

08-05-03-Errata-PR

Correction to Luce (2004).

Professor C. T. Ng (2008, submitted) has observed that I made an important error in Corollary 2 to Theorem 1 of Luce (2004). The correct result is:

Corollary 2 to Theorem 1. Given the background assumptions, the p-additive representation

$$\Psi(x, u) = \Psi(x, 0) + \Psi(0, u) + \delta\Psi(x, 0)\Psi(0, u),$$

and the definitions of \oplus found there, then the following are equivalent:

- (i) Bisymmetry holds for \oplus_i , $i = l, r$, or s
- (ii) There exists a constant $\gamma > 0$ such that either

$$\Psi(x, 0) = \gamma\Psi(0, x) \quad \text{if } \delta = 0 \quad (1)$$

or

$$1 + \delta\Psi(x, 0) = [1 + \delta\Psi(0, x)]^\gamma \quad \text{if } \delta > 0 \quad . \quad (2)$$

I incorrectly argued that bisymmetry forced either $\delta = 0$ or $\gamma = 1$.

The proof from (i) to (ii) is based on the observation that the argument given for (1), which is based on the additivity of $\Psi(x, u)$ when $\delta = 0$, is correct, and on the observation that, for $\delta > 0$, $\tilde{\Psi}(x, u) = \ln[1 + \delta\Psi(x, u)]$ is also additive. So (2) follows immediately from (1). The converse is more difficult to prove.

Auditory data reported by Luce and Steingrimsson (2005), and 3 later articles which were summarized by Luce and Steingrimsson (2006), gave data strongly supporting bisymmetry, but also data rejecting condition (1). For more detail see Luce and Steingrimsson (2008). The conclusion they should have drawn is that condition (2) must hold. For signals far from the threshold, this becomes

$$\Psi(x, 0) \simeq \delta^{\gamma-1}\Psi(0, x)^\gamma,$$

which for power functions at each ear means

$$\alpha_l x^{\beta_l} \simeq \delta^{\gamma-1} \alpha_r x^{\beta_r \gamma}.$$

Thus,

$$\alpha_l \simeq \delta^{\gamma-1} \alpha_r \quad \text{and} \quad \frac{\beta_l}{\beta_r} \simeq \gamma.$$

Based on the erroneous published result, they misinterpreted their data as being more inconsistent with the prediction from bisymmetry than it really is. For more detail see Luce and Steingrimsson (2008).

References

- Luce, R.D. (2004). Symmetric and asymmetric matching of joint presentations. *Psychological Review*, 111, 446-454.

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- Luce, R. D., and Steingrimsson, R. (2008). Note on a changed empirical inference in several Steingrimsson and Luce articles due to C. T. Ng's correction of an error in Luce (2004). *Journal of Mathematical Psychology*, submitted.
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