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COMPARATIVE USER-FOCUSED EVALUATION OF USER GUIDES: A CASE STUDY

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ABSTRACT

A comparative evaluation of two user guides—the document traditionally used by a company and a model document designed on the basis of research results and recommendations—was carried out using a number of complementary approaches focusing on the user. The quality and suitability of these documents for the target audience were assessed in terms of content, structure, presence of certain organizational devices (such as headings) and pictures included. The results revealed that the model document was more attractive, more efficient, and better adapted to users' needs, thanks to its modular organization (being structured according to "functions"), a large number of pictures, the presence of headings, and rationalization of the vocabulary used.

INTRODUCTION

Research in the field of cognitive psychology has allowed us to gather a vast amount of knowledge and understanding as to how language is produced and understood, how problems can be solved and how actions are planned and carried out. Nonetheless, research results generally remain confined to psychology and attempts at applying them to the industrial domain remain relatively rare. The aim of this article is to show how theory for designing procedural documents (instruction leaflets, user manuals, etc.), based on both field work and basic research in cognitive psychology, was put into practice to fulfill the requirements of a company's request in the field of technical writing, and to indicate how this approach led to positive evaluations of the resulting documents by the general public.

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Data from after-sales services, consumer services, and quality control departments within companies producing appliances for the general public show that, in certain cases, some items are returned to the factory due to failure. However, when tests are carried out, no technical fault is found. This suggests that such problems are related to difficulties in using the appliance which cannot be solved by the user (particularly by novices who have no previous knowledge of the product). They often result from the user not reading and/or understanding the instructions properly, if indeed the instructions are used at all [1, 2]. On the basis of this observation, a company which produces domestic appliances decided to improve the efficiency of its instruction manuals in order to produce documents which were adapted to the users' needs (i.e., which were useful both when users are inexperienced and want to learn how to use the appliance, and at a later stage when they may wish to further their knowledge of certain aspects of the appliance or solve any problem which may have arisen). In order to meet these requirements, we chose to study certain aspects of users' behavior when using the documents in question. The new documents were then designed based not only on the literature dedicated to technical and procedural documents but also on the results of experiments and observations carried out both in the laboratory and through field work [3, 4]. A resulting instructions manual was designed for a pressure cooker that had to fulfill four requirements: attractiveness, practicality, simplicity, and efficiency. The manual was required to be more attractive in order to incite a large number of users to use it spontaneously (i.e., more than 50% of users); more practical so as to be able to be read and used without affecting the handling of the equipment; simpler, so that it could be read and understood by a diverse target audience; and lastly more efficient to encourage progressive learning as well as to allow rapid access to the information required [4]. Research results were used in order to create a document aimed at helping users to learn to use the appliance more easily. The resulting document was then evaluated in comparison to the document traditionally used by the company.

DESIGN STRATEGY

The design strategy relates to three characteristics of the document: its format, its structure, and its content.

Format

The document must not be overly cumbersome so that it can be easily placed beside the appliance and read whilst using it. Observational data brought to light the fact that a number of users tend to obtain information by going back and forward between the document and the appliance, a process known as *switching activity* [5-7]. This method appears to be a strategy used by individuals in order to reduce the burden on working memory. In such a case, the

cognitive workload could be reduced by the physical and/or temporal proximity of the instructions and the appliance [7].

Structure: Page Layout and Information Access

Observational data of the use of technical documents generally reveal that the users' needs are essentially two-fold: first, users need to access information which will enable them to carry out the basic tasks and, secondly, they need to find the relevant information when difficulties arise (see [4] for more details). These needs may vary according to the user's knowledge of the appliance. However, pressure cookers are intended for a very diverse public[1] with very different needs (beginners, experts, young people, elderly people, etc.) and varying levels in the comprehension of written texts. We therefore developed a strategy whereby the user guide allows information access along two axes. The first is a chronological, linear organization and is aimed at users who need first of all to learn the basics of how to use the appliance, and subsequently progress step-by-step. The second axis is based on a modular approach to information access, organized by "function," each of the appliance's functions being described in a separate section. This facilitates rapid identification of the relevant information. In terms of page layout, the modular organization by "function" (or by "section") means that all the appropriate information about a particular function or element of the appliance must be presented on a single page or on two adjacent pages, e.g., instructions, tips, questions and answers, etc.). This page layout should help the user to find the information he/she is looking for quickly and easily.

Content

Use of Prominent, Clear and Accurate Headings

Research into the effects of headings on procedural instructions shows that their presence facilitates the carrying out of instructions. Specifying the goal of an activity activates a plan in the user's memory and/or helps him/her to create a mental representation organizing his/her actions, and to monitor his/her activity. Therefore, the heading must closely correspond to both the goal and the content of the instructions, as better results are achieved in these cases.

Headings also help the user to identify quickly and easily the relevant section when he/she is looking for a particular piece of information, as showed by Hartley and Trueman [8]. In order to fulfill these criteria, Wright [9] remarks on the necessity of using clear and accurate headings, and suggests that they should be made prominent both spatially and through the use of characters varying in size and color from the body of the text. Furthermore, the use of a color-coded contents

[1] In France, estimates show that some 80% of households have pressure cookers.

page with the exact headings helps the user to identify relevant information by facilitating direct access to the appropriate section.

Rationalization of Vocabulary

The vocabulary used in instruction manuals is often the source of numerous problems. It can often seem overly technical and incomprehensible to the user [10, 11]. Sometimes several terms or expressions are used in the one document to refer to the same action, function or part (for example, in a pressure cooker instructional manual, one might find the terms "cover handle," "lid handle," and "knob" all referring to the same part). The vocabulary used can thus be rationalized by adhering to the three following rules:

- use a single term or expression to refer to each particular action, part, and/or function;
- avoid using technical vocabulary and prioritize everyday expressions. Guespin [12] notes that there is often a significant difference between the vocabulary used by the writer and the user;
- when the use of technical terms is unavoidable, for example to describe certain parts of the appliance, these terms should appear in a labeled diagram typically placed at the beginning of the document. This diagram serves partly to define a common vocabulary for the technical writer and the user (by creating a common point of reference).

Joint Use of Text and Pictures

Research shows that the addition of pictures to written documents has a number of positive effects on text comprehension and knowledge acquisition. First, pictures enable the user to construct a mental picture more quickly and more completely [13]. Secondly, they lead to quicker and more accurate actions [14, 15]. Finally, the workload involved in information processing is reduced, in comparison to the use of text only [16]. Consequently, pictures (either drawings or photographs) should be used in addition to written instructions as much as possible.

IMPLEMENTATION

Based on the theory and design strategy explained above, a model document was developed, through collaboration with a communication agency specializing in the design of technical documents. A series of comparative evaluations of the original user guide (Appendix 1) and the model user guide (Appendix 2) was then carried out in order to investigate whether the latter did in indeed correspond to the users' needs.

ASSESSMENT OF THE MODEL USER GUIDE

Assessing user guides is no easy task, due to their complexity (e.g., the combination of different kinds of information) and the users' diversity (e.g., diversity of the target audience). Different elements of these documents must be taken into account: their content (e.g., whether the text meets the audience's needs, fulfills the objectives set, and suits the product described), their structure (i.e., presentation of the information: layout, typography, etc.), the presence of certain organizational devices (e.g., headings), and the illustrations included (e.g., drawings, schematic diagrams, tables). Schumacher and Waller [17] suggest that the quality and efficiency of such documents should be assessed according to a variety of criteria. However, according to Hartley [18] no such standard assessment tool exists. He thus suggests [19], along with Schumacher and Waller [17], that the assessment should be carried out according to a number of indicators, each testing different characteristics of the document. According to these authors, combined measurements prove to be more useful and more complete than single measurements. We therefore adopted this approach in order to carry out a comparative analysis of the original user guide and the model user guide designed according to our design strategy.

Aims of the Evaluation

Our main objective was to test the quality and efficiency of the model user guide and, if necessary, to revise the guide, so that it would meet the four mentioned criteria: attractiveness, practicality, simplicity, and efficiency. The manual was required to be attractive in order to incite a large number of users to use it spontaneously; practical so as to be able to be read and used without affecting the handling of the equipment; simple, in view of being read and understood by a diverse target audience; efficient to encourage progressive learning, as well as to allow rapid access to the information required.

To attain this goal, a testing procedure was developed in order to assess the model document in comparison to the original user guide. This procedure involved using assessment methods which focused on the user, in addition to traditional methods used by companies (i.e., based on the work of experts). The first approach was focused on experts' evaluation and involved a number of professionals from various fields of expertise who were asked to review the new document. The experts were from areas related to the audience and/or the product (Customer Services, Quality Control, Marketing Department, Research and Development, Standards Board). The test was individual and the experts had no constraints and were free to modify the document. After the document was revised by the experts, user-based assessment sessions were organized. The tests carried out were both qualitative and quantitative. They included *on-line* measurement of performance as well as *off-line* measurement of preference and satisfaction. They were designed in order to assess whether the document corresponded to both the objectives set

and the target audience. To compare the efficiency of each of the two documents (original user guide vs. model user guide), three types of tests were carried out: preference tests, information searching task, and tests focusing on various characteristics. These were chosen from different guidelines, recommendations, and research work [18-23]. They were designed to allow information to be gathered regarding the document's attractiveness, content, and information layout. These characteristics were: document format, structural organization, efficiency of the contents page, layout, simplicity of the text, typography, usefulness of any pictures, and overall attractiveness. As a result of the user-focused evaluation, the ultimate goal was to improve the model user guide in order to create a final document which would be marketed alongside the product.

Method

Participants

Twenty-six adults (of which 24 were women), between 28 and 58 years old (average age: 42; $\sigma = 9.94$), volunteered to take part in this study. This sample (20 production employees, 4 employees/technicians, and 2 managers) was made up of members of the industrial staff, not involved in the pressure cooker production unit.

Materials

Materials used:

(a) the two user guides to be tested: the original user guide and the model user guide. The appearance of the two documents did not reveal their respective identities as an existing document and a model document;
(b) a fully-functional prototypical pressure cooker;
(c) a camcorder to record the data.

Procedure

Each test was individual and lasted about 30 minutes. All of the participants' actions were filmed, as was the interview with each of them. The session was organized as follows:

a. *Presentation*—First, the organization of the session was presented: the aim of the test, the tasks to be completed, and the procedures to follow.

b. *Comparison of user guides and preference test*—The participants were allowed to compare the two user guides at liberty for 10 minutes. After 10 minutes, they had to decide which user guide they preferred and to justify their choice. For each participant the order of the user guides on the work-bench was reversed: each user guide was placed alternatively on the left and then on the right for the different participants. This was done in order to avoid

any lateralization effect which could have induced a preference for the user guide placed on the same side as the participant's writing hand (and hence chosen first).

c. *Information location task*—Under the pretext of becoming acquainted with the two texts, the participants were asked to locate three pieces of information in the user guide they had chosen, and then three others in the second document (see Table 1 for the two sets of questions). This phase was aimed at evaluating objectively the extent to which each user guide allowed efficient information access. The information the participant was asked to locate corresponded to the questions listed in Table 1.

The answers to these questions could be found in both user guides. However, the answer to Q4 was different in that it appeared both inside the document and in a "Questions and Answers Table" at the end of the original user guide, while it was only at the bottom of a page in the model user guide (the "Questions and Answers Table" was left out of this document on purpose at the manufacturers' request). The questions in the two sets were counterbalanced so as to eliminate any possible consequence of the order of the information (Table 2).

Table 1. Questions Asked for the Information Location Task.
(The expected answers are in *italics* opposite the relevant question.)

Question	Expected answer
1st Set	
Q1. When cooking food which may increase in volume, how full can you fill the pot?	*Fill the pot no more than half-full.*
Q2. What advice is given about storing the pressure cooker?	*Place the lid upside down on the pot.*
Q3. What is position 2 on the valve for?	*For pre-prepared dishes, cooking meat, and defrosting.*
2nd Set	
Q4. Steam has escaped from around the lid. What has gone wrong?	*The gasket is not in the right position.*
Q5. What advice is given about cleaning the lid.	*Do not leave the lid to soak.*
Q6. What is the minimum amount of liquid required?	*25 cl or 2 glasses.*

Table 2. Order of Questions for the Two Types of User Guides

	Original user guide	Model user guide
Participants 1 to 13	Q1 – Q2 – Q3	Q4 – Q5 – Q6
Participants 14 to 26	Q4 – Q5 – Q6	Q1 – Q2 – Q3

d. *Assessment interview*—The participants were then asked to assess different characteristics of both user guides using a 5-point scale as follows:

1. Very bad (marked 1)
2. Bad (marked 2)
3. Satisfactory (marked 3)
4. Good (marked 4)
5. Very good (marked 5)

The characteristics assessed were:

- document format (model document = 148 × 210 mm; original user guide = 139 × 158 mm);
- layout *("Is the layout confusing, jumbled or well organized?")*;
- contents page (*"Is the contents page helpful in identifying information?"*);
- information location *("Does the layout enable you to easily locate the relevant information?")*;
- simplicity of the text (*"Is the vocabulary used in the text simple or complicated?")*;
- font size ("*Are the characters too small making them difficult to read, or are they large enough?"*);
- usefulness of pictures ("*Do the pictures clarify the information provided in the text?")*;
- attractiveness (*"Does the document make you want to read it?"*).

After having assessed these features, the participants had to give each user guide an overall mark (out of 5).

e. *Open interview*—The assessment session ended with an open interview, during which each of the participants was free to comment on the session and/or on their personal use of procedural documents.

Results

Preference Test

After a 10-minute period during which the participants could look through the documents, 23 out of 26 chose the model user guide when asked which of the two they preferred.

Information Location

In calculating the time needed to find information, all of the measurements were taken starting from a closed guide. For each question, timing started when the user guide was opened, and stopped when the participant gave the expected answer (or a similar answer).

A 2 (Type of document: original user guide or model user guide) × 6 (Information to locate: Answer to question Q1; Answer to question Q2; Answer to question Q3; Answer to question Q4; Answer to question Q5; Answer to question Q6) analysis of variance (ANOVA) was carried out. The results revealed that participants identified the information more quickly using the new user guide (M = 47.7 sec.) than using the original user guide (M = 66.54 sec.), $F(1, 144) = 5.48$, $p < .03$.

The time needed to find the information varied according to the type of question, $F(5, 144) = 5.64$, $p < .001$. The results, in ascending order, for the time taken to identify the answer to each question were as follows: Q3 (26 sec.) < Q2 (46.24 sec.) = Q5 (46.58 sec.) < Q6 (57.06 sec.) < Q1 (74.42 sec.) < Q4 (92.42 sec). This order did not, however, correspond to the order in which the information appeared in the user guides (Q1 = Q6 < Q3 < Q2 = Q5 < Q4).

The Type of document × Information to be identified interaction was significant, $F(5, 144) = 6.57$, $p < .001$. Comparison of these results showed that participants found the answers to questions Q1, Q2, Q3, Q5, and Q6 more quickly using the new model user guide (Figure 1). This trend was significant for Q1: $F(1, 144) = 10.9$, $p < .01$ and Q6: $F(1, 144) = 7.18$, $p < .01$. The results did not enable any conclusion to be drawn for Q2, $F(1, 144) = 1.12$, *n.s.*; Q3, $F<1$; and Q5, $F(1, 144) = 2.86$, *n.s*.

The answer to question Q4 was identified more quickly using the original user guide (53.72 sec., where it could be found both inside the manual and in the "Questions and Answers Table" at the end of the manual) than in the model document (131.11 sec.. which had no "Questions and Answers Table" at the end), $F(1, 144) = 15.40$; $p < .001$. These results are in line with Wright's [24] and Wright and Fox's [25] findings. They prove that information is found more quickly when there is a troubleshooting section in the form of a table.

Preference Test Results

The participants were asked to evaluate various features of the two documents on a 5-point scale [18, 20]. The results presented in Table 3 show higher scores for the model user guide (M = 4.47) than for the original guide (M = 3.77). A Student's t-test was performed for each evaluation criterion for the original user guide and the model user guide. For all the evaluation criteria, the scores obtained for the model user guide were higher than those obtained for the original user guide. Statistical analysis showed a significant difference in terms of attractiveness, layout, contents page, information location, simplicity of the

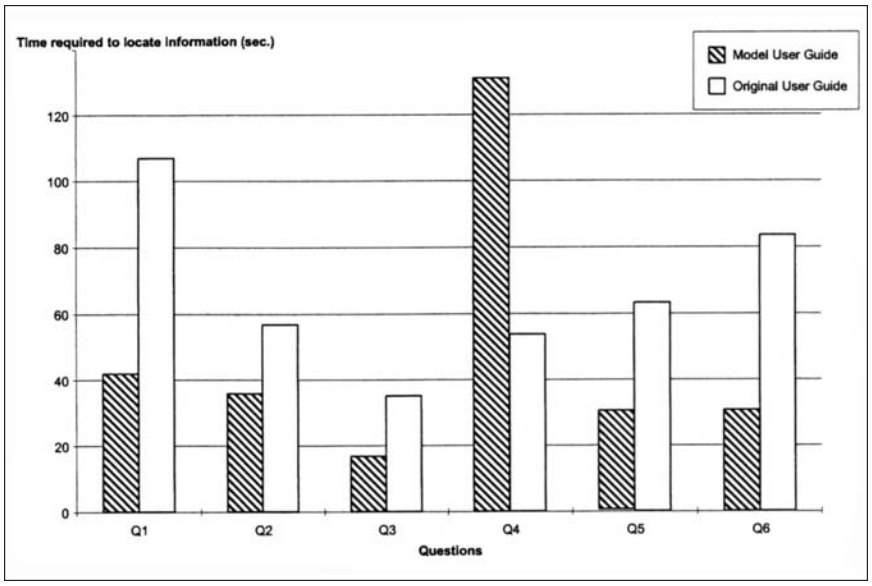

Figure 1. Time required to locate the information relating to each question in both user guides.

Table 3. Average Mark (Out of 5) for Each Evaluation Criterion, Given to Each User Guide

	Original user guide	Model user guide	ANOVA
Attractiveness	3.8	4.6	$t(25) = -3.85, p < .001$
Format	3.8	4.2	$t(25) = -1.36$, n.s.
Layout	3.6	4.5	$t(25) = -6.81, p < .001$
Contents page	3.6	4.6	$t(25) = -5.35, p < .001$
Information location	3.6	4.6	$t(25) = -4.61, p < .001$
Simplicity of the text	3.8	4.4	$t(25) = -2.98, p < .01$
Usefulness of pictures	4.0	4.3	$t(25) = -1.39$, n.s.
Font size	4.0	4.2	$t(25) = -.84$, n.s.
Overall assessment	3.9	4.5	$t(25) = -3.49, p < .01$

text, and overall assessment (Table 3). The results did not allow us to draw conclusions about the format of the document, the helpfulness of the illustrations, and the font size.

A meta-analysis was carried out, taking into account all the marks given to each document. This analysis revealed that the mean score obtained by the model user guide ($M = 4.4$) was higher than that obtained by the original user guide ($M = 3.8$). This result is significant, $t(25) = -2.9$, $p < .01$.

Discussion

The aim of evaluating the user guide was to obtain information regarding the quality of the document as well as information about its suitability for the target audience. The results of the user-focused evaluation indicate a clear improvement in the quality of the model user guide compared to the original user guide. In terms of attractiveness, practicality, and efficiency, the results revealed that the model user guide was considered more attractive than the original user guide (the model user guide was chosen by 23 out of 26 participants), more practical as regards information location, and more efficient in terms of understanding the structure of the document and in terms of the readability/comprehensibility of the text.

An interesting point to underline here is that these results led to certain changes being made to the model user guide; in particular, the addition of a "Questions and Answers Table." A resulting "final" user guide was created, which was to be marketed alongside the product.

CONCLUSION

The case study presented in this article brings to light the necessity of a user-focused evaluation in the design of procedural documents. Wright [26-28] has proposed that this technique should be an essential part of the technical writing process in so far as there are no existing design rules which can guarantee the efficiency of all documents. Hartley [19] and McClelland [29] emphasize the importance of making sure that the document is suitable for the users in order to ensure that any major flaws in the document's design are intercepted before its distribution to the general public, thus decreasing the chances of the product being returned due to poor comprehension of the instructions. As a result of the research work carried out, we suggest that a strategy which involves a designing/evaluating/revising method of procedural documents should be established (Figure 2).

This approach involves a primary version of the document (model document) being tested by a group of users, then changes being made based on both the results obtained and the modifications suggested by experts. Such a strategy takes in to account the suitability of the document for the product (due to

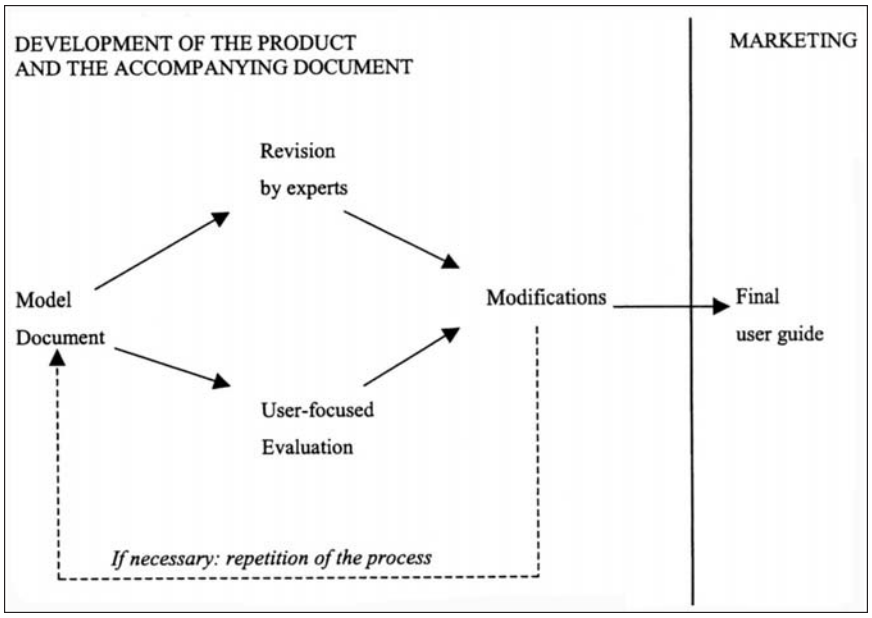

Figure 2. Designing/evaluating/revising stages suggested for user guides.

the experts' modifications), and allows for the correction of any flaws in the document's design, brought to light through the user-focused approach. Examples of similar evaluation strategies are described by Hartley [19, 23], Komoski and Woodward [30] and Waller [31]. According to Schriver [32], such user-focused methods of evaluation have both immediate and long-term benefits. On the one hand, they allow immediate revision of the document by technical writers, and on the other hand, they provide information about the way users work with documents and thus help to avoid certain design flaws.

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APPENDIX 1: Example of the Original User Guide

Pour certains aliments qui gonflent à la cuisson (voir "précautions importantes" n° 11) ou qui produisent de l'écume, ne dépassez pas la moitié de la hauteur, afin d'éviter que l'eau ou les aliments ne sortent par la soupape et ne l'obstruent.

Remplissage minimum : mettez toujours au moins 25 cl (2 verres d'eau) de liquide.

POUR LA CUISSON VAPEUR

Le panier contenant les aliments ne doit pas être immergé dans l'eau mais posé sur son support.
L'eau ne doit pas dépasser la hauteur du support panier.

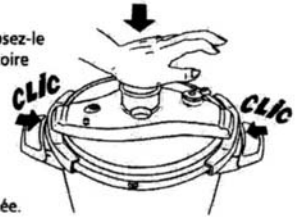
75 cl de liquide sont indispensables pour une cuisson vapeur.

Panier pour Cocotte 6L et 7,5L avec trépied livré avec l'appareil.

Panier pour Cocotte 4,5L avec trépied livré avec l'appareil.

2 FERMETURE DE LA COCOTTE

Prenez-le couvercle par son pommeau. Posez-le à plat sur la cuve sans alignement obligatoire de la traverse sur les poignées. Appuyez sur le dessus du pommeau avec la paume de la main en son centre pour refermer les mâchoires sur la cuve. Celles-ci doivent venir se plaquer sur le pourtour du couvercle, votre Cocotte est dans cette position convenablement fermée.



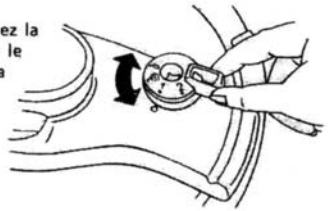
3 SELECTION DE LA PRESSION DE FONCTIONNEMENT

La Cocotte Clipso® dispose d'une soupape à 4 positions :

- **0** — **Mise en place ou enlèvement de la soupape.**
- ✥ — **Décompression.**
- **1** — **Cuisson vapeur, conservation des vitamines.**
- **2** — **Cuisson des viandes, plats cuisinés, décongélation.**

Pour changer de position, tournez la soupape jusqu'à faire coïncider le repère blanc de la traverse avec la position choisie.

Lorsque vous remettez la soupape en place (0) n'hésitez pas à appuyer sur celle-ci pour qu'elle s'enfonce correctement.

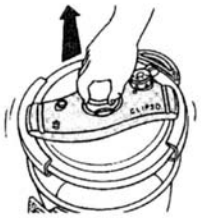


APPENDIX 2: Example of the Model User Guide

Ouverture

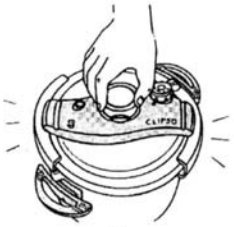
3

■ Appuyez sur le bouton d'ouverture du couvercle, les mâchoires s'écartent.



■ Soulevez le couvercle.

Fermeture



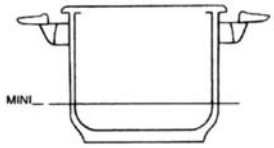
■ Posez le couvercle sur la cuve en vous assurant qu'il coiffe correctement le corps de la cocotte.

■ Appuyez sur le bouton de fermeture du couvercle.

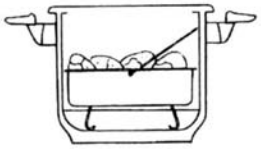
Si vous ne pouvez pas fermer le couvercle :

■ Vérifiez que les mâchoires sont bien écartées avant de poser le couvercle sur la cuve.

Remplissage minimum



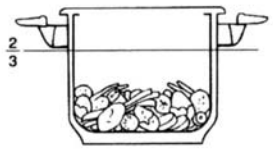
■ Mettez toujours une quantité minimale de liquide au moins égale à 25 cl (2 verres).



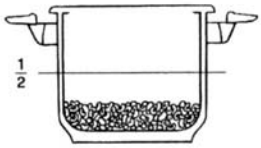
Pour une cuisson vapeur
■ Le remplissage doit être au moins égal à 75 cl.
■ Posez votre panier vapeur sur le support prévu à cet effet.
□ *Pour Clipsovale, le support est intégré au panier.*

4

Remplissage maximum



■ Ne remplissez jamais votre cocotte au-delà des 2/3 de la hauteur de la cuve.



Pour certains aliments
■ Pour les aliments qui se dilatent pendant la cuisson, comme le riz, les légumes déshydratés ou les compotes, ne remplissez pas votre cocotte au-delà de la moitié de la hauteur de la cuve.

Si la cocotte a chauffé sous pression sans liquide à l'intérieur :
■ Faites vérifier votre cocotte par un Centre de Service Après-Vente Agréé SEB.

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