# ERRATA CORRECTIONS FOR SECOND EDITION OF *CAUSALITY*

### 8/25/09 Updated

**page 346** paragraph 3, line 7: **replace** section starting, "For example, $\{Z_1, V\}$, $\{Z_2, V\}$, or $\{Z_1, Z_2\}$, ..."

**with**

For example, $V$ and $Z_2$ can be removed from $C$ by successively applying conditions $C_1$ and $C_2$, thus producing an irreducible subset, $\{Z_1, W_1, W_2\}$, $c$-equivalent to the original covariate set $C$. However, this subset is inadmissible for adjustment because, like $C$, it does not satisfy the back-door criterion.

**continue** with "While a theorem ..."

**page 346 replace** first equation of Section 11.3.4 **with:**

$$
\begin{array}{llll}
V & \perp\!\!\!\perp & \{W_1, W_2\} & X \perp\!\!\!\perp \{V, Z_2\} | \{Z_1, W_2, W_1\} \\
Z_1 & \perp\!\!\!\perp & \{W_2, Z_2\} | \{V, W_2\} & V \perp\!\!\!\perp Y | \{X, Z_2, W_2, Z_1, W_1\} \\
Z_2 & \perp\!\!\!\perp & \{W_1, Z_1, X\} | \{V, W_2\} &
\end{array}
$$

**page 347** correction to figure caption 11.9

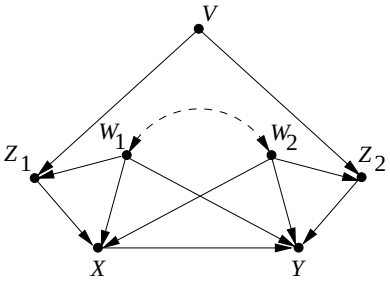


Figure 11.9: A model that is almost indistinguishable from that of Figure 11.8(b), save for advertizing one additional independency $Z_1 \perp\!\!\!\perp Y | X, W_1, W_2, Z_2$. It deems three sets to be admissible (hence $c$-equivalent): $\{V, W_1, W_2\}, \{Z_1, W_1, W_2\}$, and $\{W_1, W_2, Z_2\}$, and would be rejected therefore if any pair of them fails the $c$-equivalence test.

**page 346-7 Replace** text from

"A less trivial example..."

**through**

"...not possibly have direct effect on $Y$."

**with**

A less trivial example, one that is not sensitive to choice of parameters, lies in the class of equivalent structures, in which all conditional independencies emanate from graph separations. The search techniques developed in Chapter 2 provide systematic ways of representing all equivalent models compatible with a given set of conditional independence relations.

The model depicted in Figure 11.9 is a tough contender to that of Figure 11.8(b); it satisfies all the conditional independencies implied by the latter, plus one more: $Z_1 \perp\!\!\!\perp Y | X, W_1, W_2, Z_2$, which is not easy to detect or test. Yet, contrary to Figure 11.8(b), it deems three sets $\{Z_1, W_1, W_2\}, \{V, W_1, W_2\}$, and $\{Z_2, W_1, W_2\}$ to be admissible, hence $c$-equivalent; testing for the $c$-equivalence of the three sets should decide between the two contesting models.

Substantive causal knowledge may provide valuable information for such decisions. For example, the model of Figure 11.9 can be ruled out if we have good reasons to believe that variable $W_2$ cannot have any influence on $X$ (e.g., it may occur *later* than $X$), or that $W_1$ could not possibly have direct effect on $Y$.