**Supplement 2 – Statistical Model**

Following DeCarlo (2010), the statistical model is mathematically represented as follows. The probability *P* of a false positive (FP) response, for decision *i* = {audiological care, psychosocial counseling} and driver *j* = {hearing loss, baseline THI-score}, is the probability *p* of a yes-response conditional on belonging to population *S*1 (ΔTHI-score > -7 points; see Figure 2) and decision criterion *ci*,*j*that is associated to the utility of the decision process, and is given by,

, (S.2.1a)

Where *Yi*,*j* is a yes-response for decision *i* and driver *j, xj* is the magnitude of driver *j*, *fi*,*j*(*xj*) is the probability density function of *S*1 and *Fi*,*j*(*xj*) is the corresponding cumulative distribution function. Likewise, the probability of a true positive (TP) response, is the probability of a yes-response conditional on belonging to population *S*2 (ΔTHI-score < -7 points; see Figure 2) and decision criterion *ci*,*j*,

, (S.2.1b)

Based on Choice Theory, e.g. Macmillan & Creelman (1990) and considering that *Yi*,*j* is binomial, we assumed underlying logistic distributions. Hence, *fi*,*j*(*xi*) is given by,

, (S.2.2)

and *Fi*,*j*(*xi*) by

, (S.2.3)

where *mi*,*j* is the location parameter of the distribution and *si*,*j* the scale parameter, which is proportional to the variance of the distribution, i.e. variance = (*s*π)2/3. Inserting Equation (S.2.3) into Equations (S.2.1a) and (S.2.1b) yields, after elementary algebraic manipulation, the following relation for the probabilities of a FP or TP responseand the respective parameters of the distribution functions,

, (S.2.4a)

. (S.2.4b)

Where *ln* is the natural logarithm. Now subtracting Equations (S.2.4a) and (S.2.4b) gives, again after some elementary algebraic manipulation,

, (S.2.5a)

, (S.2.5b)

where, is the link function and 2*µi*,*j* is the distance between the modes of *S*1 and *S*2, and portrays the accuracy of the decision process. As Decarlo (1998) has shown, signal detection models with different underlying distribution functions can be obtained by using different link functions. For an equal variance signal detection model, it will hold that , while for an unequal variance signal detection model .

**References**

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