305 Lecture 29 - Independence

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• To introduce a the idea that some events are independent according to a probability function.



Odds and Ends, Chapter 6.5

Independence

A and B are independent if (and only if)

$$Pr(A|B) = Pr(A)$$

That is, taking things conditional on ${\it B}$ doesn't change ${\it A}$.



Causal

 \cdot B might be a possible cause of A.

Ways Independence can Fail

Causal

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- \cdot B might be a possible preventer of A.

Ways Independence can Fail

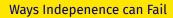
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Ways Independence can Fail

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Epistemic

• B being true could tell you that a source that also predicts A is more reliable than you thought.

Two Big Real World Facts about Independence

1. In reality, strict independence almost never obtains.

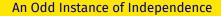
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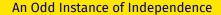
- 1. In reality, strict independence almost never obtains.
- In practice, it's very often useful to assume independence for modelling purposes.

These are consistent, but it does mean be careful. Sometimes assuming independence is like assuming that relativistic considerations aren't important to figuring out whether a bridge will stand up. And sometimes it is like assuming that friction isn't important to figuring out whether a bridge will stand up.



Two fair dice, one red and one blue, are going to be tossed. Let A be that the sum of what they show is 7. Let B be that the red die shows a 2.

Question Are A and B independent?



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Question Are A and B independent?

Surprising answer - yes!

For Next Time

• We will look at how to invert conditional probabilities, how to go from a bunch of facts of the form Pr(A|B) = x to facts of the form Pr(B|A) = y.