TO, 나갑.

Suppose a 5-category item.

Then, let

, where are probabilities for achieving [CATEGORY 0] ~ [CATEGORY 4], respectively.

And let

, so that .

The aim of this letter is to derive the Jacobian matrix, which is

.

Let

.

Then,

,

,

,

, and

.

Subscript for items and summation with respect to are omitted for brevity.

**Likelihood**

**Gradient**

**Hessian Matrix**

The quantity is the observed conditional frequency of the category of the item on the th quadrature point.