PHPE 400
Individual and Group Decision Making

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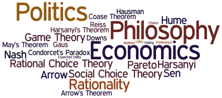
Independence

For all $L_1, L_2, L_3 \in \mathcal{L}$ and $0 < p \leq 1$,

$$L_1 \; P \; L_2 \text{ if, and only if, } [L_1 : p, \; L_3 : (1-p)] \; P \; [L_2 : p, \; L_3 : (1-p)].$$

$$L_1 \; I \; L_2 \text{ if, and only if, } [L_1 : p, \; L_3 : (1-p)] \; I \; [L_2 : p, \; L_3 : (1-p)].$$

Independence



For all $\color{blue}\blacksquare$, $\color{red}\blacksquare$, $\color{green}\blacksquare$ $\in \mathcal{L}$ and $0 < p \leq 1$,

$$\color{blue}\blacksquare\ \color{black} P\ \color{red}\blacksquare \color{black}\text{ if, and only if, } [\color{blue}\blacksquare \color{black} : p, \color{green}\blacksquare \color{black} : (1-p)]\ P\ [\color{red}\blacksquare \color{black} : p, \color{green}\blacksquare \color{black} : (1-p)].$$

$$\color{blue}\blacksquare\ \color{black} I\ \color{red}\blacksquare \color{black}\text{ if, and only if, } [\color{blue}\blacksquare \color{black} : p, \color{green}\blacksquare \color{black} : (1-p)]\ I\ [\color{red}\blacksquare \color{black} : p, \color{green}\blacksquare \color{black} : (1-p)].$$

Describing the Outcomes

Suppose you have a kitten, which you plan to give away to either Ann or Bob. Ann and Bob both want the kitten very much. Both are deserving, and both would care for the kitten. You are sure that giving the kitten to Ann (x) is at least as good as giving the kitten to Bob (y) (so $x \mathrel{R} y$). But you think that would be unfair to Bob. You decide to flip a fair coin: if the coin lands heads, you will give the kitten to Bob, and if it lands tails, you will give the kitten to Ann.

(J. Drier, "Morality and Decision Theory" in *Handbook of Rationality*)

If $L_1 \; P \; L_2$, then for all p, $[L_1 : 1] \; P \; [L_1 : p, L_2 : (1-p)]$

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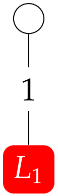

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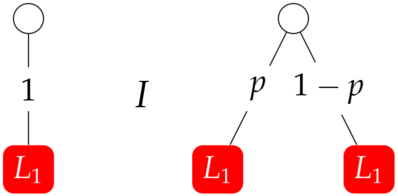

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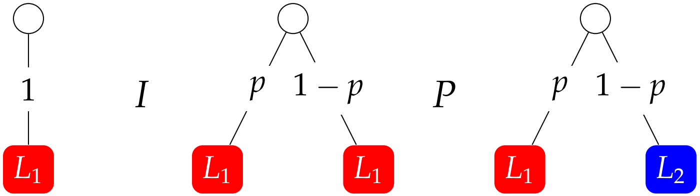
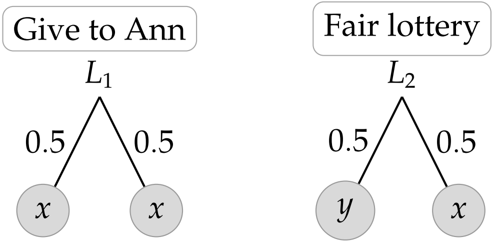
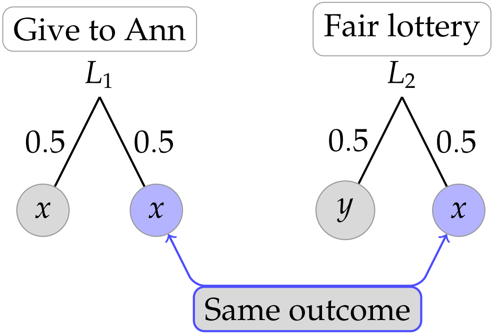




- x is the outcome "Ann gets the kitten"
- y is the outcome "Bob gets the kitten"



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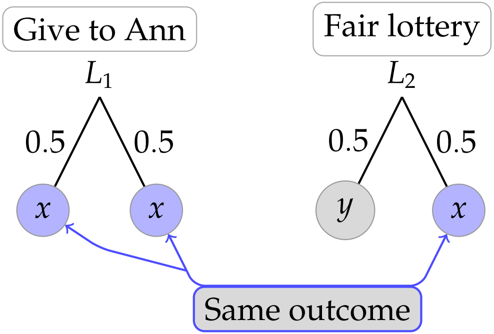

- x is the outcome "Ann gets the kitten"
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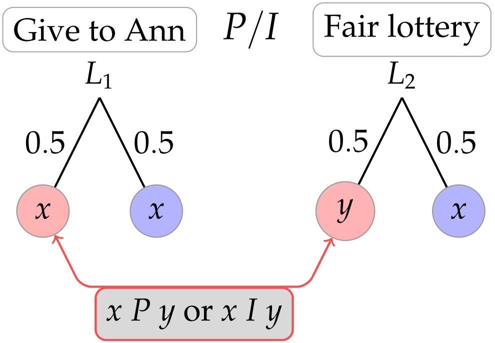
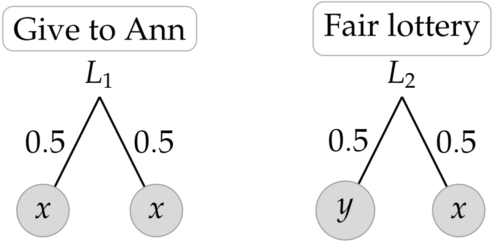
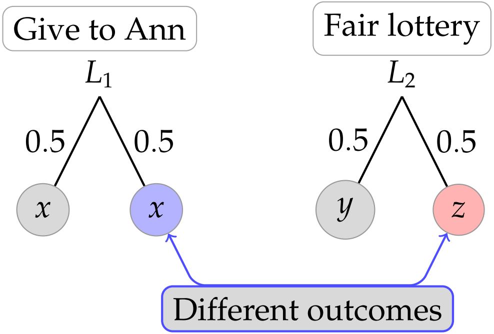


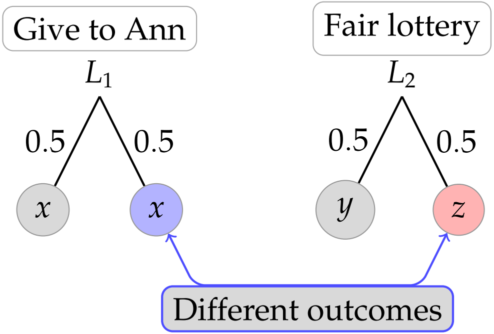
- x is the outcome "Ann gets the kitten"
- y is the outcome "Bob gets the kitten"



- x is the outcome "Ann gets the kitten, *in a fair way*"
- y is the outcome "Bob gets the kitten"



- x is the outcome “Ann gets the kitten”
- z is the outcome “Ann gets the outcome, *fairly*
- y is the outcome “Bob gets the kitten, *fairly*”



If all the agent cares about is who gets the kitten, then $L_1 \; P \; L_2$

If all the agent cares about is being **fair**, then $L_2 \; P \; L_1$