

## The Effect of Language on Human-Computer Interactions in Cameroon

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### ABSTRACT

The coming of Personal Computers (PC) has made it possible for more people to use computers. Their ease of use has increased with the introduction of graphical user interfaces (GUI's). Cameroon is a multilingual country. Its official bilingualism is based on two languages not indigenous to the country – English and French. Since these languages are foreign, the phrases/jargons and abbreviations used for interface design need not convey the right meaning to users of computers. Furthermore, in Cameroon, computer interfaces are either in French or in English. This paper reports on research carried out to determine whether users in a multi-lingual country where non-local languages are nationally used prefer a localised interface. We attempted to discover whether the current phrases used in menus are clearly understood by the various communities. A survey was conducted nationwide in Cameroon to establish this. The results did not indicate an overwhelming desire by users for a localised interface. English default text-based commands appear to be more acceptable/understood by English speaking respondents than are French default text-based commands by French respondents.

**Key words:** Usability, language, interface design, human-computer interaction

### RESUME

L'avènement de l'ordinateur personnel (le PC) a rendu possible l'utilisation des ordinateurs à plus de personnes. Leur facilité d'utilisation a été accrue grâce à l'introduction d'interfaces utilisateur graphiques (Graphic User Interfaces (GUI)). Le Cameroun est un pays multilingue. Sur le plan national, c'est un bilinguisme en français et anglais et ces deux langues utilisées ne sont pas indigènes. Puisque ces langues sont étrangères, les phrases/jargons et abréviations utilisés pour interface ne traduisent pas la signification correcte aux utilisateurs d'ordinateurs. Aussi au Cameroun, les interfaces d'ordinateur sont en français ou en anglais. Ce papier fait un rapport sur la recherche qui a été exécutée pour déterminer si une interface en langues locales était préférée par les utilisateurs dans un pays multilingue où les langues non-locales sont utilisées comme langues nationales. Nous avons tenté de découvrir si les phrases actuellement utilisées dans les menus sont clairement comprises par les diverses communautés. Une étude a été menée sur l'ensemble du Cameroun. Les résultats n'ont pas indiqué un désir irrésistible des utilisateurs pour une interface en langues locales. Pour les répondants de langue anglaise, les commandes en forme de texte anglais par défaut apparaissent plus acceptables/compréhensibles. Ce n'est pas la même situation pour les répondants de langue française lorsqu'on considère les commandes en forme de texte français par défaut.

**Mots clés :** Utilisabilité, langage, conception d'interface, Interaction homme-ordinateur.

**1. INTRODUCTION**

The concept of personal computing has been pursued seriously since the late 1970's. However the usage became widespread when the Personal Computer (PC) became more available and affordable. The areas of application and usage of computers has continued to increase (Torkzadeh et al.,1999, 2002a, 2002b). The ease of use increased with the introduction of Graphical User Interfaces (GUI's). However, much of the effort invested was focussed in developing software that could be accommodated by the limited computer hardware available. Such limitations included slow processing power and low memory and storage capabilities (Onibere, 1981,1986).

In the 1980's, both hardware and software were mostly produced in the United States. Also 75% of the *off-the-shelf* software worldwide was produced in the United States (Miller, 1994) and oriented towards Western industrialised nations. The situation is now changing because Asian countries are increasingly becoming serious competitors to Western industrialised nations in the emerging global economy. Also, the market for computer products has become increasingly international. International sales make up half the revenues for the top 100 US software companies (Miller, 1994). Because of the increased competition between software companies, the usability of a software product is becoming ever more important, relative to its functionality. With the 'overabundance of software prod-

ucts on the market that are similar in functionality (cf. Table 1), the usability of an application may indeed be the decisive factor in consumer choice and preferences. This is why efforts are being made to improve on the design of user interface (Maguire, 1999; Magnus, 1999).

Language is considered a part of culture. Ito et al (1996) and Onibere et al (2001) have shown how culture can affect human-computer interaction. Human-computer interaction has been divided into two modes: listening mode in which people are presented with a computer's reactions, and speaking mode in which people give instructions to a computer system (Ito et al, 1996). Each of these modes is again divided into three phases, namely: perception, semantic association and logical reasoning (figure 1). It can be seen that logical reasoning followed by semantic association are greatly affected by culture. Language can be seen to be under semantic association in figure 1. Variations in various languages can be found in character set, symbols, phrases/jargons, and abbreviations.

The two languages are spoken nationwide and at the same time both languages are foreign to the country. In some countries, English and French serve as national languages. Such countries also have local languages, none of which is adopted as a national language. Cameroon is an example of such a country. The conceptual view of this situation is shown in figure 2.

**Table 1:** Software classes and companies producing different brands of products in the same class

Software Class	Specific Software	Developer (Company)
Programming Languages	C++	AT & T Bell Labs, USA
	Java	
Document Processing Systems	MS-Word	Microsoft Corporation, USA
	Emacs	Artificial Intelligence Laboratory, MIT , USA
	Latex	Digital Equipment Corporation, USA
	Castillo	Castillo Bueno System Inc, USA
	Easy Write	D & L Computing, Inc., USA
Statistical packages	SPSS	Manchester Information & Associated Services (MIMAS), UK
	SAS	MIMAS, UK
	STATA	MIMAS, UK
	AcatStat	AcaStat Software, Ashburn, VA, USA
Mathematical packages	Matlab	MathsWorks, USA
	MathCad	Mathsoft, USA
	Mathematica	Mathematica, USA
	Maple	Maplesoft, Canada
Web Browsers	Netscape	AOL / Netscape Communications, USA
	Internet Explorer	Microsoft Corporation, USA

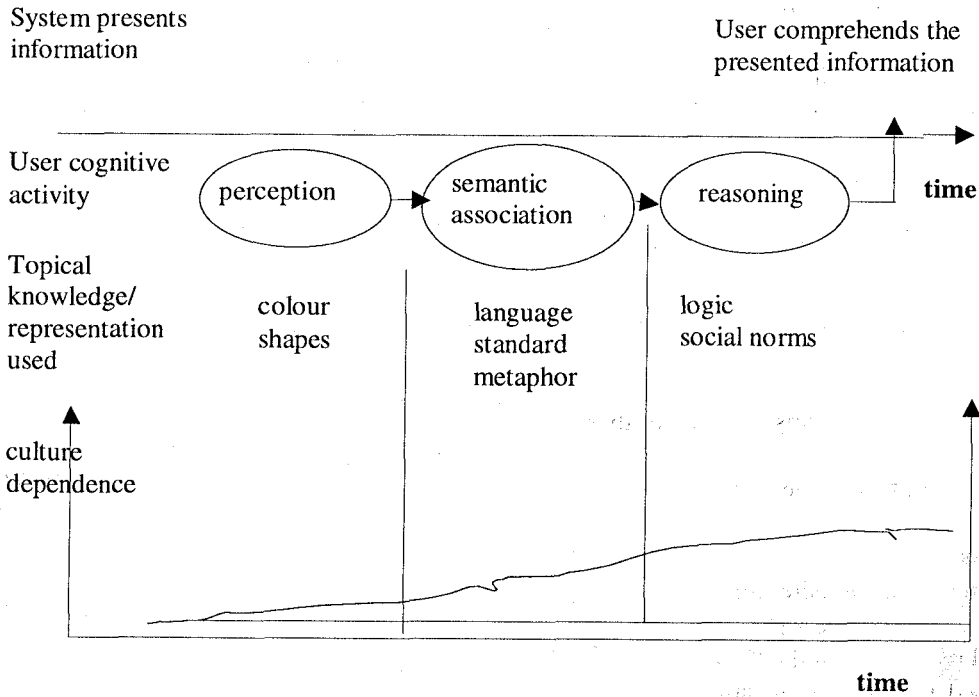


Figure 1: Cultural impact in the listening mode (adapted from Ito et al, 1996)

Out of the ten Provinces in Cameroon, English is the major language of communication in two of them, while French is the major language in the other remaining eight Provinces. In the French speaking Provinces, most of the software and hardware (e.g. keyboard) used have French interfaces, while English interfaces are used in the English speaking Provinces. User's guides and notices are often written in both languages. In some parts of the country it is not uncommon to see such guides and notices in only French or English depending on whether it is a predominantly French speaking or English part. English and French are taught from primary school. This should therefore reduce the problems encountered by Cameroonians in understanding both English and French character sets, time format, phrases and abbreviation. However since none of these languages is their "mother tongue", there can still be the possibility of people having problems in understanding interfaces written in French or English.

The aim of this research is to determine the effect of language on the understanding of commonly used phrases/jargon in such multi-lingual and multi-cultural societies. Our findings will obviously help in the design of a more usable interface in such multi-lingual environments. We hope to test the following hypotheses:

- Computer users in Cameroon prefer menu interfaces to the use of icons.
- Default text commands are equally acceptable/understood to those who use French interface and those who use English interface.
- Computer users in Cameroon prefer a localized interface (i.e. text-based commands using a local language).

We shall test these hypotheses using binomial tests. Once again, Cameroon is used as an example of a French and English speaking country with many other indigenous languages.

## 2. METHODOLOGY

The Department of Computer Science, University of Buea in the months of August and September 2001, carried out a survey of 588 computer end-users. An end-user is defined as an individual who actually uses an information system or its output and who is not an information system professional. Half of the questionnaires were in French and administered in the French speaking areas of the country. The same was done for the remaining half of the questionnaires, which were in English. The 50-50-sample approach was adopted because of some tests to be carried out that require equal numbers of French and English speaking partici-

pants. Some French questionnaires were also administered in the English speaking areas and vice versa. This was to cater for those who normally speak French but are working in the English speaking areas and vice versa. The survey took the form of structured interviews conducted in the workplace and recorded onto a questionnaire (in English/French) by the interviewer. This approach was adopted to ensure an adequate and consistent response. Each interview lasted approximately 45 minutes. Approximately 99% of the respondents were Cameroonians and 1% were non-Cameroonians.

The survey attempted to capture both quantitative and qualitative data covering,

- the respondents themselves,
- their computer usage (hardware, software, tasks),
- their computer training,
- the user support mechanisms available to them, and
- their preferred interface style and features.

### 2.1 The Process

The design of the questionnaire and survey sample involved the whole research team which was made up of four principal researchers and eight research assistants. The selected Research Assistants were doing a minor in Computer Science. The Research Assistants also provided input into the design of the questionnaire. This ensured a strong local input to the language aspects investigated in the survey. Target organisations were identified by the team and formally approached in writing (to the Head of the organisation/department). The organisations themselves then identified

who they felt were suitable typical end-users.

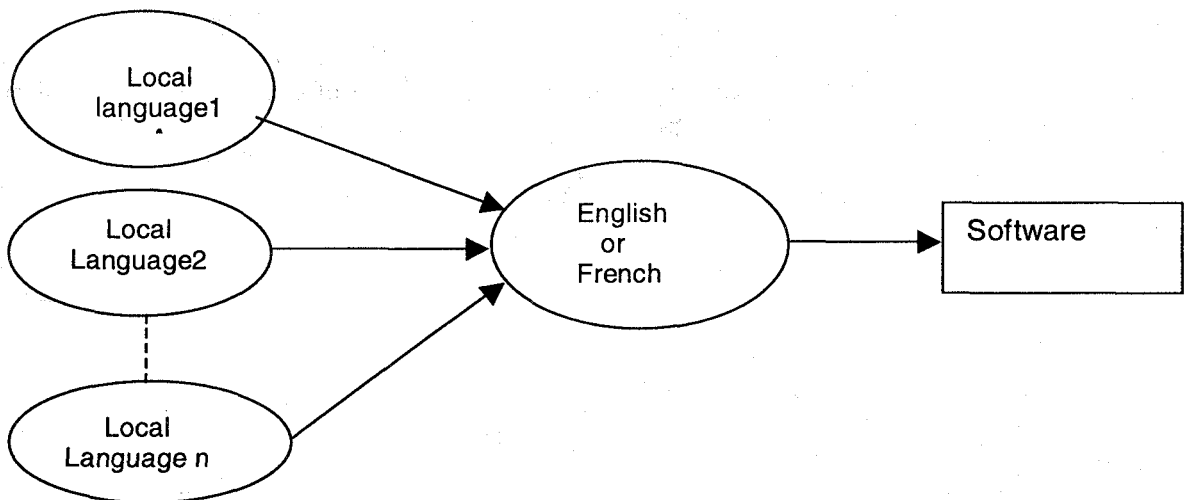
### 2.2 Questionnaire Design

The questionnaire to capture the desired data was designed by the research team. The questionnaire consisted of 38 closed questions. The questions were divided into four sections covering (i) Background Information (about the respondent), (ii) Computer Use, (iii) Training and Support and (iv) Interface Issues. Question formats for quantitative data were largely a mix of multiple choice and true/false answers. For capturing qualitative data, questions used ranked order lists, Lickert Scale forms, and multiple choice. Opportunity was also provided at the end for any additional comments.

The section covering interface issues is our main focus here. Essentially, this section was designed to capture data covering three User Interface categories. The nature of this data is qualitative since it draws on the user's subjective views and understanding.

Multiple-choice questions asked the respondent for their current preferred style of interface. Rather than using descriptive terms (and Human Computer Interface jargons), which may be confusing to the respondent, this was asked in the context of a typical task (the task chosen was "saving some data").

A second set of questions was designed to determine the respondent's semantic association with typical text-based commands. Seven typical Windows tasks were selected. For each task, the respondent was presented with a description of the task. They were asked to select from a list of optional text-based commands



**Figure 2:** English or French language interface for a multi-lingual community adapted from Bourges-Waldegg and Scrivener (1998)

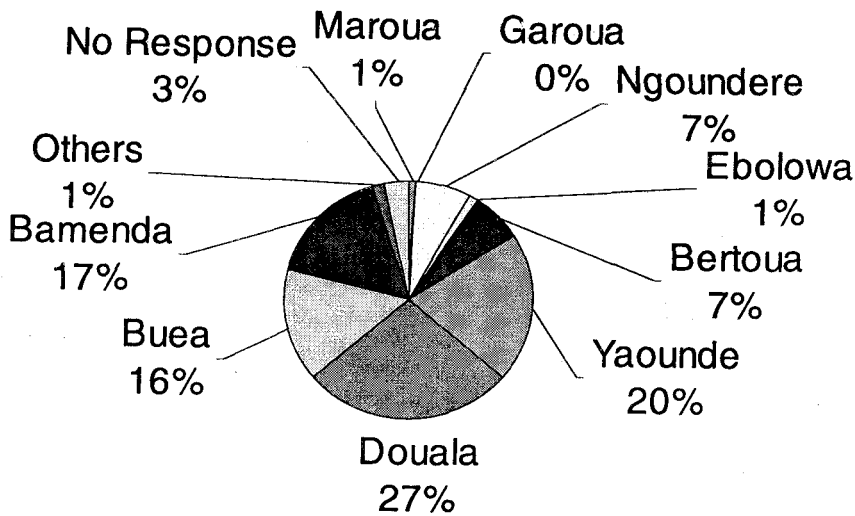


Figure 3: Breakdown of respondents by location

which one they felt best represented that activity. The design of the options offered for each activity in these questions was heavily influenced by the Cameroonian members of the research team (and the research assistants), who suggested and rejected options based on their understanding of English/French. In all option lists, the standard Microsoft Windows choice was included.

A third User Interface category concerned user views on using local language for text-based interface. Using a Lickert Scale format, the respondent was asked whether they would like to use his/her local language for interface without specifying any language. The data collected was subjected to statistical analysis and the testing of hypotheses. A sample from the questionnaire on text-based commands is given later in figure 7.

### 2.3 The Sample

We attempted to obtain responses from a cross-section

of the Cameroonian community. As such, we set out to interview 588 computer end-users in different parts of the country. To be able to do this, the following categories were considered when selecting the respondents:

**Gender:** Approximately 50% split by gender were selected. This was so as to be able to carry out unbiased tests in gender issues.

**Location:** Nine Provincial head quarters were selected to cover the diverse groups across the country. One provincial headquarter (Bafoussam) was not covered but respondents in other provincial headquarters indicated that they grew up in this town. The selection was based on population spread, computer usage spread and cultural spread. Urban versus rural mix could not be effectively carried out since computer users or operators are mostly in urban areas. The technology is new in the country and its spread to the rural areas is still at its infancy. Figure 3 shows the breakdown of

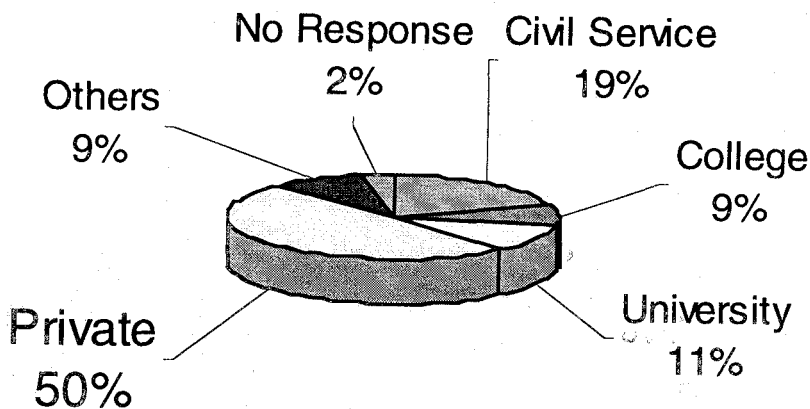


Figure 4: Breakdown of respondents by employer

respondents by location. Respondents were also asked to identify the local language they speak. This was used as an indicator of their likely tribal group. It was not possible to cover all the tribal groups. However, a substantial number was covered.

**Age:** 51% of the respondents fell into the age bracket of 26 – 45 years. 45% of the respondents fell in the age group of 16 – 25 years while 4% were either older than 45 years or did not give any response. This shows that the youths are very involved in the use of computers in Cameroon

**Organisation:** The sample attempted to include respondents from all walks of life. About 49% of the respondents worked in the private sector as this involves a larger number of people in the labour force, 19% of the sample involved people in the civil service (as this is the next major employer in the country) while the remaining 29% were split among people working in universities, colleges and others. 3% of the respondents did not give any response.

**Main Role:** To be able to get adequate input from the different types of users, the sample was selected so as to include respondents with different functional roles. Figure 5 shows the percentages of each of these respondents according to different main role at work.

**Level of Formal Education:** Attempt was made to include respondents from different educational levels. A fairly even spread was obtained (from Secondary School level through to Postgraduate) with a small percentage (1%) of respondents having only Primary level education. The word “certificate” is used here for what is awarded to people who attend short courses in an educational Institution, which may be private or public. Such certificates or attestations are presented at the end of such courses.

### 3. ANALYSIS

After completion of the survey, all questionnaire data were coded for analysis using the Statistical Package for Social Scientists (SPSS) software package. Frequency tables and a series of cross tabulations were produced. We also tested a number of hypotheses as set out in our objectives. We used Binomial tests.

### 4. RESULTS

#### 4.1 Preferred style of interface

By far the most popular style of interaction in Cameroon is the use of menus expressed in text form (54% of respondents) with ease of use cited as the reason by most of them. The use of hot keys is second (20%). The use of icons is beaten to the third position (16%). The order is the same for both English and French speaking communities taken separately. However in Botswana (Onibere et al, 2001), while the use of menus still took first position, the use of icons took second position instead of hot keys. The result is confirmed by a 1-tail Binomial test carried out at the 0.05 level of significance. The test confirmed that computer users in Cameroon prefer the use of menus with a proportion of 0.54 to other forms of interactions such as icons and hot keys.

#### 4.2 Semantic association of text-based commands

Question 36 of the questionnaire shows a table that reflects some of the text-based commands in English. Figure 7 is part of this table. The question presented to the respondents was “**In the table below, for each definition, indicate which of the commands offered that best represents the activity described**”.

**French respondents:** As shown in figure 8, only three out of the seven commands were accepted by 50% or

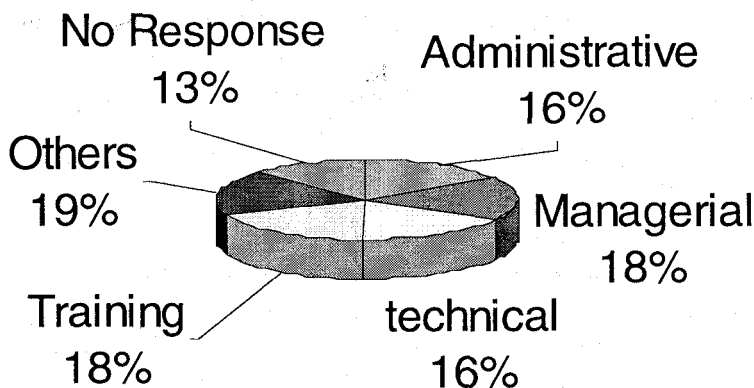


Figure 6: Breakdown of respondents by main role at work

DEFINITION	COMMANDS
In a Website, there is usually an initial page that shows in words or phrases all the information you can gain access to from that page	Start page <span style="float: right;"><i>tick one</i></span>
	Home page
	Main page
	First page
	Other
	Specify _____
To go a step backward and eliminate the last task performed.	Undo
	Cancel
	Retreat a step
	Reverse
	Destroy last step
	Other
	Specify _____
A situation may arise when a given command is not obeyed completely and as a result, there is the need to ask the system to finish it completely.	Repeat
	Refresh
	Restart
	Try again
	Redo
	Other
	Specify _____
To put an existing file in a situation that will make it possible for further work to be done on it.	Update
	Read
	Open
	Other
	Specify _____

Figure 7: Example of sample questions on text-based commands in English

more respondents. The remaining four commands, namely **Démarrer**, **Actualiser**, **Exécuter**, **Corbeille**, all scored below 24%. This shows a very sharp disagreement for the use of these standard text-based commands, by those who speak French mainly.

The suggested commands (for **Démarrer**), namely **Page du début**, **Page principale**, did not fare better either since they scored 27% and 25% respectively. However for **Corbeille**, the suggested command **Panier de recyclage** scored 56%. This shows that **Panier de recyclage** is more acceptable to the respondents than the default text **Corbeille**. Similarly with a score of 59% for the word **Exécution**, respondents showed that they prefer it to the default command **Exécuter** that has a score of 23%. As for **Actualiser**, there appears to be no outstanding choice. There is a wide spread of choices indicating a distinct lack of consensus as to its semantic interpretation. This is similar to the **Démarrer** command.

**English respondents:** In the case of English respondents, there is a stronger acceptance for the default commands. Five out of the seven selected commands scored at least 50%. Although **Run** and **Refresh** scored below 50% (with 43% and 36% respectively), the disagreement is not as sharp as that for French speaking respondents. Also, although these two default commands did not score up to 50%, they still scored above other suggested commands. **Execute** command (with a score of 39%) is second to the default command **Run** while **Try Again** command (with a score of 19%) is second to **Refresh**. These results are shown in Fig 9. Binomial 1-tail test was also carried out at 0.05 level of significance of the default text-based command against all other suggested text-based commands. For English text-based commands, the test shows that default commands are more acceptable/understood by those who use English language with a proportion of 0.55. However for French text-based commands, the test shows that default commands are less acceptable/understood by those who use French language with a proportion

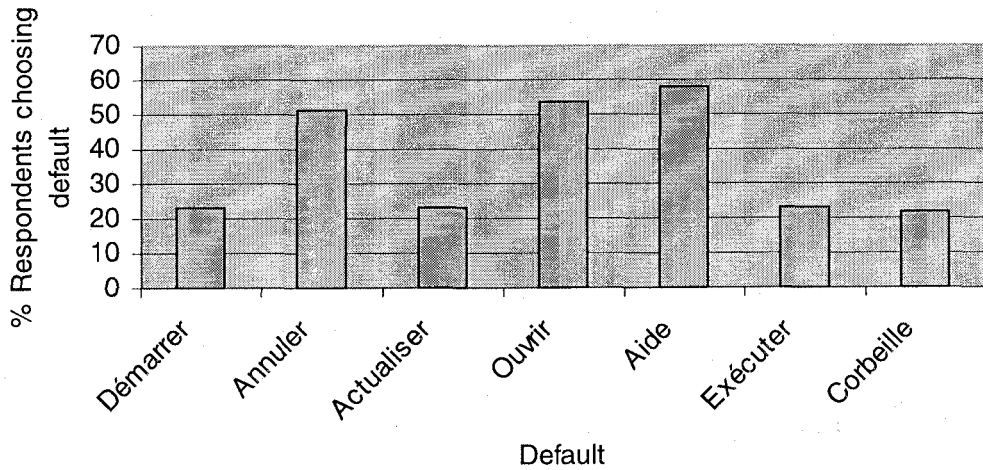


Figure 8: Text-based commands (French speaking respondents)

of 0.38. Therefore the hypothesis that default text-based commands are equally acceptable/understood to those who use French and those who use English interface is false.

**4.1 Desirability to use local words for Interface**

Respondents were asked whether they would like to use words in their local language for text-based commands. The respondents were to choose from strongly agreed to strongly disagree. Strongly agreed to slightly agree were grouped as agreed, then neutral, followed by slightly disagree to strongly disagree as disagree. We have for French speaking respondents '38% agree', '18% neutral' and '30% disagree'. There is therefore agreement for the use of local languages for text-based commands. However the agreement is not overwhelming. The same holds true for English respondents but with even a smaller margin between those who agree and those who disagree. We have for English-speaking respondents 41% agree, 18% neutral, 38% disagree. The situation is same for both French and English re-

spondents combined. For all respondents 39% agree, 22% neutral, 35% disagree.

The test of the hypothesis that computer users in Cameroon prefer a localized interface (i.e. text-based commands using a local language) was carried out using a 2-tailed Binomial test with a 0.05 level of significance for all respondents. A proportion of 0.52 was obtained confirming the hypothesis. From the proportion the agreement can be seen to be weak.

We also examined the issue of difficulty experienced using English interface for users who are more fluent in French and vice versa. For French speaking respondents 45% find using English interface easy while 52% find it difficult. For English-speaking respondents 40% find it easy to use French interfaces while 58% find it difficult. Both populations find it difficult to use the language they are not fluent in. Also in both populations there is no outstanding difference between those who find it difficult using a language in which they are

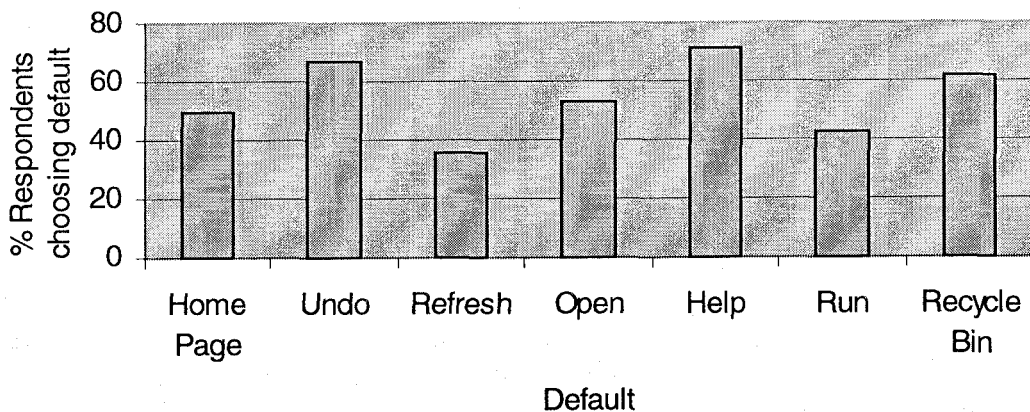


Figure 8: Text-based commands (English speaking respondents)



not fluent and those who find it easy. This is probably due to the fact that the population learnt both languages in primary and secondary school.

## 6 DISCUSSIONS

It has been shown that the preference style of interaction across users is using menu rather than buttons or hot keys. This is perhaps why the study of text-based commands should be taken seriously so as to make such commands as clear as possible to users.

As earlier noticed and confirmed by the Binomial tests, the French-speaking sample has more difficulties accepting/understanding the default text-based commands than the English speaking population. As the original interface of most software is in English, their translation from English into French may be responsible for this: in some cases, an equivalent French word is impossible to get. Also, translators can make their own mistakes when suggesting equivalent words. The suggested phrases, namely the French for **Panier de recyclage** and **Exécution**, are more acceptable to French-speaking communities than the default ones. These suggested translations perhaps represent better the actions taken by these commands.

In the case of the English-speaking sample, there is a better acceptance of the default text-based commands. This is confirmed by the Binomial test. There is however a lack of consensus for the commands **Run** and **Refresh**. These default commands still had higher preference ratings than those for the suggested commands. They are therefore still the best. However, this does not rule out further search for better-understood words or phrases to replace these two default commands. The hypothesis that default text-based commands are equally acceptable/understood to those who use French interface and to those who use English interface is therefore rejected.

Just over 50% of the French speaking population find it difficult to use English interface and vice versa. The average level of difficulty in using English interface by those who speak French mainly and vice versa may be due to the fact that both groups learn the two languages (French and English) from primary school to secondary school. Surely the level of difficulty would have been higher if the other language is totally new to them. Perhaps this can be taken as a measure of the level of bilingualism in the country. If French and English were to be totally accepted by the overall population, then there should be no difficulty in the use of

either interface to interact with the computer. The level of difficulty should have been lower than our survey found. The result has therefore confirmed anecdotal evidence that though the country may be bilingual, the two languages are not equally understood or equally used by all inhabitants.

The issue of the use of local languages for text-based commands was addressed in the survey. Despite the fact that no specific local language was mentioned in the questionnaire, only 39% of the total sample agreed that a local language should be used for text-based commands. The binomial test agrees with the desire to use local language(s) for text-based commands with a proportion of 0.52 at 0.05 the level of significance. This is however not overwhelming. There is even the argument that if the questionnaire were to cover more rural areas, then the proportion would have been higher, in favour of the use of local language. For now it is not possible to investigate this since the use of computers in rural areas is very low. We can therefore conclude that there is no overwhelming interest in the use of local language(s) for text-based commands. This may be due to the fact that there is no indigenous (local) language adopted as a national language. The emphasis is more on speaking and writing French and English by every citizen of the country. This has probably subdued any clamour for an indigenous language to be used as a national language. Since there are many local languages, there will also be the problem of which local language to adopt. In Botswana (Onibere et al, 2001) there was an overwhelming acceptance of localized interface. This may be due to the fact that English language and an indigenous language are the national languages. In Cameroon no indigenous language is a national language. However in Botswana, when it came to using a particular local language (Setswana) for such an interface, there was disagreement. The interesting thing is that Setswana and English are their national languages.

## 7. CONCLUSION

It has been shown that the user community in Cameroon is more disposed to the use of menus and language-based interfaces. This is perhaps why more research work should be done to make the use of such interfaces even easier.

For those who use an English interface, there is great acceptance of its default text-based commands. This is however not the case for those using the French interface. There is therefore the need to look again at the

default commands in French in order to see whether the translation from English to French was properly done.

There is no overwhelming acceptance for the use of a local language for text-based commands. This may be due to the fact that most people may not know how to read or write in their own local language. They have grown up learning French and English languages, since no indigenous language is adopted nationally. Most people do not take time to study local languages. Also most people in the villages who speak their local languages all the time may not be able to read or write in any other language. Thus the use of a local language for text-based commands does not appear to be necessary. However more work needs to be done to investigate this issue further for the rural populace.

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