States, Processes, and Events, and the
Ontology of Causal Relations

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Key Questions regarding Causation (after Davidson)

1. What are the elements that are being related by causal relations?

2. Do causal relations relate universals or particulars?

3. What is the relation between causation and causal explanation?
How to Express Causation

(a) The accident was caused by a lorry-driver.
   EVENT caused by INDIVIDUAL

(b) The accident was caused by the driver’s braking suddenly.
   EVENT caused by EVENT

(c) The accident was caused by the fact that the traffic was heavy and the road was icy when the driver braked suddenly.
   EVENT caused by FACT
The cause of the accident was the driver’s braking suddenly.

The heaviness of the traffic and the iciness of the road were not causes but background conditions which enable the causation to take effect.

The background conditions feature in causal laws invoked in explanations of the facts of causation.

\(^1\)Or more accurately: APG’s interpretation of Davidson
The “facts of causality” consist in causation relations between token events:

\[ E_1 \text{ is the cause of } E_2 \]

Causal explanations explain causal facts by reference to causal laws:

Any event sufficiently similar to \( E_1 \), would, if sufficiently similar background conditions obtain, cause an event similar to \( E_2 \)

where “event similar to . . .” has to be made explicit by referring to some event type.
The Role of States in Causation

- The driver’s braking is an **EVENT**
- the heaviness of the traffic and the iciness of the road are **STATES**

On the view presented here causes are always events; states play the role of background conditions which enable causation to occur and which may be invoked in explanations of causation.

States are not themselves causes.
Suppose someone claims that state $S$ causes event $E$ to occur at time $t$.

**Case 1:** $S$ already holds over an interval $\langle t', t \rangle$

In this case, why did $S$ not cause $E$ earlier than it did? If $S$ is sufficient to cause $E$ at $t$, it should be sufficient to cause $E$ at $t'$ . . .

unless there is a relevant difference between $t$ and $t'$ . . .

in which case the cause of $E$ is the *coming into being* of that difference, and $S$ is merely a background condition.

**Case 2** $S$ holds at $t$ but not during some interval $\langle t', t \rangle$

In that case the cause of $E$ is not the state $S$ but the event of $S$’s coming to hold at $t$. 
State Tokens

State $S$ allows (or enables) event $E_1$ to cause event $E_2$.

$E_1$ and $E_2$ are event tokens (i.e., individual occurrences).

So is $S$ a state token?

If so, how are state tokens defined?

Provisional answer: A state token is a continuant particular, e.g., the state of iciness of the road comes into being at time $t_1$ and persists until time $t_2$. It is wholly present at each time during the interval $\langle t_1, t_2 \rangle$.

Compare a state type, such as the state of iciness in general, here understood as the class whose individual instances are the iciness state tokens.
A freezing event INITIATES an iciness state which ALLOWS a braking event to CAUSE an accident. Later, a thawing event TERMINATES the iciness state.
A person is outside a house, at the front door. The door is shut, and locked. The person turns the key, thereby unlocking the door; this allows her to open the door by pushing on it. The result is that the door is then open, which allows her to enter the house by walking forward through the doorway.
Person is outside the house, at the door

- Person enters house

Person enters house

- Door is open

Door is open

- Door is unlocked

Door is unlocked

- Door is shut

Door is shut

- Person is inside the house

Door is shut

- Door is locked

Door is locked

- Person pushes door

Person pushes door

- Person turns key

Person turns key

- Door opens

Door opens

- Door unlocks

Door unlocks

- Door is unlocked

Door is unlocked
EXAMPLE 2: A gardener pushes a barrow from A to B

Gardener pushes

causes

Barrow moves
EXAMPLE 2: A gardener pushes a barrow from A to B

Gardener pushes

causes

Barrow moves

causes

Gardener pushes

Barrow moves
EXAMPLE 2: A gardener pushes a barrow from A to B
EXAMPLE 2: A gardener pushes a barrow from A to B
EXAMPLE 2: A gardener pushes a barrow from A to B

Gardener pushes

perpetuates

Barrow moves
EXAMPLE 2: A gardener pushes a barrow from A to B

- Gardner starts pushing (initiates)
- Gardner pushes (perpetuates)
- Gardner stops pushing (terminates)

- Barrow starts moving (initiates)
- Barrow moves (perpetuates)
- Barrow stops moving (terminates)

- Gardner pushes causes Barrow moves
- Barrow moves causes Gardner pushes

EXAMPLE 3: I throw a ball

I am not moving my hand

I start moving my hand

I am moving my hand

The ball is not moving

The ball starts moving

The ball is moving

I am holding the ball

I let go of the ball

I am not holding the ball
EXAMPLE 4 (Granularity): Hammering in a nail

Hammer blow

causes

Nail goes in a bit further

...
EXAMPLE 4 (Granularity): Hammering in a nail

Hammering

- Hammer blow
- Hammer blow
- Hammer blow
- Hammer blow

Nail going in

- Nail goes in a bit further
- Nail goes in a bit further
- Nail goes in a bit further
- Nail goes in a bit further
EXAMPLE 5 (Granularity): Operation of a boiler

- **BOILER IS ON**
- **WATER IS AT 50°C**

The diagram shows a flow relationship where the boiler being on maintains the water at 50°C.
EXAMPLE 5 (Granularity): Operation of a boiler

[Diagram]

Boiler is on → Boiler supplies energy to water

Maintains perpetuates

Water molecules undergo thermal agitation

Water is at 50°C
EXAMPLE 5 (Granularity): Operation of a boiler

BOILER IS ON

BOILER SUPPLIES ENERGY TO WATER

WATER MOLECULES UNDERGO THERMAL AGITATION

WATER IS AT 50°C

maintains

perpetuates
The signalman’s timely action prevented a train crash.

Two analyses which don’t work well:
An analysis which doesn’t mention prevention or crashes

The signalman acts

initiates

A certain state

allows

The trains pass by

Implies no crash occurs
Conclusions

- My aims were
  - to elucidate the different roles of states, processes and events in causation.
  - to explore a cluster of causal and causal-like relations exemplified by verbs such as ‘cause’, ‘allow’, ‘perpetuate’, and ‘prevent’.

- I took instance-level relations to be primary: instances of causation and perpetuation exist independently of how we describe them and whether we can explain them.

- Relations such as initiation and termination do not involve full-blooded causality but express logical connections between states, processes and events.

- Allowing and prevention relate to the preconditions for causal relations to hold.

- Prevention is problematic because it does not readily lend itself to analysis at the instance level, requiring reference to event types.
Thank you for listening

ANY QUESTIONS?