Earthquake or burglary

1. Evidential reasoning
2. Intercausal reasoning (explaining away)
From these examples, we can distinguish different types of transmission of evidence.

1. Serial (or pipeline) influence

\[ A \rightarrow B \rightarrow C \]

A change in the certainty of A may affect the certainty of C.

If B is not known, influence may pass from A to C.
If B is known, influence may not pass from A to C.
2. Diverging influence

If A is not known, B may influence C.
If A is known, B may not influence C.
3. Converging influence

\[ B \rightarrow A \rightarrow C \]

If A is not known, B may not influence C.
If A is known, B may influence C.
Definition 2.1 [J07] (d-separation)

Two distinct variables $A$ and $B$ in a causal network are d-separated if for all paths between $A$ and $B$ there is an intermediate variable $V$.

Note: therefore two adjacent variables cannot be d-separated such that either
- the connection at $V$ is serial or diverging and $V$ is instantiated ("is known"), or
The connection is converging and neither V nor any of V's descendants is instantiated (is "known").

If A and B are not d-separated, they are (said to be) d-connected.

Claim (p. 30[507]) If A and B are d-separated, then changes in the certainty of A have no effect on changes in the certainty of B.
Is A d-separated from J given evidence on B and M?
Defn 2.2 ([Jof7]). The Markov blanket of a variable $A$ is the set consisting of the parents of $A$, the children of $A$, and the variables that share a child (the spouses) of $A$.

Claim (Eq. 2.8 ([Jof7])). Let $A$ be a variable in a causal network. Assume that all variables in $A$'s Markov blanket are instantiated. Then...
A is d-separated from the remaining unindicated variables.