Symmetry of roles of disease and exposure in the odds ratio

The Odds Ratio is notoriously confusing when first encountered, particularly in contrast to the simplicity of the interpretation for the Relative Risk. Why is the Odds Ratio then used so often*? A fundamental reason is that the Odds Ratio is ***symmetric*** in the roles of D and E.

Reversing the roles of D and E makes **no difference** in Odds Ratio : this is the **key** to estimating association between an exposure and disease in **case-control studies**.

$$OR = \frac{P(D|E)}{P(\bar{D}|E)} : \frac{P(D|\bar{E})}{P(\bar{D}|\bar{E})} = \frac{P\,(D\&E)/P\,(E)}{P\,(\bar{D}\&E)/P\,(E)} : \frac{P\,(D\&\bar{E})/P\,(\bar{E})}{P\,(\bar{D}\&\bar{E})/P\,(\bar{E})}$$

$$= \frac{P(D\&E)}{P(\bar{D}\&E)} : \frac{P(D\&\bar{E})}{P(\bar{D}\&\bar{E})} = \frac{P(D\&E)}{P(D\&\bar{E})} : \frac{P(\bar{D}\&E)}{P(\bar{D}\&\bar{E})}$$

$$= \frac{P\,(D\&E)/P\,(D)}{P\,(D\&\bar{E})/P\,(D)} : \frac{P\,(\bar{D}\&E)/P\,(\bar{D})}{P\,(\bar{D}\&\bar{E})/P\,(\bar{D})}$$

$$= \frac{P(E|D)}{P(\bar{E}|D)} : \frac{P(E|\bar{D})}{P(\bar{E}|\bar{D})}$$

*Also for the popularity of the logistic regression model