

## Traumatic Brain Injury in Adult populations: Limitations of the Neuropsychological Approach

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**Received:** June 27, 2018; **Published:** July 12, 2018

### Abstract

In this preliminary research shows that Traumatic Brain Injury is a public health problem in adult populations. We think that it is necessary to do joint work between clinical neuropsychology and the experimental analysis of behavior to generate new models of diagnosis and intervention, since this is lacking.

**Keywords:** Traumatic Brain Injury; Neuropsychology; Experimental Analysis of Behavior; Public Health Problem

**Abbreviations:** TBI: Traumatic Brain Injury; EAB: Experimental Analysis of Behavior; CASP: Critical Appraisal Skills Program; STROBE: Strengthening the Reporting of Observational Studies in Epidemiology

Volume 2 Issue 4 July 2018

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### Introduction

Traumatic Brain Injury (TBI) it is a public health problem and is acquired through accidents or genetic causes. It is usually generated by traffic accidents or by other contextual conditions. The acquired brain damage can originate from different causes: vascular lesions, infectious diseases or anoxia [1]. The most common causes are of traumatic origin and therefore receive the medical classification of traumatic brain injury. It can be due to open or closed wounds in specific regions of the head, which usually originate injuries in one or more areas can also affect the patient in different functional levels [2], especially at the cognitive and motor level, producing some type of disability that requires a complete neurological, neuropsychological and neurophysiological evaluation.

Clinical neuropsychology has had a very secondary place in health systems in terms of the functional rehabilitation of patients with brain damage, given that only in the last 10 years, their work has been becoming a more relevant task [3]. Regarding the Experimental Analysis of Behavior (EAB), it has only been used in experimental contexts, but not applied, which limits the use of its applications in public health contexts [4], but has proven to be highly effective in its scientific methodologies for medical or neurological conditions and what will be investigated in this study.

**Citation:** Nicolás Parra-Bolaños., *et al.* "Traumatic Brain Injury in Adult populations: Limitations of the Neuropsychological Approach". *Current Opinions in Neurological Science* 2.4 (2018): 515-519.

### Materials and Methods

A preliminary search was made of the terms of the title of this study. We have tried to make a rigorous program selection of databases known as Web of Science, Scopus, Index Medicus and PubMed. The Critical Appraisal Skills Program - CASP is being used and as a backup to compare the research, we will continue using the Strengthening the Reporting of Observational Studies in Epidemiology - STROBE, which are a very important tool to verify the rigor of our scientific study. We compared two models of the most relevant contemporary authors of clinical neuropsychology and experimental analysis of behavior for the design and construction of this manuscript.

### Results and Discussion

The incidence of acquired brain damage occurs in an age range that is usually go from about 15 to 35 years old and it's more frequent in men than in women. These damages occur with higher rates in developing countries, which is clearly evident in the African Continent and in Latin American nations. Each accident is unique, it has no age, nor sex, nor socio-cultural situation, any person can suffer it and nobody is exempt from it. The first consequence that comes to light, when accidents occur that are diagnosed as brain damage, is the loss of consciousness [5], which can last from minutes, to a prolonged coma in months.

Among the most outstanding risk factors that can cause a stroke more easily are: excessive alcohol consumption, drug abuse, irresponsible driving and reckless, the lack of mandatory protection, the lack of use of approved helmets for motorcyclists and cyclists, lack of responsible use of the safety belt for drivers and companions, take occupational safety risks in the civil engineering sector, lack of safety in high risk sports and full contact sports such as football soccer, rugby, boxing, climbing, cycling [6], and other sports in addition to convulsive diseases.

The physical dimension is one of the areas that are usually most affected and those that are most evident. People who have suffered brain damage usually present difficulties in the precision of the movements and in the slowness of them. This implies that people with acquired brain damage should adjust their behaviors and compensate them with supports such as orthopedic supports, therapeutic strategies, motor aids and specialized tools such as: wheelchair, crutches, walkers, hearing aids, glasses, magnifying glasses, personalized computer, computer adaptations, adapted cutlery, and specific adaptations in the home, sexual therapy, psychological therapy and occupational therapy [7]. Motor damage can cause a lack of dynamic or static equilibrium, turning the march into a goal to be highlighted.

Other sequelae that are frequently observed, are usually difficulties in the loss of sensibility and perceptual closure, which hinders the daily action, when having to use electrical appliances, cook, and develop skills of daily life. The cognitive dimension must be taken into account, since people who have suffered from a TBI usually have difficulties in the attention, understanding and execution of slogans or simple orders [8], alterations in the trial, loss of immediate memory and difficulties to solve satisfactorily situations in the family context [9].

Other manifestations of the TBI are observed in the dimension of what are the apraxias, which are the difficulties to perform learned movements to execute the motor functions. Although it is true that physical capacity is active, such as muscle tone and motor coordination, there are difficulties in carrying movement out. Difficulties are identified to execute precise movements in fine motor skills. The TBI they are reflected in the apraxias and in a wide variety of daily actions, such as: getting dressed, preparing food, brushing teeth, cutting bread, making the shopping list for the supermarket, cleaning the house, organizing vacations, bringing home economics and many other tasks that require organization and planning [10]. It is detected that in the TBI the impulse control is much diminished, there are infantile behaviors, a lot of verbal, social, sexual and affective dis-inhibition.

The emotional aspect, in some cases, is often compromised. In some people obvious changes of humor are perceived, the character is accentuated, the versatility of the emotions towards their immediate surroundings. In general terms, some people seem to hypersensitize, changing emotional states quickly and without apparent motives. It also highlights a decrease in the spirit of self-criticism, unpredictability of the proceedings [11]. Passivity, absence of motivation and interest, general apathy, difficulty in undertaking new proposals, personal objectives, accompany this dimension.

There are different stages of adaptation where the family nucleus of people affected by a TBI usually pass, which they often define as: situations that surpass them, unexpected and “without an instruction manual” to be able to solve them. The situation of a person with TBI generates uncertainty, restlessness when not being able to cope with all the senses and generalized overflow. Each family usually goes through a shock stage, a traumatic reaction when listening to the medical diagnosis and the prognosis of rehabilitation, where different emotions like: guilt, fear, anxiety, anger, confusion, frustration, stress, loneliness and isolation [12].

The members of the family group become real managers and seekers of adequate resources that benefit the welfare of their affected family member. Sometimes, the family nucleus acquires extreme, polarized postures, such as overprotection, distancing, extreme demand, and laziness. The roles of family members are often altered, overlapping and sometimes absent. It is emphasized that patients with TBI need time, be listened to, and solve all kinds of doubts, in order to learn to coexist with the situation that directly affects them [13].

As professionals, we also have to emphasize, so that the family is taken care of, be honest with their emotions, validate them and look for spaces of respite, in self-help groups. No person is prepared a priori, to coexist with a TBI. It will help in this process, the power to contextualize each stage, assess each small achievement and share the experience with other family members who are going through similar situations. From there, the importance of family and couple therapy groups, in order to understand the person suffering from a supervening disability.

The transition that occurs from the hospital environment to the family and social context of the affected person is altered. The decrease in autonomy, multiplied by architectural, social and communication barriers, generates a social handicap and little adaptive. However, it is very important to accompany the members of the family group, so that they learn to take risks, respect the pace of the affected person, not anticipate stages or processes, assess personal effort and have a motivating attitude, which will generate adaptive behaviors for the affected person.

It is very common to listen to people with TBI who comment that their circle of friends is reducing to the extreme point of distancing themselves and disappearing [14]. The environment of friends, acquaintances and relatives, due to lack of knowledge, tend to adopt conducts tending to protection, which they annul and in extreme cases, they even isolate the person, in activities that they can carry out, but due to fear, insecurity, they usually close new learning situations. The tendency should be to seek the maximum quality in the personal and social autonomy of the person by a clinical diagnosis of TBI [15].

The contributions of the EAB, are decisive to understand the mechanisms of behavior, the basic psychological processes and the functioning of classical conditioning and operant conditioning to correlate the neurological activity with the functions of behavior in specific contexts. Classical conditioning allows us to understand the physiological mechanisms of behavior [16], which would allow patients with TBI, to have elements to generate intervention programs that are based on chaining of stimuli and responses, as well as types of stimuli and types of responses that are designed for the specific needs of each patient with TBI. As for operant conditioning, this would allow patients with TBI, recover damaged functions after the accident, through programs based on antecedents, behavior and consequences (ABC), in order to adapt the contextual conditions and the types of reinforcers [17] to generate a better neurological stimulation in adult populations with brain damage that require improvement in their cerebral plasticity.

## Conclusion

The EAB is a scientific field that should be used by neuropsychologists around the world, since ex post facto studies do not have the same degree of rigor as the experimental studies. This means that we think it is necessary that these two scientific disciplines, such as EAB and neuropsychology, join forces to produce much more efficient tools and predictive models to help adult populations that have suffered from TBI [18]. Finally, design reinforcement programs based on the functional connectivity of the brain and on the characteristics of transportation conditions in large cities around the world, could generate a model from environmental and ecological psychology to help drastically reduce accidents and allow save hundreds of thousands of lives that are annually blinded because of TBI that are not adequately treated.

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