Assignment:- 1

AI1110: Probability and Random Variables
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Question: If $\Pr(A|B) > \Pr(A)$, then which of the following is correct?

(A) $\Pr(B|A) < \Pr(B)$ (C) $\Pr(B|A) > \Pr(B)$
(B) $\Pr(AB) < \Pr(A) \cdot \Pr(B)$ (D) $\Pr(B|A) = \Pr(B)$

Solution: We can write the given condition as:

$$\Pr(A|B) = \frac{\Pr(AB)}{\Pr(B)} > \Pr(A) \tag{1}$$

Multiplying both sides of Equation 1 by $\Pr(B)$, we get:

$$\Pr(AB) > \Pr(A) \cdot \Pr(B) \tag{2}$$

Dividing both sides of Equation 2 by $\Pr(A)$, we get:

$$\frac{\Pr(AB)}{\Pr(A)} > \Pr(B) \tag{3}$$

Using the definition of conditional probability, we have:

$$\Pr(B|A) = \frac{\Pr(AB)}{\Pr(A)} \tag{4}$$

Substituting Equation 4 into Equation 3, we get:

$$\Pr(B|A) > \Pr(B) \tag{5}$$

Therefore, the answer is option (C), $\Pr(B|A) > \Pr(B)$.

Hence, we can conclude that if $\Pr(A|B) > \Pr(A)$, then $\Pr(B|A) > \Pr(B)$.