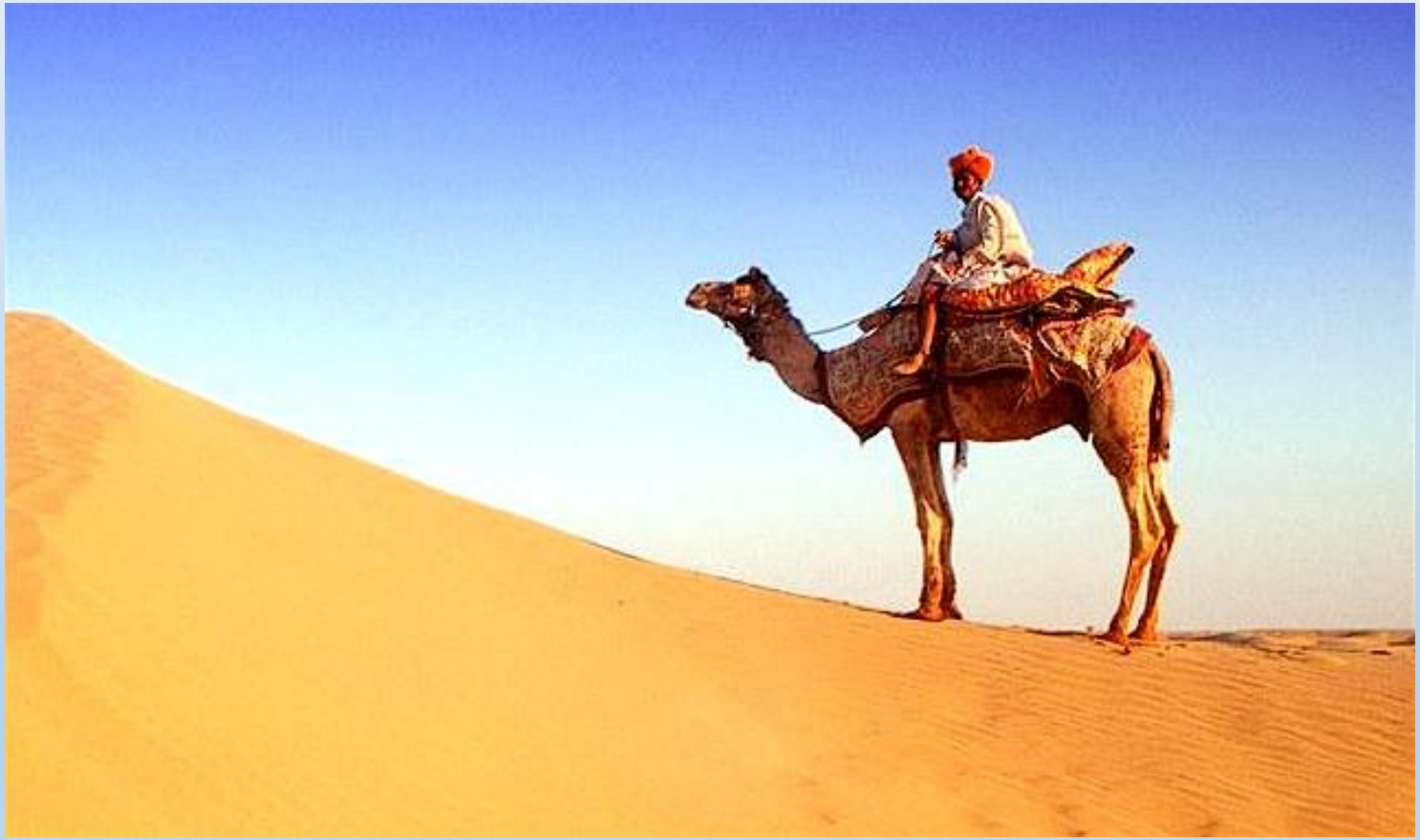
Causal Dependence

Where ***c*** and ***e*** are distinct events, and both occur, ***e*** *causally* depends on ***c*** if and only if: if it were the case that ***c*** does not occur, then it would be the case that ***e*** does not occur.

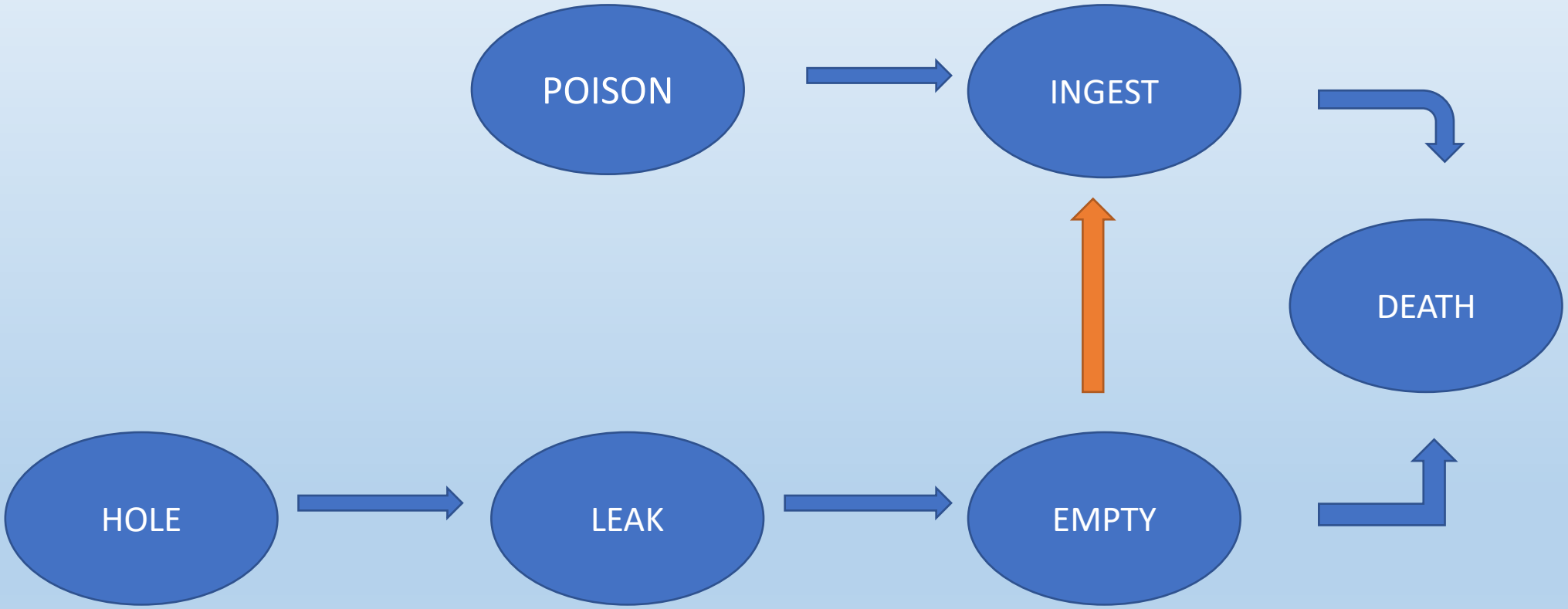
A Simple Counterfactual Theory of Causation ("CTC")

Where ***c*** and ***e*** are distinct events, and both occur, ***c*** is a cause of ***e*** if and only if: if it were the case that ***c*** does not occur, then it would be the case that ***e*** does not occur.

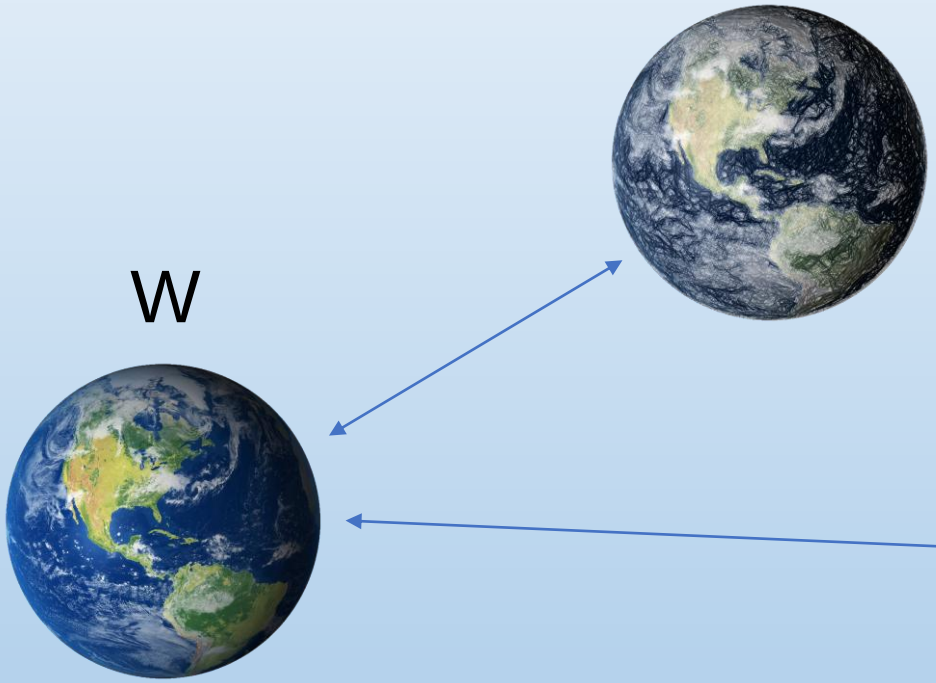
The Traveller in the Desert (I)



The Traveller in the Desert (II)



Possible world semantics and the truth conditions of A □→ B



W1: A & C

W

W2: A & not C

A □→ C

Causal Dependence (Reprise)

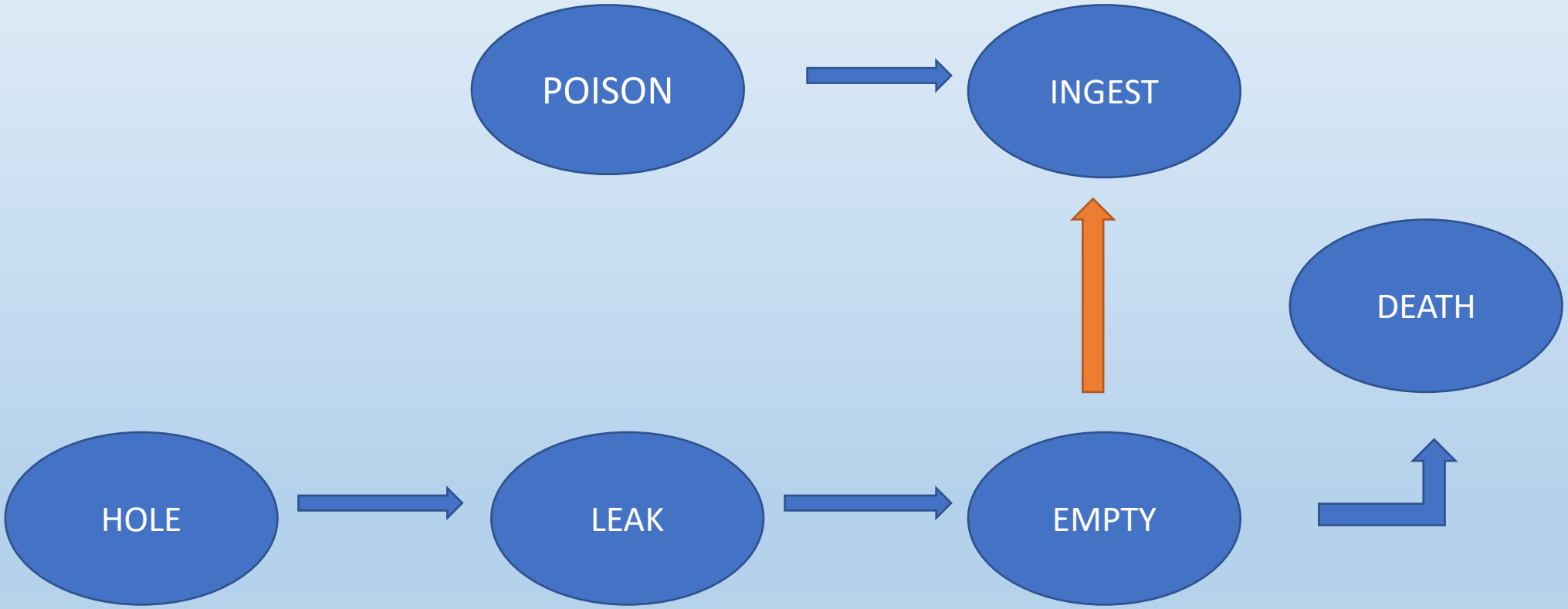
Where ***c*** and ***e*** are distinct events, and both occur, ***e*** *causally* depends on ***c*** if and only if: if it were the case that ***c*** does not occur, then it would be the case that ***e*** does not occur.

Causal Chains and Causation (Lewis, 1973)

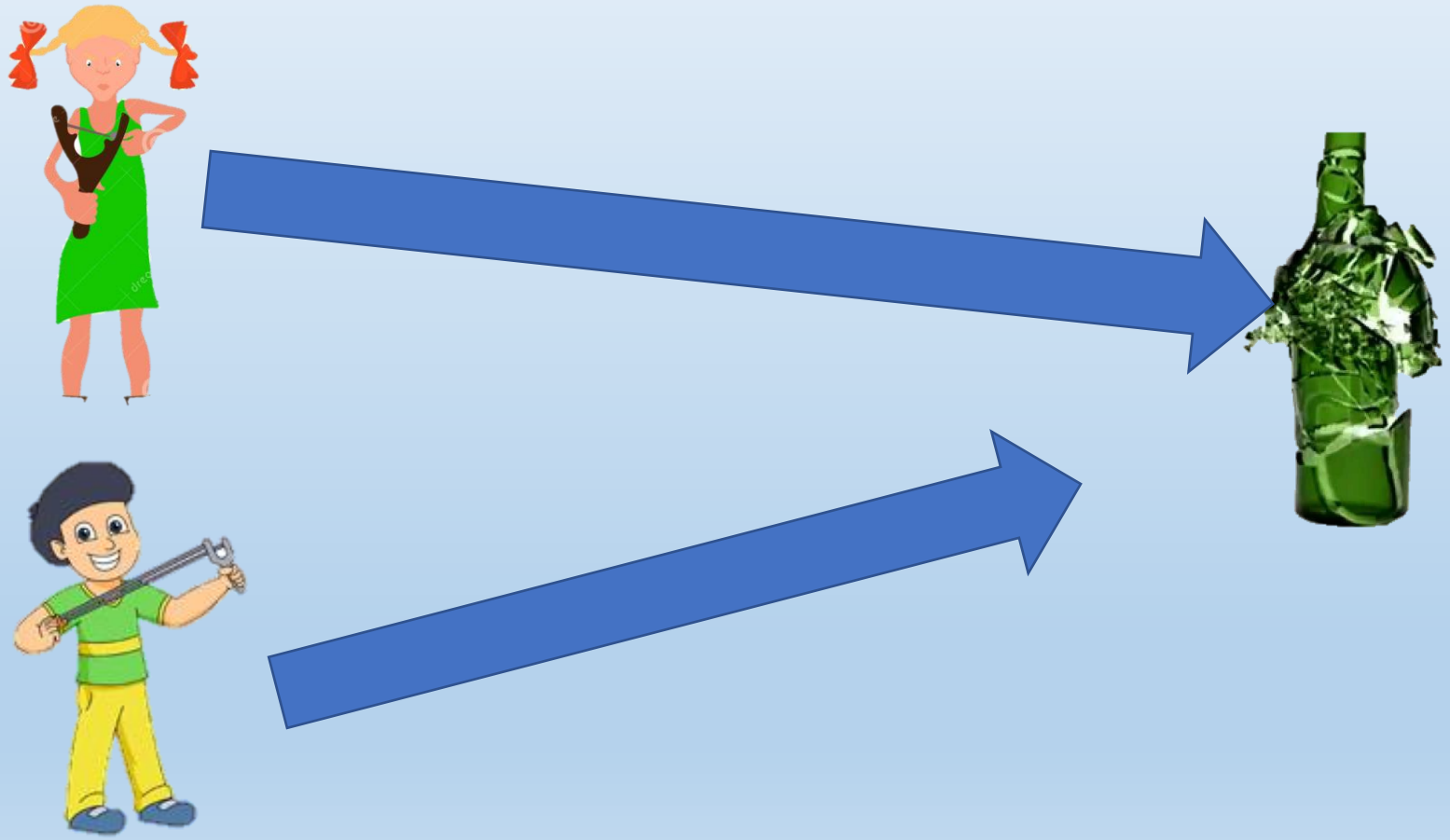
A causal chain is a finite sequence of distinct actual events in which each event is causally dependent upon the preceding event.

Where ***c*** and ***e*** are distinct events, ***c*** causes ***e*** if and only if ***c*** and ***e*** both occur, and there exists a causal chain leading from ***c*** to ***e***.”

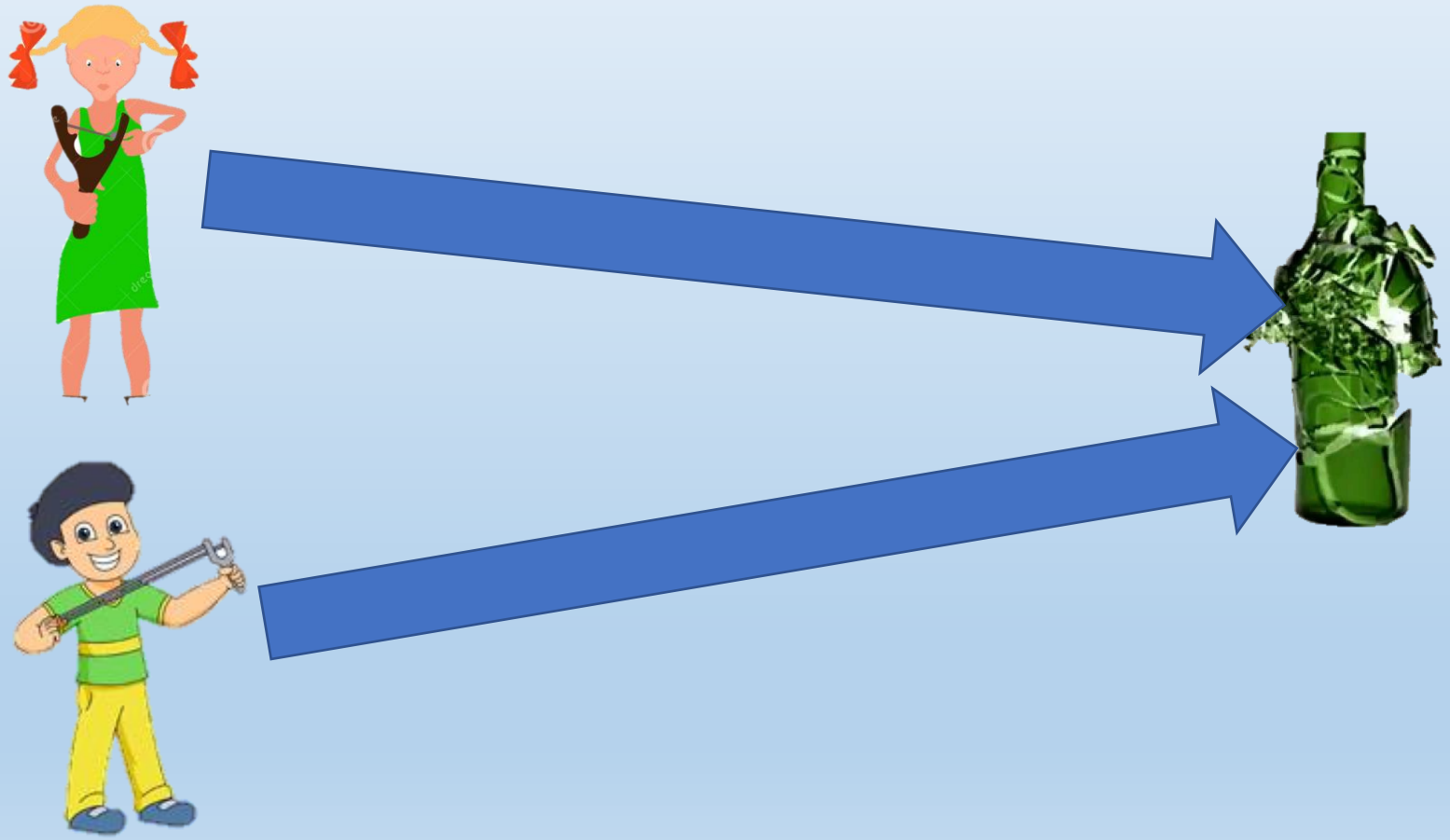
The Traveller in the Desert (Reprise)



Late Pre-Emption



Symmetrical Overdetermination



Two Wizards and the Prince

Lewis's Notion of an alteration of an event

An alteration is an event, which may be actualised or unactualised, that occurs at a slightly different time or in a slightly different manner from a given event.

The term "alteration" is to include the given event itself (the "unaltered alteration" as Lewis put it)!

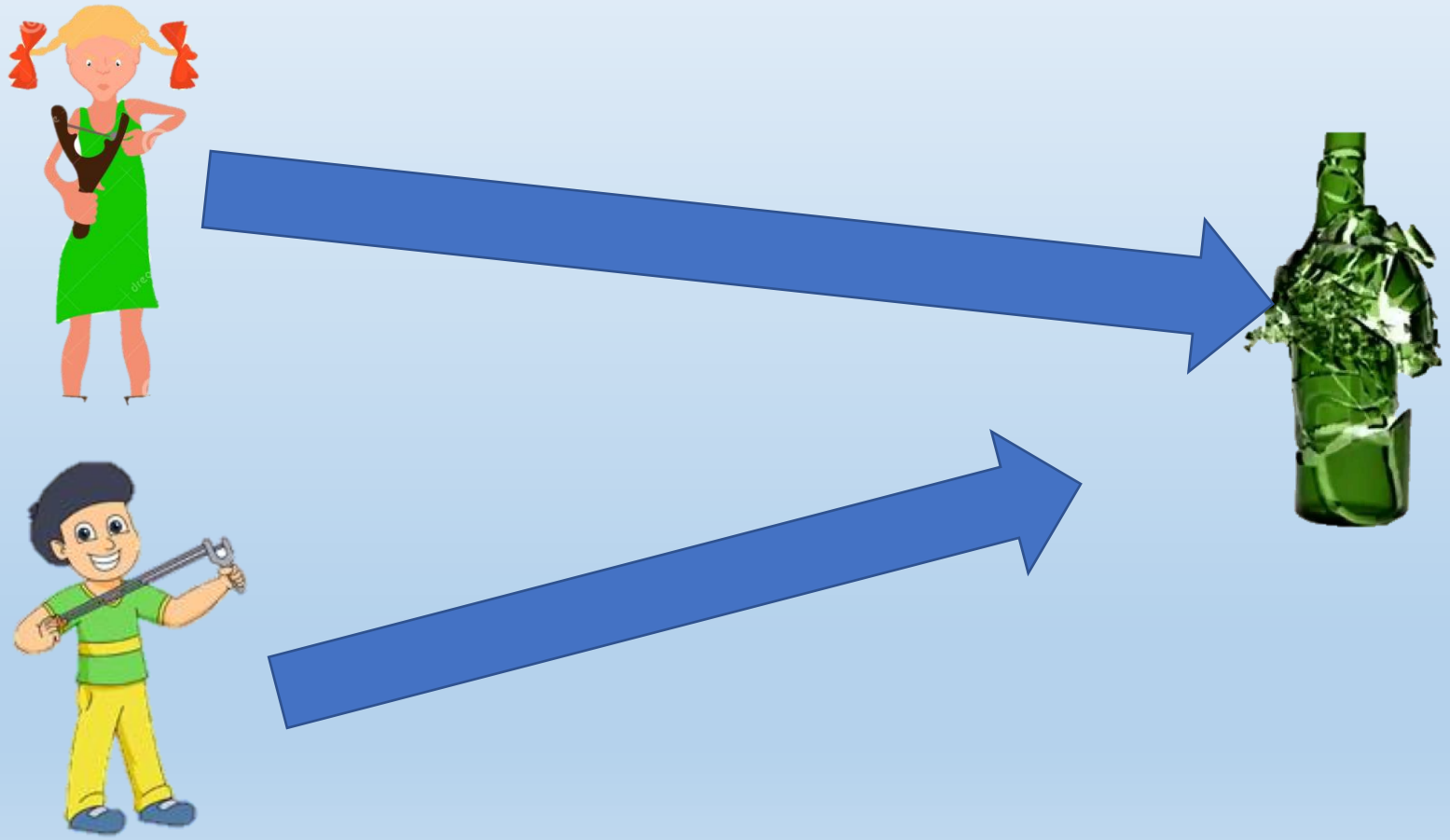
Lewis's relation of influence

Where ***c*** and ***e*** are distinct events, ***c*** *influences* ***e*** if and only if there is a substantial range $\boldsymbol{c_1}$, $\boldsymbol{c_2}$, … of different not-too-distant alterations of ***c*** (including the actual alteration of ***c***) and there is a range $\boldsymbol{e_1}$, $\boldsymbol{e_2}$ … of alterations of ***e***, at least some of which differ, such that if $\boldsymbol{c_1}$ had occurred, $\boldsymbol{e_1}$ would have occurred, and if $\boldsymbol{c_2}$ had occurred, $\boldsymbol{e_2}$ would have occurred, and so on.

Lewis's final analysis of causation

Where ***c*** and ***e*** are distinct events, ***c*** causes ***e*** if and only if there is a chain of stepwise influence from ***c*** to ***e***.

Late Pre-Emption (Reprise)



The Last Train to Clarksville

David Hume's Second Definition of "Cause" (First Enquiry, Section VII)

(1711 – 1776)

We may define a cause to be ….. Where, if the first object had not been, the second never had existed.

Lewis's 1973 CTC – the Collins, Hall and Paul Version

Event ***c*** causes event ***e*** if and only if ***c*** and ***e*** both occur, ***c*** and ***e*** are distinct and there is a (possibly empty) set of events $\{\boldsymbol{d_1}, \boldsymbol{d_2}, \ldots, \boldsymbol{d_n}\}$ such that if ***c*** had not occurred, $\boldsymbol{d_1}$ would not have occurred; and if $\boldsymbol{d_1}$ had not occurred $\boldsymbol{d_2}$ would not have occurred; … and if $\boldsymbol{d_n}$ had not occurred, ***e*** would not have occurred.