

## Subjective evaluation of the comfort of popular denim: elaboration and validation of the the data

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**Abstract:** The main objective of this study is to describe the process of validation of the inquiry of subjective evaluation of the comfort of the popular jeans, through the accomplishment of a pre-test. Through this research, we intend to define the language corresponding to the understanding of the public participating in the research and to use the scale of responses in accordance with the interpreters' ability to infer the analysis of the parts in question based on the different comfort parameters. The group of evaluators consists of 10 women consumers in the popular markets of Fortaleza, aged between 18 and 40 years. With this research it was possible to elaborate questions and answers focussed to the public understanding in order to choose the attributes of evaluation in analysis, to define the scale of answers and to validate the inquiry as instrument of data collection.

### 1. Introduction

The present paper consists in the study of Brazilian popular denim jeans comfort, specifically the process of elaboration and validation of the inquiry for subjective evaluation of comfort by the popular denim jeans wearer.

The popular denim in question refers to jeans created, produced and consumed by the popular poor class of the region of the Brazilian Northeast, having as main focus the market of Fortaleza, in the state of Ceará, which has 47,8%[1] potential consumers, the equivalent of 623,790 women [1]. The female's jeans are a symbol of popular fashion and as it is one of the most popular items in fairs and in popular shopping malls [2,3] it plays an important role in the aesthetic composition, describing a strong socio-cultural expression, by means of their different finishing[4].

Based on the concept of total comfort of clothing, including sensory, physiological and ergonomic components, that includes aspects related to style, size and ease of movement and psycho-aesthetic factors, which depend on multiple agents such as culture, religion, fashion, color and psychological state of mind by the wearer that may predominate over the functional aspects [5,6]. The subjective evaluation of the comfort of jeans sold in popular markets, using the techniques of subjective measurement of comfort, allows identifying the comfort conditions provided by these pieces and thus determining if the aesthetic expression is overestimated to the loss of comfort.

In order to perform the subjective comfort assessment, following the literature recommendations of researchers on the subject, such as Slater[7] and Y Li [8], it is necessary to elaborate an inquiry as a data collection instrument.



Therefore, the present paper consists of an experience report, which has as main objective to describe the process of elaboration and validation of the survey of subjective evaluation of the comfort of popular jeans, describing the following steps:

- 1) process of elaboration of the inquiry with definition of the model;
- 2) choice of attributes to be applied to the construction of the questions;
- 3) determination of the type of answers;
- 4) selection and training of the group of evaluators;
- 5) description of the environment conditions for pretest application;
- 6) process of applying the pretest.

The purpose of this procedure was to elaborate an inquiry that uses the necessary attributes to analyse the comfort of the garment pieces in question, considering different comfort parameters: psycho-aesthetic, sensory, thermal and ergonomic aspects, applying the appropriate language for the participants of the research; using the scale of responses according to the participants' ability to interpret.

With the accomplishment of this work it was possible to verify that to work with the poor public with low level of education for elaboration of the inquiry a combination of techniques is necessary; confirmed the importance of the pretest of the inquiry in order to identify the most reliable model and thus to devise an instrument that is capable of collecting the data that is closer to the reality.

The relevance of this research lies in the importance of choosing the most appropriate vocabulary through the use of different attributes, questions and answers that are appropriate for the participants of the research validating the data collection instrument in order to assemble the information that is closest to reality. Analysing the type of jeans that are being offered in the popular markets, we determine the comfort conditions felt by the consumers regarding the use of the popular jeans in the scope of comfort and fashion in the Brazilian market and even worldwide.

The present text is divided in introduction, materials and methods, results and conclusions, future perspectives and references.

## **2. Materials and methods**

The realization of the pre-test of the subjective evaluation of the comfort of the popular jeans proceeds the following steps:

- 1) process of elaboration of the inquiry, choice of attributes to be applied to the construction of the questions and determination of the type of answers;
- 2) selection and training of the group of evaluators;
- 3) description of the environment conditions for pretest application;
- 4) process of applying the pretest.

### *2.1 Process of elaboration of the inquiry*

The first stage of the pre-test began with the elaboration of the inquiry: it started with three different models, with the choice of attributes and the determination of three different answer models:

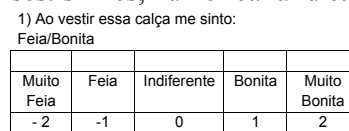
*2.1.1. Choice of attribute.* The three models use the same question models, defined through previous interviews with popular consumers from Fortaleza [4,9], in which they presented preference factors that guided the definition of the used attributes. The attributes, or categories of descriptors of the characteristics of the evaluated product, follow the method of pairs of anonymous words separated by intensity scales[10] that describe an aspect of the jeans to evaluate.

*2.1.2. Answer models.* Three different formats of response scales were applied, such as the models: smiles, numeric (-2, -1, 0, 1, 2) and categories (e.g. very ugly, ugly, indifferent, beautiful, very beautiful).

The first inquiry model was applied only to the smile scale (Figure 1). In the second inquiry model the combination of numerical and category scales (Figure 2). And in the third inquiry used the scale model that combines the three scales of responses: smiles, numerical and categories as shown in figure 3.



**Figure 1.** Inquiry with smile scales



**Figure 2.** Inquiry with numerical and categories scale



**Figure 3.** Inquiry with smile, numeric and categories scale

## 2.2 Process of applying the validation, choice and formation of the group of evaluators

The application of the validation and pre-test of the three inquiry models was carried out with consumers of the popular markets. This consists of the presentation of the research proposal, in order to justify the relevance of the study and explain the procedures necessary to perform the pre-test.

With this, the participants were 10 female consumers from the popular markets of Fortaleza, aged between 18 and 40 years, of whom 5 (five) public university students, 3 (three) housemaid and 2 (two) hairdressers. The application of the pre-test occurred between April 8 and 12, 2016.

## 2.3 Determination of the environment for application of survey validation

Application of the survey follows the methodological criteria of ISO 11092 2014 [11] for the five levels of clothing assessment. In this stage the environmental parameters follow the recommendations of level 5 that concerns the subjective evaluation in real conditions. For the measurement of temperature and humidity, a digital thermo hygrometer was used. During the application of the pre-tests the average values of temperature was 24.71°C and 66.26% of relative humidity.

To define the application environment of the pre-test of the surveys, the principle was chosen as the spaces and occasions where the popular consumers usually wear their jeans. Therefore, the pre-tests occurred in three different environments, corresponding to the participating evaluator's real surroundings: in a laboratory room of the Federal University of Ceará, in the patron's house and in a beauty salon, in Fortaleza, Ceará, Brazil.

## 2.4 Application of the pre-test of inquiry models

For the application of the pre-test were evaluated five models of jeans, these were previously selected based on indications presented in questionnaires with popular consumers, where they presented the five models most desired.

Therefore, the ten female consumers evaluated the five models of jeans, in the three different inquiry models, fifteen responses per person and generating a total of one hundred and fifty responses (table1).

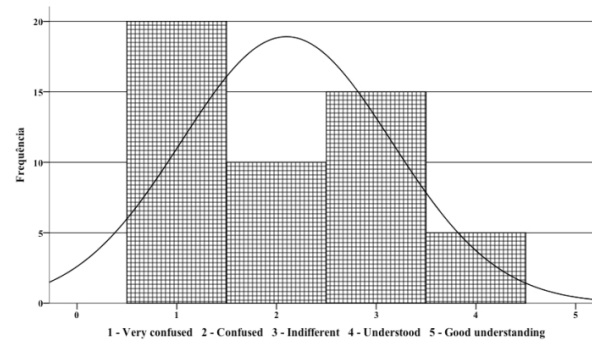
**Table 1** Pre-test application response numbers

Number Evaluators	Jeans Models	Inquiry's Model	Total Replies
10	5	3	150

## 3 Results and conclusions

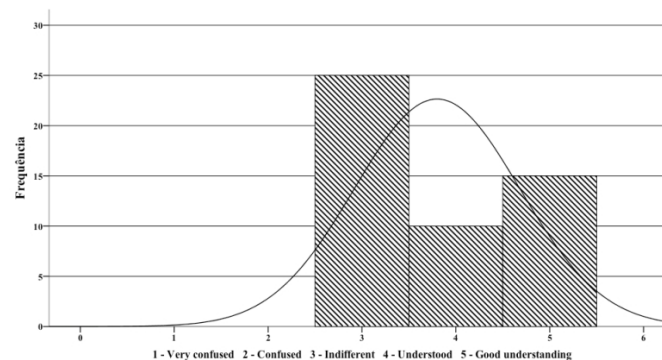
The results obtained through the treatment of the answers collected from the pretest show the following information:

As far as the evaluation of the inquiry using the smile scale model the responses were, 20 very confused, 10 confused, 15 understood and 5 had good understanding, as demonstrated in figure 4 which represents the graph of responses from the evaluation of smiles scale.



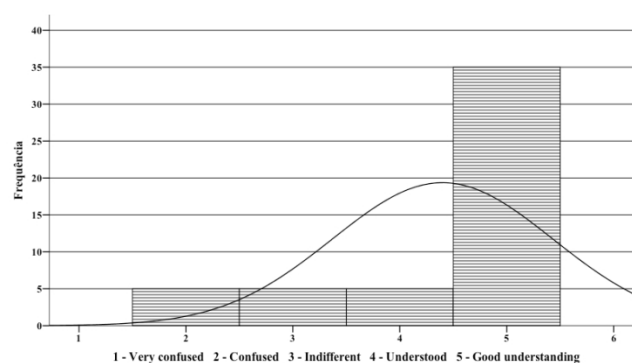
**Figure 4** Smile scale evaluation graphic (n=50)

In the second inquiry model, with the combination of numeric and category scales the responses were as follows: 25 indifferent, 10 understood, and 15 good understanding. In Figure 5, shows the graph of the numerical and category scale rating responses.



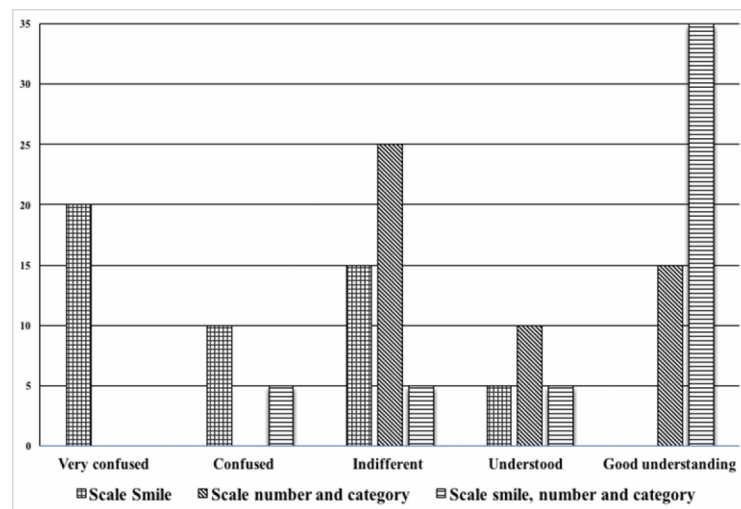
**Figure 5** Numerical scale and category graphic (n=50)

The third model of the inquiry, where the combination of the scales of smiles, numerical and of categories, the answers collected were: 5 confused, 5 indifferent, 5 understood and 35 good understanding.



**Figure 6** Smile, numeric, and category scale evaluation graphic

When comparing the responses of the three inquiry models, it is possible to observe that among the three models, the smile scale model (Figure 4) were the most confusing, the inquiry model in which it presents the combination of the numerical and category scales obtained more answers to indicate as indifferent (Figure 5) and the inquiry in which the combination of the three scale models was presented was good understanding (Figure 6). Figure 7 shows the graphic of the evaluation responses of the three scale models.



**Figure 7** Evaluation of the three models of scales graphic.

By analyzing the data of the pre-test with popular consumers it is possible to verify that the scale of smiles was evaluated as very confusing, therefore it's not an adequate scale in surveys of subjective evaluation of clothing.

It was observed that the numerical and category scale although it is a commonly applied model in surveys of subjective assessment of the comfort of clothing, the popular consumers, affirmed that the combination of these scales is indifferent.

The model of the combination of the three scales was pointed out, with the largest number of responses to be indicated, as a scale of good understanding by the popular consumers. The smile scale reinforces the understanding of numeric and category scales.

The collected responses indicate that only one scale model was not understandable, and therefore it was necessary to use a combination of the models for a clear understanding of the answers. Therefore, it is perceived that in order to work with the popular public, it must be taken into account that it is a heterogeneous group, with low levels of schooling, and it becomes necessary to adapt the methods, the tools and techniques for the elaboration of the inquiry, the composition of the questions and the combination of intensity scales for the subjective evaluation of the attributes and descriptors.

It was identified the need to elaborate explanatory texts before each attribute of classification of the characteristics of the pieces, besides having to modify some words/attributes such as rough and smooth, because during the application, the participants questioned the meaning of these terms.

Thus, as the realization of this investigation confirms the importance of the validation of the survey in order to identify the points to be improved, complemented and thus to elaborate an instrument capable of collecting the data closer to the real environment.

And finally, it is concluded that the investigation of subjective evaluation of the comfort of popular clothing and specifically of jeans created, produced and sold by popular markets in Brazil is unprecedented.

#### 4 Future perspectives

In further studies the purpose of this study is to apply the changes in the reformulation of the inquiry and thus to apply the new model as a subjective evaluation tool for popular fashion, specifically for female's jeans, and we will compare the results with data obtained through objective evaluation using a thermal manikin. This study has also a concern to present the collected information to the producers and traders of Fortaleza of this type of product in order to contribute to the development of the market.

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