

Bayesian modeling of the item response theory of the data obtained from the application of the "test de los senderos TESen" in adult major with and without disexecutive syndrome of the city of Bogota

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Abstract

The Bayesian paradigm contains three key sections to replicate millions of times the reality of patients, voters, behaviors etc; in this case performance of people in the TESen test. The first of these sections is the a priori information, which corresponds to the information contained by the clinician or the literature, which serves as a guide to show a little of the history of the measurement of the phenomenon, in the case of present research, (the experience and expertise of the clinician against dis executive syndrome); the second section is data made in the experiment (or likelihood). In this work, the likelihood is the operation that is performed with the data provided by the neuropsychology laboratory. Finally, there is the a posteriori one, which is the numerical combination of the previous two and results in a set of parameters which contain the previous information and the updated information through computational mechanisms, to which the great number of iterations that can be made of these two sources of information to improve the quality of the parameters [1].

On the other hand there is the theory of response to the TRI item, which was the tool for interpreting the test results and served as the basis for the generation of Bayesian modeling. This theory has been generated and developed by Rasch and Birnbaum in the 60's, with the idea of establishing a mathematical relationship between the behavioral reactivity of an individual against an item and the trait responsible for generating said reactivity, as discussed above; to establish this mathematical relationship they use the probability of executing a certain response against the item for each level of latent feature within it [2].

What was intended to be achieved by merging these paradigms of different disciplines (statistics and psychology) was to identify the latent traits of people who performed the TESen (Test of the trails) and identify if it was possible to generate a Bayesian modeling on the TRI. These latent features belong clinically to the set of symptoms that correspond to the onset of dementia [3]. This feature, or set of traits, is called the Executive Syndrome.

To extract the dis executive syndrome, the work of applying TESen by the neuropsychology laboratory of Manuela

Beltrán was essential. It was they who performed the data extraction so that, in this manuscript, they were analyzed statistically.

Methodology

The Bayesian approach to TRI makes use of improved computational methods for modeling the discrete nature of the data in the item response theory and, thus, generating a new, more flexible point of view that deals with relationships with data from higher level, where standard distribution assumptions do not apply. A key element was the development of MCMC (Monte Carlo Markov Chains) methods and their simplicity for joint estimation despite the increased complexity of the model. Specific problems related to response data modeling make certain Bayesian methods very useful. The ability of the individual then and the difficulty of an item are considered random variables in Bayesian TRI and these parameters generate a prior distribution that reflects the uncertainty about the true values of these parameters before obtaining the data. Then, the data obtained by the neuropsychology laboratory were entered in the form of plausibility for the final modeling of the a posteriori. There were two models that passed all the tests performed on documents that tried to perform the same modeling.

Conclusions and recommendations:

The Bayesian methodology for estimating the parameters of skills and difficulties present an innovative way to find the latent features of patients with and without executive dis syndrome. The achievement of the specific objective 1 and 2 is then achieved. Having in the results that the two models performed have a great similarity in the visual tests, and even in the means vectors; In the same way the two models pass the tests carried out proposed by Acero, Gutierrez and Lemus in 2010, in their work some methodological challenges of Bayesian modeling of item response theory, referenced above. The vast majority of vectors converged as evidenced in the procedures used in a similar application of Bayesian modeling of TRI [4].

The results show that Bayesian modeling is viable for the early detection of dementia by focusing attention on the measurement of dis executive syndrome. From the Statistical Bio, with the help of institutional research processes, we must tend to reduce the gaps in the field of psychometrics, Bayesian statistics and Alzheimer's This will correctly reward society in terms of contributions of ideas that can stabilize the behavior of the

economy of a health system, the quality of life of people with dementias and the rapid attention of the psychosocial teams of Colombia.

References:

1. Muñoz, G. Debate sobre métodos frecuentistas vs bayesianos. *Gac Sanit* 2000; 14: 482-94
2. Leenen, "Virtudes y limitaciones de la teoría de respuesta al ítem para la evaluación educativa en las ciencias médicas". *Inv ed Med*. Vol 3 (9). 40-55. 2013
3. Test de los senderos, Edición online. TESen Test de los senderos para Evaluar las funciones Ejecutivas, Madrid,2014.
4. Terrón, A. Introducción al análisis de la teoría de respuesta al ítem. Ediciones Aidesoc. San Francisco. 2010