

Re: mutually exclusive vs independent

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- *From:* Bruce Weaver <bweaver@xxxxxxxxxxxx>
 - *Date:* Thu, 14 Sep 2006 14:58:30 -0400
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Ethan.Johnsons@xxxxxxxx wrote:

So, "independent" can have the overlapping area in Venn diagram, correct?

More than that. They HAVE to overlap in a Venn diagram. If events A and B are independent, $p(A) = p(A|B)$, and $p(B) = p(B|A)$. In other words, knowledge that B has happened does not affect $p(A)$; and knowledge that A has happened does not affect $p(B)$.

In your Venn diagram, if it is drawn to scale:

$p(A)$ = area of circle A over total area
 $p(B)$ = area of circle B over total area
 $p(A|B)$ = area of A-B intersection over area of circle B
 $p(B|A)$ = area of B-A intersection over area of circle A

So, for $p(A)$ to equal $p(A|B)$, and for $p(B)$ to equal $p(B|A)$, there has to be overlap, and it must be in the correct proportions.

Then, what is "dependent"?

Not independent. Related.

thx much

Reef Fish wrote:

Ethan.Johnsons@xxxxxxxx wrote:

I thought I understood this, but getting back to me again.
Can you pls explain 'mutually exclusive' vs 'independent' for me with

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examples if possible?

The simplest mnemonics for the DIFFERENCE between the two concepts is that THEY are mutually exclusive, i.e., they cannot both happen!

A and B are mutually exclusive if $A \cap B$ is the empty set,

hence

$$P(A \text{ and } B) = 0.$$

If A and B are non-empty events, they are independent IF and ONLY

IF

$$P(A \text{ and } B) = P(A) * P(B) \neq 0.$$

-- Reef Fish Bob.

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