

# Development and validation of the Bush–Francis Catatonia Rating Scale – Brazilian version

Desenvolvimento e validação da versão brasileira da escala de classificação de Bush–Francis para catatonia

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## ABSTRACT

**Objective:** This article aims to describe the adaptation and translation process of the Bush–Francis Catatonia Rating Scale (BFCRS) and its reduced version, the Bush–Francis Catatonia Screening Instrument (BFCSI) for Brazilian Portuguese, as well as its validation. **Methods:** Semantic equivalence processes included four steps: translation, back translation, evaluation of semantic equivalence and a pilot-study. Validation consisted of simultaneous applications of the instrument in Portuguese by two examiners in 30 catatonic and 30 non-catatonic patients. **Results:** Total scores averaged 20.07 for the complete scale and 7.80 for its reduced version among catatonic patients, compared with 0.47 and 0.20 among non-catatonic patients, respectively. Overall values of inter-rater reliability of the instruments were 0.97 for the BFCSI and 0.96 for the BFCRS. **Conclusion:** The scale's version in Portuguese proved to be valid and was able to distinguish between catatonic and non-catatonic patients. It was also reliable, with inter-evaluator reliability indexes as high as those of the original instrument.

**Keywords:** catatonia; humans; psychometrics; translations.

## RESUMO

**Objetivo:** O artigo tem como objetivo descrever o processo de tradução e adaptação da Escala de Catatonia Bush–Francis (ECBF) e de sua versão reduzida (ICBF) para o Português, bem como sua validação. **Métodos:** O processo de equivalência semântica foi realizado em quatro passos: tradução, retro-tradução, avaliação da equivalência semântica e estudo-piloto. A validação consistiu em aplicações dos instrumentos em português simultâneas por dois avaliadores em 30 pacientes com catatonia e 30 pacientes sem catatonia. **Resultados:** Média dos escores totais em pacientes catatônicos foi de 20,07 para a versão completa e 7,80 para versão reduzida, contra 0,47 e 0,20 em pacientes não-catatônicos respectivamente. Valores gerais para confiabilidade inter-observador dos instrumentos foi de 0,97 para ICBF e 0,96 para ECBF. **Conclusão:** A versão em Português da escala provou ser válida e capaz de diferenciar pacientes catatônicos daqueles sem catatonia. Também mostrou ser confiável, com índices inter-avaliadores tão altos quanto no instrumento original.

**Palavras-chave:** catatonia; humanos; psicometria; traduções.

Catatonia has historically been associated with schizophrenia, but it has also been connected to other diagnostic categories such as organic diseases<sup>1,2</sup> and several mental disorders<sup>3,4,5</sup>. More precisely, in the DSM-5<sup>6</sup>, catatonia is not an independent nosologic category. Diversely, the DSM-5 states that: a) catatonia is associated with other mental disorders (for example, neurodevelopmental disorders, psychotic disorders, bipolar disorder); b) a catatonic disorder may be due

to another medical condition and; c) there are unspecified catatonia disorders. According to the DSM-5, catatonia is defined by three or more of the following 12 psychomotor features: stupor, catalepsy, waxy flexibility, mutism, negativism, posturing, mannerism, stereotypy, agitation not caused by external stimuli, grimacing, echolalia and echopraxia.

Despite the ongoing belief that catatonia has become less frequent due to the advent of antipsychotic

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medication, catatonia may actually be underdiagnosed and little-recognized by untrained examiners<sup>7,8,9,10</sup>. As it is a severe and possibly lethal disorder, early diagnosis and treatment are paramount. Nevertheless, there are few studies about the syndrome, especially regarding its treatment. A search of the term “catatonia” was performed in the Medline database in 2011 with no time boundaries regarding publication year, and yet only 48 clinical trials were retrieved. Of those, only 16 had catatonia as the main theme. Most emphasized treatment of the disorder and did not address its etiopathogeny. None of them used specific scales to diagnose catatonia and few studies were controlled<sup>11</sup>.

Scales to evaluate catatonia have been proposed and developed in the last decades but are still very few in number. The review from 2011<sup>11</sup> showed that there are seven tools for the evaluation and classification of catatonia available in the literature, all in English: Modified Rogers Catatonia Scale<sup>12</sup>; Rogers Catatonia Scale<sup>13</sup>; Bush-Francis Catatonia Rating Scale (BFCRS)<sup>14</sup>; a revision of the BFCRS proposed by Ungvari<sup>15</sup>; Northoff Catatonia Rating Scale<sup>16</sup>; Braunig Catatonia Rating Scale<sup>17</sup>; and the Kanner Scale<sup>18</sup>.

The Bush-Francis Scale, created in 1996, is the most widely used due to its validity, reliability and ease of application. The Bush-Francis Scale has two versions: a longer one (BFCRS) with 23 items rated from 0 to 3 to evaluate catatonic symptom severity; and a reduced version, the Bush-Francis Catatonia Screening Instrument (BFCSI), with only the first 14 items, to evaluate presence or absence of catatonic symptoms, and to screen for syndrome. The original version of that scale was tested by its authors in a sample of 28 catatonic patients and showed a high inter-evaluator reliability ( $\kappa = 0.93$ ). Besides, diagnoses formulated with the BFCSI were in accordance with other criteria for catatonia, between 75% and 100%. That confirmed the conclusion that the instrument is reliable and valid<sup>14</sup>.

No versions of the Bush-Francis Scale in other languages were found. To the best of our knowledge, there is no screening and classification instrument for catatonia adapted to Portuguese, nor one in which psychometric characteristics have been studied<sup>11</sup>.

The present article aims to describe the process of translation and adaptation of the BFCRS into Brazilian Portuguese as well as its validation.

## METHODS

### Forward and back translation and semantic equivalence processes

The BFCRS's semantic equivalence process included four steps: translation, back translation, semantic equivalence evaluation and a pilot-study, according to Herdman et al.'s protocol<sup>19</sup>.

Two translations into Portuguese of the original BFCRS were made by two bilingual psychiatrists, independently from each other. Both translations were back translated into English by two other bilingual psychiatrists, also independently from each other. These back translations were evaluated with regard to their adequacy by one of the authors of the original scale (A. Francis). Finally, a third set of two bilingual psychiatrists (who were not involved in the previous phases) created a version of the BFCRS in Brazilian Portuguese based on the BFCRS's original text, both translations, back translations and the author's evaluation of the back translations. This version incorporated a few items from one of the translated versions. Other items in the synthetic version were a combination of items of each translation. Before developing the final version; items were evaluated with regard to the conceptual equivalence by two psychiatrists, and items rated as unclear were changed. A few items required a third alternative to the translated versions and that was done in order to achieve the best semantic equivalence possible.

### Validation

A complete final version of the scale in Portuguese was applied to patients in a psychiatric hospital – Federal University of Rio de Janeiro Psychiatry Institute (IP/UFRJ) – in Rio de Janeiro, and patients in a non-psychiatric hospital – Federal University of Belo Horizonte General Hospital, in Belo Horizonte, between June, 2011 and November, 2013.

The criteria used to diagnose catatonia were made according to the DSM-IV-TR<sup>20</sup>, that is, the presence of at least two of the following symptoms: catalepsy, agitation, negativism, posturing, and echophenomena (echolalia or echopraxia). The catatonia diagnosis was determined by only one of the researchers in each center: ALSN, in Rio de Janeiro and RN, in Belo Horizonte.

The Brazilian version of the instrument was applied to 30 catatonic patients, 23 in Rio de Janeiro and seven in Belo Horizonte. The patients were the first 30 who were hospitalized with the diagnosis of catatonia in both hospitals from the beginning of the study. During the same period, the instrument was also applied to the first 30 non-catatonic inpatients in the Rio de Janeiro hospital, who agreed to participate.

The scale was applied to each of the 60 patients simultaneously, though independently, by two psychiatrists, with the objective of evaluating inter-observer agreement.

### Statistical analysis

Means and standard deviations were compared through the *t-Student* test for independent samples<sup>21</sup>. Inter-observer agreement was evaluated through Pearson's product-moment correlation. Correlation was calculated for each item and for the total score of both scales. The *r* value considered was  $\geq 0.70$ , both for the total scores of the scales and the scores of each item, which is considered a high score. The analyses were conducted using the software SPSS 21.0<sup>22</sup>.

## Ethical statement

All the patients – or alternatively their family, whenever patients were not able to express their will – agreed to take part in the study. They also signed an informed consent form. This research was approved by the Institutional Ethical Board of IPUB/UFRJ.

## RESULTS

Table 1 shows a few of the translations as examples, back translation and preparation phases of the Brazilian Portuguese version of the BFCRS. The author of the scale was of the opinion that, in general, one of the back translations was closer to the original version and, for that reason, it was taken into greater consideration when preparing the Brazilian version of the BFCRS.

During the preparation of the final version, a few items proved divergent as neither of the translations was fully adequate for the item's purpose. Because of this, the researchers charged with preparing the summary version replaced a few terms with the objective of improving the instrument, as in items 4 and 5. Other items, such as 17 and 18, had terms in German that had no translation in Portuguese. The terms were, therefore, kept in German. For some items, one of the translations was closer to the original text and, for that reason, this translation was maintained in the final form. There was no divergence for most of the items and both translations were very similar and compatible with the original version.

As shown in Table 2, the total scores given by examiner 1 to the catatonic patients were, on average, significantly higher than the scores given to non-catatonic patients, both for the longer scale (BFCRS) as well as the shorter form (BFCSI). This shows that the Brazilian version of the instrument is able to distinguish both groups.

When considering only the catatonic patients, inter-rater reliability for the evaluation of each item of the instrument was high, as can be seen in Table 3. The total score correlation was also high, which means that even when the evaluators did not give the same score for each item, the total scores showed strong agreement in the end.

## DISCUSSION

This study consisted of the translation and adaptation into Brazilian Portuguese of the most valuable scale for the evaluation of catatonic states, the BFCRS<sup>14</sup>. Validation of the instrument was made in two ways. Initially, when applied to catatonic and non-catatonic patients, the Brazilian version of the BFCRS was able to distinguish between both groups. As well, it showed a high inter-observer reliability index.

The inter-rater reliability indexes found in this study were practically identical to the ones obtained by the authors of

the original instrument when it was validated<sup>14</sup>. The original version of the scale was tested by the authors in a sample of 28 catatonic patients and showed inter-rater reliability ( $\kappa = 0.93$ ). In our sample, the correlation values found were also high for both the longer form ( $r = 0.96$ ) and for the screening version ( $r = 0.97$ ). In our study, we used Pearson's correlation, which is usually applied when two experts are observing the same phenomenon and both give scores from a range, which was our case<sup>23</sup>. Elsewhere, on the original scale, the authors used Cohen's kappa, which determines agreement among judges, typically used when judging the suitability of an item to a scale and for nominal data<sup>24</sup>. The correlation assumes that the scale of response is an interval, as in our case<sup>25</sup>.

A literature review conducted by Sienaert et al. in 2011<sup>11</sup> pointed out that the original version of the BFCRS deserves special mention among available instruments that presently evaluate catatonia for its ease of application – the screening version may be applied in about five minutes by a well-trained examiner. The Braunig Catatonia Rating Scale, in contrast, takes about 45 minutes to be applied. In addition, the BFCRS offers a semi-structured interview, diverging from other instruments, like the Rogers Catatonia Scale and Modified Rogers Catatonia Scale, for example. These authors consider it preferable, in routine clinical practice, to improve the prompt detection of the catatonic syndrome and to measure the treatment response<sup>11</sup>. Catatonia evaluation scales have rarely been used in studies that measure response to treatment. Nevertheless, one study has already shown that the BFCRS is sensitive to the changes in the severity of the catatonic symptoms during treatment with lorazepam and electroconvulsive therapy<sup>26</sup>. Despite being considered valid and widely used, a lack of uniformity and the existence of inaccurate definitions and symptoms are said to be some of its limitations<sup>27</sup>. We found only one revision of the BFCRS proposed by Gabor Ungvari, who applied the instrument to 225 randomly selected, chronic schizophrenic inpatients. However, in Sienaert's review, this was considered purely a statistical manipulation, and not a distinct scale<sup>11</sup>.

The psychometric properties of all the instruments available for the evaluation of catatonia have not been addressed in this work, because the main goal was the comparison between the original version and the Brazilian version. However, the expansion of this comparison may strengthen, in a second study, the arguments in favor of the greater applicability of the BFCRS.

The idea that catatonia is associated with schizophrenia has been incorporated into several editions of the DSM and International Classification of Diseases<sup>28</sup> and is still defended by several authors<sup>29</sup>. Such an historical definition partially explains the lack of care regarding the catatonic syndrome and its dramatic underdiagnosis<sup>10</sup>. It has become clear, though, that catatonic symptoms can be observed not only in schizophrenia but also in several mental disorders, especially affective disorders<sup>30,31</sup>. Nowadays, many researchers consider

Table 1. Examples of translation and adaptation of BFCRS into Brazilian Portuguese.

Item	Original Version	Translation	Back translation	Summary	Comments
5.	Posturing/catalepsy: Spontaneous maintenance of posture(s), including mundane (e.g. sitting or standing for long periods without reacting). 0 = Absent. 1 = Less than 1 min. 2 = Greater than one minute, less than 15 min. 3 = Bizarre posture, or mundane maintained more than 15 min.	5.A. Postura/Catalepsia Manutenção espontânea de postura(s), incluindo usuais (ex. permanecer sentado ou de pé por longos períodos sem reação). 0 = Ausente 1 = Menos de 1 minuto. 2 = Mais de 1 minutos, menos de 15 minutos. 3 = Postura bizarra, ou usual mantida por mais de 15 minutos.	5.A. Posture / Catalepsy Maintenance of spontaneous posture (s), including the usual (eg sit or stand for long periods without reaction). 0 = Absent 1 = Less than 1 minute. 2 = More than 1 minute, less than 15 minutes. 3 = bizarre posture, or usual held by more than 15 minutes.	5. Postura/Catalepsia: Manutenção espontânea de postura(s), inclusive comum(ns) (ex. permanecer sentado ou de pé por longos períodos sem reação). 0 = Ausente 1 = Menos que 1 minuto. 2 = Mais de 1 minuto, menos de 15 minutos. 3 = Postura bizarra ou corriqueira mantida por mais de 15 minutos.	No disagreement regarding term translation. Regarding term definition, we preferred to translate "mundane" as "usual" since the term in the original language means ordinary. The translation into Portuguese – "mundano" – could eventually mean "someone seduced by material pleasures" or "belonging to the world", the latter as something material and transitory.
5	- - - - - -	5.B. Postura/Catalepsia Manutenção espontânea da postura, inclusive mundana (permanecer sentado ou em pé sem reagir por longos períodos) 0 = Ausente 1 = Menos que 1 min. 2 = Entre 1 e 15 min. 3 = Postura bizarra ou mundana mantida por mais de 15 min.	5.B. Posture / Catalepsy Maintenance of spontaneous posture, even mundane (remain seated or standing for long periods without responding) 0 = Absent 1 = Less than 1 min. 2 = Between 1 and 15 min. 3 = Posture bizarre or mundane maintained for 15 min.	- - - - -	
18.	Gegenhalten: Resistance to passive movement, which is proportional to strength of the stimulus, appears automatic rather than wilful. 0 = Absent. 3 = Present.	18.A. Gegenhalten/paratonia Resistência ao movimento passivo que é proporcional à força do estímulo, aparentemente automático e não intencional. 0 = Ausente. 3 = Presente.	18.A. Gegenhalten / paratony Resistance to passive movement that is proportional to the strength of the stimulus, apparently automatic and unintentional. 0 = Absent. 3 = Present. 18.B. "Gegenhalten" Resistance to passive movement proportional to the strength of the stimulus, which occurs automatically and unintentionally	18. <i>Gegenhalten</i> (Paratonia inibitória): Resistência ao movimento passivo que é proporcional à força do estímulo, aparentemente automática e não intencional. 0 = Ausente. 3 = Presente.	"Gegenhalten" is a German word and has no translation in Portuguese. We considered translator 1's version closer to the original.
18	- - -	18.B. "Gegenhalten" Resistência ao movimento passivo proporcional à força do estímulo, que ocorre de forma automática e não deliberadamente 0 = Ausente 3 = Presente		- - -	

**Table 2.** Mean BFCSI and BFCRS scores in catatonic and non-catatonic patients.

Groups (n = 60)	BFCSI		Cohen's d	BFCRS		
	Mean (SD)	p-value		Mean (SD)	p-value	Cohen's d
Non-catatonic patients (n = 30)	0.20 (0.48)	p < 0.001	d = 0.88	0.47 (0.94)	p < 0.001	d = 0.79
Catatonic patients (n = 30)	7.80 (2.88)			20.07 (10.79)		

BFCSI: Bush-Francis Catatonia Screening Instrument; BFCRS: Bush-Francis Catatonia Rating Scale; SD: standard deviation.

catatonia as an independent nonspecific nosologic category since it can easily be recognized and distinguished from other conditions, has specific development and shows effective responses to treatment<sup>7,28,32</sup>. Nevertheless, this is not referred to in present diagnostic compendiums. Such a poor classification status discourages the diagnosis of catatonia in non-psychotic disorders<sup>10</sup>. The lack of a psychopathological definition and conceptual understanding of catatonia<sup>18</sup> jeopardizes research in the field. There is a growing need of a clear definition of the concept as well as of reliable evaluation instruments to guide both researchers and clinicians in catatonia diagnoses and evaluation, not to mention treatment. Improving detection and evaluation of catatonia is important due to the fact that the presence of catatonic symptoms has significant prognostic and therapeutic value<sup>11</sup>.

Improvements brought about by the standardization of evaluation, classification and diagnosis through psychometric instruments for a syndrome with high morbidity and mortality rates that historically has been underdiagnosed, especially when wrongly treated, justify the efforts for the development and improvement of proper instruments<sup>11</sup>. The use of scales will make diagnosis and therapeutic practices easier in the clinical realm and will enable further clinical trials on this so far underexamined syndrome<sup>11</sup>.

The BFCRS version in Portuguese presented here shows high validity, reliability and inter-rater reliability indexes, similar to the original version. The BFCRS is the most widely-used scale for catatonia evaluation available at present. We believe that the Brazilian version will be of great use for the Portuguese-speaking populations both in clinical practice and in research, since no other instrument for the evaluation of catatonia has so far been available in the language.

**Table 3.** Interrater reliability for each BFCSI and BFCRS item in the catatonic patients.

Item	Interrater correlation	
	BFCSI	BFCRS
1	0.75	0.90
2	0.78	0.78
3	0.77	0.81
4	0.85	0.61
5	0.62	0.74
6	0.62	0.92
7	0.91	0.90
8	0.93	0.69
9	0.8	0.86
10	0.83	0.73
11	0.64	0.86
12	0.73	0.87
13	0.79	0.69
14	0.64	0.95
15	-	0.96
16	-	0.90
17	-	0.71
18	-	0.87
19	-	0.62
20	-	0.78
21	-	0.70
22	-	0.99
23	-	0.99
Overall	0.97	0.96
Average (items only)	0.78	0.82
SD	0.11	0.12

BFCSI: Bush-Francis Catatonia Screening Instrument; BFCRS: Bush-Francis Catatonia Rating Scale; SD: standard deviation.

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