Contenidos

Unico ponente mexicano en el WEM 2003

Participa Arredondo en el mas importante mercado mundial de educacion en Portugal

Raùl Contreras Zubieta Franco

Lisboa, Portugal.- Reconocido como uno de los mas influyentes expertos en educacion en el ambito internacional, el rector de la Universidad Veracruzana, Victor Arredondo, fue invitado para participar en el foro World Education Market, (WEM 2003), considerado el mas importante en el establecimiento de alianzas y redes para atender las necesidades del mundo del aprendizaje, que se lleva a cabo, desde el 20 de mayo, en la capital lusitana.

Durante los cuatro d_as del programa, el encuentro busca propiciar intercambios entre profesionales y los principales actores del mundo de la educacion a escala mundial, y en _l se dan cita cerca de dos mil participantes y 949 organizaciones provenientes de 71 paises.

El rector V_ctor Arredondo, _nico orador mexicano en la reuni_n, particip_ en el panel dedicado a analizar los retos de dise_ar programas educativos a la medida, tomando en cuenta las necesidades de los pa_ses a los cuales van destinados dichos programas.

En dicho panel tambien participaron **Mokhtar Ben Henda**, del Instituto Superior de Documentacion de Tunez; Paul Hollin, director de educacion de la empresa britànica Sherston Software; Duane Sider, director comercial de la empresa norteamericana Fairfield Lenguaje Technologies, y Jacquelyn Scott, presidente de la Fundacion de la University College of Cape Breton, de Canad

Arredondo se refiri_ al imperativo de reconocer las diferencias culturales como elemento clave cuando se trata de comercializar programas educativos en el mercado internacional, y a_adi_ que ello ser_ exitoso en la medida en que dichos programas permitan un impacto y aceptabilidad amplios, busquen una aplicabilidad sostenida y reconozcan las diferencias culturales de la poblaci_n de los pa_ses a los cuales se pretenden ofrecer.

Las instituciones y empresas que busquen atender el mercado internacional educativo, dijo, deben considerar qu_ tan bien se adaptan los programas educativos a las diferentes condiciones socioecon_micas de los pa_ses destinatarios, en qu_ medida incorporan soluciones para atender las diferencias terminol_gicas e idiom_ticas y qu_ tan bien atienden las experiencias locales y pr_cticas de los temas bajo estudio.

Arredondo afirm_ que es fundamental que el contenido de los programas tenga una adaptaci_n a las condiciones particulares del pa_s al que se ofrece: "no s_lo traducir los contenidos al idioma sino contextualizarlos con la cultura y las pr_cticas que se realizan en dichos pa_ses". Esta localizaci_n del contenido significa atender las necesidades locales, estar ligada a los casos de aplicaci_n pr_ctica y basada en terminolog_a propia del pa_s, y que sea significativo para cada sociedad.

Necesario, reconocer las diferencias culturales para comercializar programas educativos en el mercado internacional, dijo en su exposici_n, ante cerca de dos mil participantes y 949 organizaciones de 71 pa_ses

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Cultural assumptions and localization tailoring:
The dilemma of numbers bi-directionality in the Arabic script

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Abstract :

The localization industry (L10n), becoming a key issue for manufacturers and international markets operators, is strengthening its position within the international context, reinforced by the two prevailing phenomena of Globalization (G11n) and Internationalization (I18n). L10n is, in fact, a common claim to respond to grass-root users' minimal expectations and subtle cognitive requirements while dealing with automated information systems and computer interfaces without breaking ties with the larger scope of I18n. All the peculiarities of local markets and consumers have been deeply treated by the scientific literature, the international standards, recommendations and RFCs. However, some of them, related to complex scripts like Arabic, remain undocumented or biased although their importance for a wider acceptance and a larger spread of the technical products marketed. This document is trying to shed light on some of these undocumented and biased aspects of L10n when confronted with cultural assumptions of the Arabic world. A one major issue is addressed: bi-directionality of numbers and dates and the diversity of their manipulation.

Introduction

The global village is becoming a reality. As geographical barriers and distance constraints to the creation of the global society are becoming increasingly insignificant due to the emergence of new technologies and the rapid growth of the Internet, investigation is oriented towards more specific considerations that constitute the last obstacles to the full integration of all the communities to the information society of this third millennium. Some of these specific considerations are languages diversity and cultural differences which are still showing for many some resistance to the universal integrity at level of access to information, transborder data flow, commercial exchanges and so forth development areas.

A first step towards a kind of solution was initiated since the World War One under aspect of coalitions and strategic political and economic alliances. We are henceforth still living a universal tendency towards regional and international unifications based on economic, ethnical and even cultural and linguistic values shared by historically tied communities or agreed-upon coalitions. The world is evolving at large paces toward a global context where economic forces are sweeping out a lot of former obstacles that formed the barriers between nations and communities. Some pretend that, among the "casualties" of this rapid evolution of economic forces of globalization, cultural identities are the first to be affected. Reinforced

by much more sophisticated information technologies that accelerate its pace, globalization is predicted to overcome all kinds of hindrances to unify the entire world under auspices of a unique economic model. "*One could thus argue that cultural diversity – meaning any characteristic that does not conform to the homogenised target of the marketing experts – is an obstacle, particularly if that diversity includes the 97% of the world population with no access to the Internet*" [1].

However, one of the basic hypotheses that researchers develop is that cultural and linguistic diversities can potentially become a key asset in the information society even though culture and languages are generally defined as an "obstacle" to unification. This is not a simple task, however. But research and market operators are pushing towards a set of technical and standardized options to overcome these two constraints without involving an effect of isolation or implicating a drastic clustering effect on cultures and languages of the world. In the time of New Information and Communication Technologies and Internet, the software industry and the hardware manufacturers are directly concerned with two major concepts, worldwide introduced and debated : Internationalization (I18n) and Localization (L10n). As stated by ICU, "*… the standard process for creating globalized software includes internationalization, which covers generic coding and design issues, and localization, which involves translating and customizing a product for a specific market*" [2]. John Harris and Ryan McCormack also argued that an appropriate globalization strategy would start by selecting the right market, and then launch an internationalization and localization operations to the appropriate degree to cope with this market requirements. They state that "*Development based on the trinity of digital globalisation elements involves finding a balance between them, within the context of a given business strategy. The cost, benefit, and speed-to-market of a digital globalisation initiative is then determined by this balance*" [3]. Reinhard Schäler also intended defining globalization in the following terms : "*The term globalisation describes a business strategy for taking a product to the global market, rather than an activity, as in the case of internationalisation and localisation. This requires worldwide marketing, sales and support*" [4].

Internationalization Process

In the software development industry, Internationalisation is applied to give a single software product the potential to be used in many countries with different languages and cultures. Generally, Internationalisation implies designing systems where culture-specific parameters are isolated from system functionality. According to John Harrys and Ryan McCormack, "*A simple example would be the error messages generated by a software system. Instead of hard-coding error messages in English, an internationalised system might store messages in a file or database removed from the generating code. The system would then provide a means to detect the current language setting, select the appropriate error message and then display it*" [5].

The concept of Internationalization describes the process of creating (or modifying) a flexible system infrastructure able to isolate the linguistically and culturally dependent parts of an application that supports culturally specific parameters such as language, geographic location systems, weights and measures, and currencies.

Reinhard Schäler summarizes the principles of Internationalisation in the following criteria:

- "*Separation of translatable text from the code of an application so that it can be easily accessed by translators without requiring recompilation of the code and subsequent extensive testing*";

- "*Separation of locale-dependent functionality from the core functionality of an application, including that referring to character sets, keyboard layout, data input and display conventions and collating sequences*"**6**.

According to these simplistic definitions, a fully internationalized application seems to be easy to realize trough a translation procedure of the translatable text of the interfaces menus and system messages to meet the requirements of a foreign market. Localization in this situation would become equivalent to a mere translation of texts. However, given the current state of the art of the software development industry, it seems unlikely that localization meet this target. It would certainly go further beyond this limit to embrace more appropriate adaptation criteria with the language and the culture of the targeted market. It was a time when developers designed products with the domestic market only in mind without prediction for any international extension. But with a rapidly worldwide economic growth, "*localisation or the adaptation of the application to the requirements of foreign markets required extensive redevelopment and not just translation of the application*"**7**. The concept of Internationalization, then assumes that when Localization is operated on the application, the process code will not be affected or altered.

When the Internationalization of a system is carried out, designers and programmers are expected to take into consideration those cultural features that will be supported by the system. These elements of culture or "internationalization parameters" are included within a piece of program external to the core codes generally called "Locales". They help the process of Localization without need to rewrite and recompile the core codes. These parameters include the following values:

- Language;
- Writing system;
- Currency;
- Calendar;
- Time zone;
- Time measurement system;
- Weights and measures;
- Geographic location system;
- Postcode system;
- Telephone dialing codes.

Localization Industry

As a direct consequence to Internationalization, Localization is the process of preparing a product to cope with the requirements of a target market different from that for which it was originally developed. It is a means to give the application a larger scope of cultural, geographic and linguistic use. That is why adaptation generally covers linguistic and cultural parameters not through a mere translation of the user interface, the online help system and the printed user guides and manuals, but also trough a respect for local regulations and standards. It is a process taken to a certain extent where a system is tailored to respond to the needs and requirements of cultural and linguistic expectations of consumers within a specific local market. According to Reinhard Schäler, Localization was a process initially applied to Software exclusively. But, after "*developments in vertical markets, global services and new technologies like the web, synergies have been created between the IT and other industry sectors that are dealing with issues similar to those encountered in the software*

localization industry… Then localizing IT products for Asian or Middle Eastern markets, however, the functionality of both hardware and software usually has to be adapted"[8].

As mentioned above, Localisation does not limit to text translation. It covers all the system elements where the target market culture parameters need adaptation to meet local consumers expectations. These elements concern major aspects from visual design to information architecture, application functionality, and content. These parameters are translated throughout the software system by means of the "locales" which allow customizing and configuring a software system for a particular country or region.
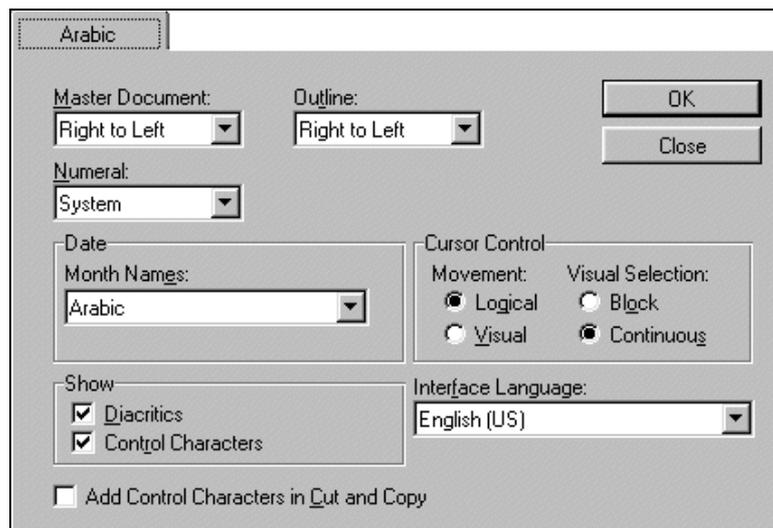
A Windows/MSWord97 panel to configure an Arabic Locale

It is not compulsory to implement all localization features at once and on the same way. They can be defined for selected markets within a single cultural or linguistic community according to specific cultural expectations that can make differences within a broad community. Within the Arab world, for instance, the numeric system differs from the East (Indian numerals) to the West (Arabic numbers). Localization should then take these peculiarities into account and convert them into a tailored locale or many locales applied differently for each circumstance.
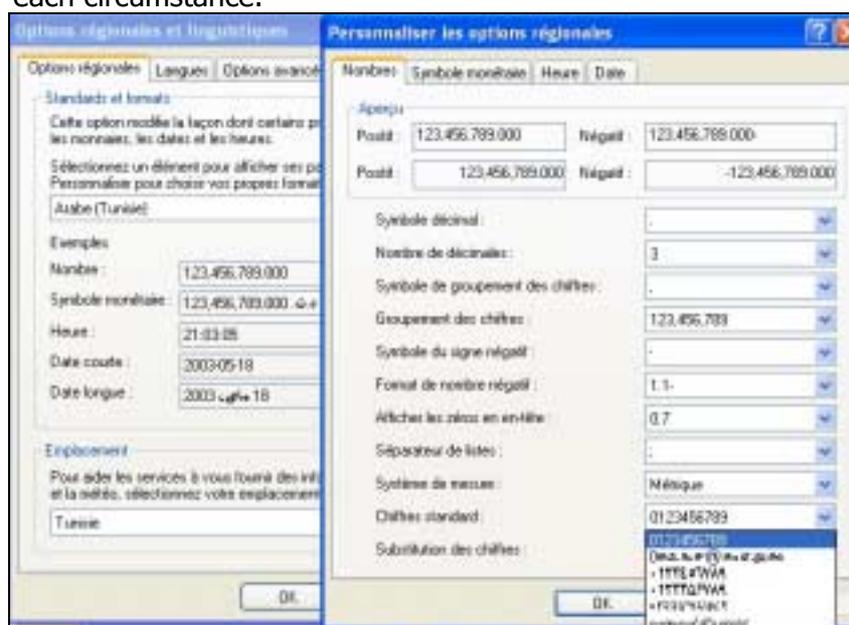
A Window XP Locales customizing (case of Tunisia)

A locale allows determining a set of variables that identify a specific region for which Internationalization and Localization processes are supposed to be done. A locale also defines a users community where similar culture and language values are shared for data processing and computer usage.

The main sequences of a locale codes are the language code stated according to ISO-639 Standard, the country code using ISO-3166 Standard and so many other variant codes depending on the case treated. These variant codes allow specifying differences that may appear for example in languages conventions, currency symbols or calendar systems used within the same region or country. The ICU technical documents refer to a particular case of Collation differences (sorting order) between traditional and modern Spanish languages to illustrate the role of a locale to make differences between both mechanisms. "*The "es__TRADITIONAL" locale uses the traditional sorting order which is different from the default modern sorting of Spanish*"[9].

In the first above illustration, the panel reproduces the parameters of an Arabic language locale used by a word processor to determine the linguistic and cultural details required by an Arabic user while using the application software. This locale defines the master mode of the document, directionality (right to left), the numeral system (Arabic, Hindu, contextual), the calendar system (Islamic, Gregorian), the cursor control (logic, visual), the selection mode (block, continuous), the interface language (Arabic, English) etc.

In the second illustration, it is rather an operating system oriented local (Windows XP). It covers exhaustive aspects of cultural and regional parameters (regional and language options, numbers forms, monetary symbols, time and date formats). Each parameter is optional and variable according to the user choices and basic cultural and linguistic assumptions.

The state of the art in locales definition is the outcome of a long process of study and analysis of the local markets specific peculiarities and expectations. Localization has gained a lot studying these peculiarities in detail while designing and implementing systems in different countries and cultures. Many software programmers and hardware manufacturers used to make unconscious assumptions about their user's language and customs when they design their products. This is a critical issue that we would like to argue in the following chapter with regard to the Arabic language and culture.

Localization and cultural assumptions

As the information context increasingly widen towards a global environment, it becomes necessary to develop software that adequately and transparently supports individual work habits, different cultures, languages and even subtle individual preferences. One of the major achievements of Internationalization and Localization is that applications are becoming able to provide for users not working in their own language and cultural context, an adequate environment to work as if they were at home. This is due to a certain extent to the market efforts based on commercial/end-user expectations rather than academic and fundamental research modes. Many of the adaptation facilities have been resolved and afforded to the end-user on a practical basis. Some other issues remain however problematic mainly when they deal with:

- Keyboard layouts, character set encoding, user interfaces;
- Man-machine interface interaction in a multi lingual context;

- Swapping forms and language versions of documents;
- Easy and transparent access to spelling checkers, grammar checkers and summarisers in different languages.

Cultural localization is still hiding a lot of its secrets for international vendors and market operators. Claude Henri Pesquet, Director in Compaq Society, states: "*The Internet underlines and exacerbates cultural differences. We are still living in the dark ages of cultural approaches*". Pete Fullard of Fullard Learning, reported by Clive Shepherd, agrees: "*The localisation of content needs to be far more than simply a translation of words. All sorts of cultural subtleties need to be taken into account*"[10].

John Harris and Ryan McCormack confirm this citation when they say: "*At first glance, it may not be immediately obvious how IA [Information Architecture] is related to localisation, but elements of culture often dictate the ways in which information should be structured. Many of the parameters that affect information architecture are so deeply ingrained in local culture that they are often taken for granted and can be easily overlooked. Anomalies may only be obvious to viewers within a specific target locale*"[11].

We would like to focalize this special issue of anomalies generally overlooked by software designers and programmers and try to expose in this document examples of overlooked parameters ingrained in local culture of the Arabic society but ignored in internationalized software and locales. These anomalies deal in their major aspect with writing system direction and Human-Computer interfaces in some specific areas of interaction with the end-user.

Bi-directionality of writing systems

It has been proved by research in cognitive sciences and human-Computer interfaces that writing system direction has direct affect on navigation within a software application or in a Web site. "*When looking at a page of information, a user of the Latin writing system will immediately look to the top left, because Latin script runs from left to right, top to bottom. A user of the Hebrew* [and Arabic] *writing system, on the other hand, will look to the top right because Hebrew* [and Arabic] *script*[s] *runs from right to left, top to bottom. Nearly all Web site navigation systems and even the layout of browser controls, assume a Latin writing system view of the world*"[12]. Sharon Corell assumes that "*Because they were designed by Westerners, they historically have a simplistic model of text processing adequate to handle languages like English*"[13].

What's Bi-Directionality ?

Bi-directional text is a right-to-left flow of text with some left-to-right inserted segments of text (i.e. an Arabic text with text sequences in English). The opposite is also true (i.e. an English text with an Arabic or Hebrew characters nested within it). The predominant direction is called the global orientation or the master mode.

Bi-directional scripts are used mainly used in the Middle East and include languages like Arabic, Urdu, Farsi, Hebrew, and Yiddish. They are called bi-directional because they always occur in software applications as a second language with a predominant one like English, French or German.

In a bi-directional script, the general flow of text is ordered horizontally from right to left with exception of numbers which are written from left to right, the same way as they are

written in a latin mode. We will shed light on this precise detail of exclusive left to right directionality of numbers and treat it as one of our central polemic subjects that we expose in this document.

According to ICU, "*there are over 300 million people who depend on bi-directional scripts, including Farsi and Urdu, which share the same script as Arabic, but have additional characters*" [14]. The following chart summarizes the different bi-directional languages and their geographic scope.

Language	Number of Countries
Arabic	18
Farsi	1 (Iran)
Urdu	2 (India, Pakistan)
Hebrew	1 (Israel)
Yiddish	Israel, North America, South America, Russia, Europe

The regional scope Bi-directional languages

According to ICU, these complex scripts show the following complications that are not found in the Latin script[15]:

- Contextual Forms: This complex text displays some characters using different shapes depending on the surrounding characters. For example, Arabic character shapes change to connect to adjacent characters.
- Bi-directionality: The visual order of some words differs from their storage order. For example, in Arabic and Hebrew, text is read from right to left, but numbers are read from left to right.
- Ligatures: This complex text displays a sequence of characters using a special form called a ligature. Ligatures represent a short sequence of characters or images that do not have a unicode equivalent. For example, the Lam-alief ligature in Arabic and the KSSA ligature in Hindi.
- Reordering: The order in which ICU displays the characters may be different from the spoken or "logical" order. For example, in Hindi, the short-I vowel is displayed to the left of the consonant, even though it is spoken after the consonant.
- Character Positioning: Some characters, such as accent marks placed above base characters, may require horizontal, vertical, or both positioning adjustments to display correctly. For example, in Hindi, vowel marks are positioned to align with the stem of the consonant.
- Split Characters: Some characters appear in more than one position. For example, in Tamil, the short-O vowel sign splits into two pieces; one that is displayed to the left of the consonant and one that is displayed to the right of the consonant.

Bi-Directionality of numeric and date systems

If bi-directionality seems to affect alphabetical text, numbers constitute a specific problem in multilingual texts since they observe an exclusive left-to-right layout direction even when inserted in right-to-left text.

One of the most important paradoxes of our study to the numeric systems is their inherited right-to-left processing directionality opposed to their left-to-right layout in a Latin writing system. If we respect the algorithmic system of calculation, the number "1999" would be

"normally" written in the form "9991". If Arabs have maintained this approach of right to left calculability, it is just because it corresponds with their handwriting directionality.

The question that almost nobody has asked in the official literature, is WHY and HOW the decimal numeric system of our times was converted into a left to right directionality although it was originated into a right-to-left directionality? What are then the implications of the round trip back to the sources in a left-to-right orientation?

We will consider this aspect of bi-directionality from three stand points concerning numbers analysis: arithmetic calculability of number values, oral structure of numbers values and the graphic transcription of numbers.

These three considerations will be treated within the current Arabic cultural and linguistic contexts to demonstrate to which extent localization has coped with reel expectations of Arabic users and the historical and cultural basics of that community.

Arithmetic calculability and the incremental system of numbers

We don't need to go back and explain the decimal numeric system functioning based on position values. Latin argument, which we consider redundant by comparison to the Latin writing system, attributes the highest weight to those figures positioned on the left of the number. It is clear however that the incremental system of numbers within a decimal arithmetic approach still respects the right to left directionality respecting a value increase from the smallest to the biggest value (units, tens, hundreds, thousands etc.).

Within a sequential counting process, a number increases as a digital chronometer trough a succession of cyclic modifications from the element on the right to the element on the left.

The following chart demonstrates this incremental technique of the decimal arithmetic calculation.

Milliers	Centaines	Dizaines	Unités
0	0	0	1
0	0	0	9
0	0	1	0
0	0	9	9
0	1	0	0
0	9	9	9
1	0	0	0
1	9	8	7
1	9	8	8
1	9	8	9
1	9	9	0
1	9	9	8
1	9	9	9
2	0	0	0

Table 1: Incremental mechanism of numbers

Within more complex arithmetic calculations, the same principle of right to left evolution is observed. In the following example, the sum calculated using Excel software, is obtained through a counting progression from right to left. No left to right operations are observed at any time in this process except how numbers are input.
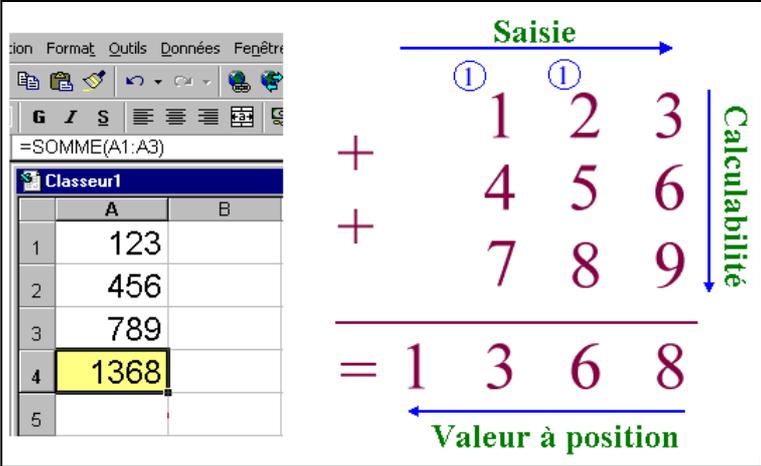
Arithmetic calculability from Right to left

We consider that nothing has forced from the beginning this right to left directionality of the arithmetic operations if not their oriental origins within a culture using right to left writing system.

We also consider that the migration of the decimal numeric system to the Occidental world has been accomplished without changing the internal functioning of the system. Only the graphic act and the pronunciation way have been adapted to the occidental linguistic style. This explains the current methods used by the manual or automated arithmetic algorithms based on a counting principle using factorial elevation opposed to the way of Latin writing.

Graphic transcription of numbers and the effect of alphanumeric bi-directionality

In fact, the transcription act of numbers (isolated or accompanied with text) shows up a conflict and a lack of standardization within a multilingual context.

The Latin context

As we stated that in the precedent paragraph, the Latin linguistic context functions on a directional opposition between both essential aspects of numbers analysis : input and calculability.


Opposition between the transcription mode and the position values of numbers in a standard Latin mode

This opposition between both data input and value calculability in a Latin mode creates another opposition when numbers are inserted within a sequence of text.
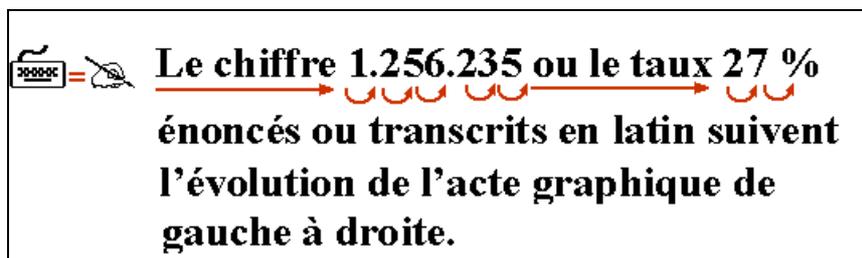
Conformity of text directionality and way of writing numbers in a Latin mode

However, when the incremental factor is taken into consideration, another opposition appears: treating sequentially the alphanumeric characters is done on two opposed methods: a linear sequence from left to right in order to write the alphabetic sequence and a right to left progression to arrange the numeric characters according to the principle of position values.
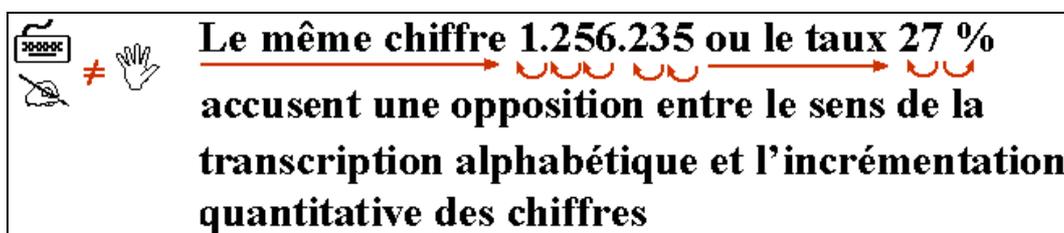

Directionality opposition between Latin text and numbers calculability

The Arabic context

To this incoherence within the Latin text, is added the Arabic language complexity within itself and when opposed to Latin languages.

Within the same Arab speaking community, numbers transcription is not less conflictive although it has always been conform to the right to left directionality of the alphabetic characters until the colonial period. It is still current however to encounter scholars, historians, linguists and other "cultured" persons writing numbers and dates from right to left. The writing of decimals and fractions for instance is still done from right to left although no standards fix the way how they should be done. The value two thirds (2/3) could be written 3\2 within an official Arabic text. Although it is much rare, the decimal 25,10 could be encountered in the form 10,25. Literature and theological environments can be considered among the last contexts where these classic modes are still surviving due to their limited contact with the occidental influence. In these environments, numbers usage is still following the standard Arabic norms respecting right to left directionality in graphic transcription, oral structure and arithmetic calculability.
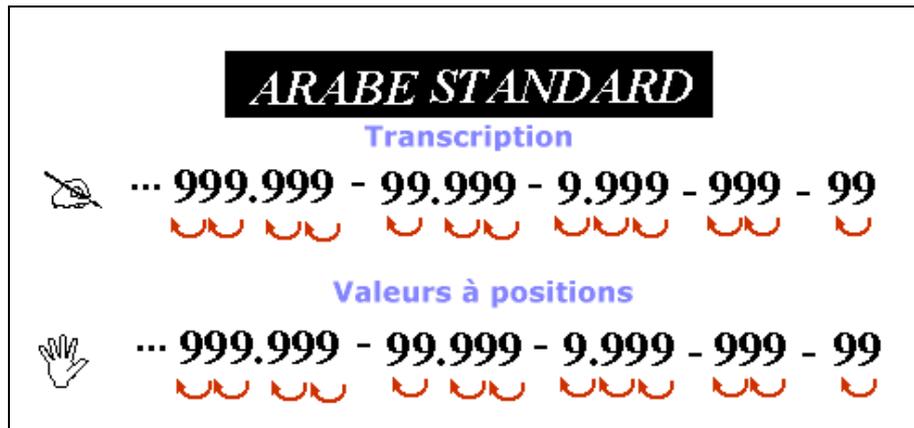
Conformity between transcription and position values of numbers in a standard arabic mode

The round trip migration of the numerical system to and back from the West has resulted into a hybrid mechanism of numbers writing. The Arabic graphic act has become influenced by the left-to-right directionality of the Latin system even though in an original Arabic master mode.
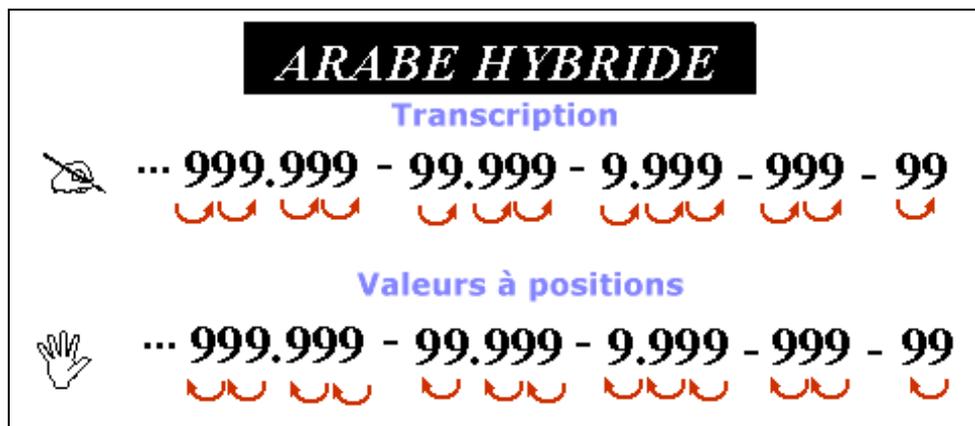
Opposed directionality between transcription and numbers calculability in a hybrid Arabic mode

In fact, this example illustrates a hidden anomaly situated at level of the two first columns of units and tens of any numeric value. Observations to which we had arrived concerning this anomaly has demonstrated that two attitudes of these values transcriptions are possible.

When the number value to transcribe is limited to the two columns of units and tens exclusively, the majority of persons observed compose the number in a right to left directionality. But, when the number to compose exceeds the value of tens, people tend generally to write it within a left to right directionality. Very few people compose a three-digit number (or more) beginning at the extreme left position and flash back to the right for the two last digits of the units and the tens. A two-digit number is also transcribed from right to left meanwhile a more than two digit number is written from left to right more frequently.
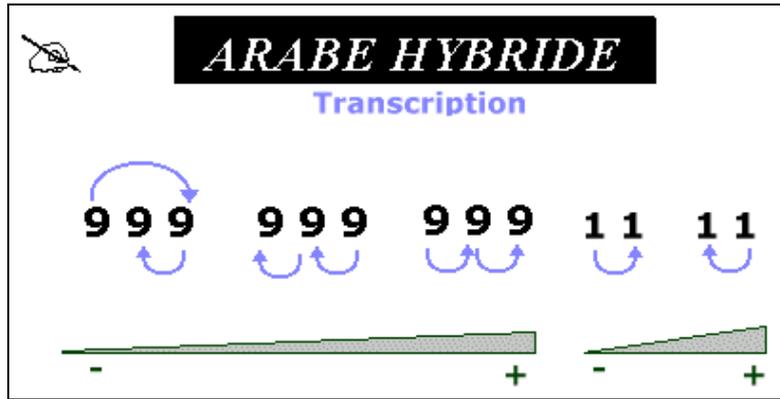
The polemic of the two columns of units and tens

This irregularity is directly associated to the oral structure of the numeric values. When writing numbers, people tend to think what they write.

This hybrid aspect is more relevant within a combination of numbers and Arabic text. Meanwhile Latin languages succeeded adapting directionality of the numbers graphic act to the one of text, the Arabic language disposes actually of two combinatory situations between numbers and letters, the first is official and the second is hybrid or composed.
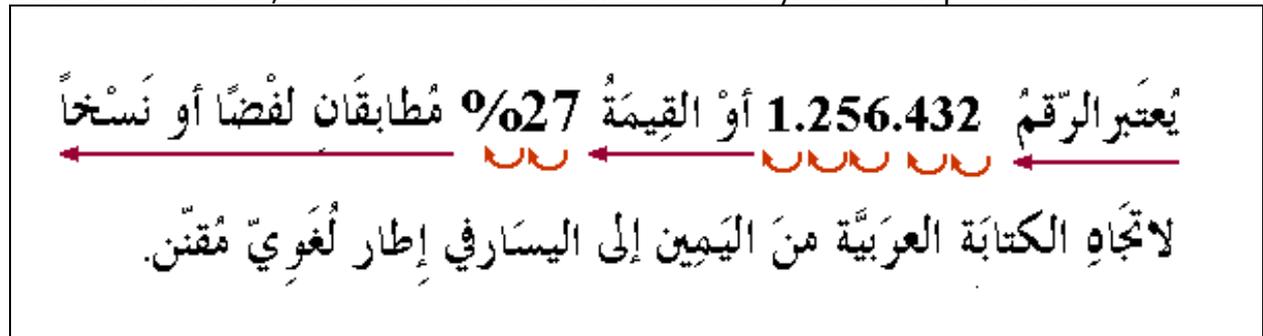
Alphanumeric transcription directionality in a standard Arabic mode

In this example, the alphabetic transcription obeys to a one-way right-to-left directionality for the numbers and letters. It is the method used by large part of intellectuals and specialists in history, theology and civilization.

In fact, the Arabic culture has always respected its logic of right-to-left directionality even for numbers transcription. In classical literature, numbers were transcribed and pronounced in an arithmetic structure based on the incremental principle. The value "1998" written in a sentence is composed in a left spatial succession to the last letter of the last word beginning with the character 8 followed by 9, 9 and 1. The pronunciation of the same number is done respecting the same directionality starting from the units until the thousands.
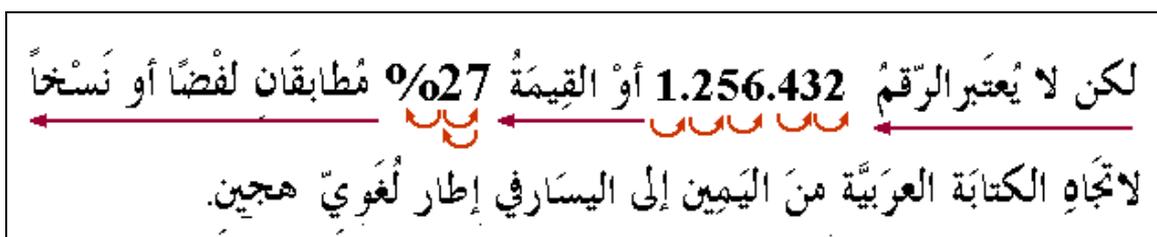
Alphanumeric transcription directionality in a Hybrid Arabic mode

However, in the above example, the occidental influence is noticeable at level of the numbers transcription that copes with the Latin left-to-right way of writing numbers. This is the method applied by the common Arab citizen, in mass media and scientific and technological sectors with strong relations with the Occident.

The impact of the numeric system round trip to and from the Occident, is that this system has undergone double modifications: the first when it has been adopted by the Occident and the second when it has been imported back to the Orient. It became thus very common nowadays to write numbers in an Arabic context on the Latin model. It is even possible to observe that no standard way of writing numbers is yet defined in the Arab world. All predicts an irreversible Latin model imposition in the technological field and in human computer interfaces.
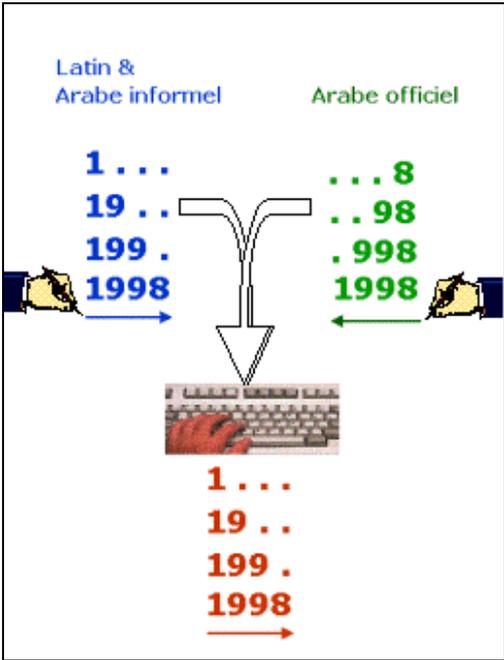
One way transparent direction of Numbers automated transcription

Dates in Arabic show the same usage problem. The date "11 February 1998" is a sequence of values, which at a first glimpse respect the incremental evolution from the smallest value to the largest one. In this case, evolution occurs from the value of the day to that of the month and finally to the value of the year. However, if we consider, on basis of an algebra principles, the way the values in this date are transcribed, we can observe that in the day value, tens are placed, in this Latin orientation, before the units. This opposes the evolution principle from the smallest value to the biggest one. If we consider now the Arabic date " فبفري 1998 11 ", we can observe that it respects this evolution principle on semantic and arithmetic standpoints.


Oral structure in numbers pronunciation

The oral factor plays an important role in this polemic of opposed directionalities. As we already stated as for the numbers in a Latin mode, enunciation of a number corresponds to its graphic directionality but is opposed to its internal arithmetic structure. The number 1 256,235 is pronounced "One million two hundred fifty six thousands two hundred thirty five" respecting a left-to-right directionality.

In case of the standard Arabic language, all numeric values are pronounced according to its arithmetic internal structure as well as to its graphic transcription mode. The date "28 may 1998" would be pronounced "Eight and Twenty may, eight and ninety and nine hundred and thousand". This practice constitute until now one of the distinguishing marks that characterize a good performance in official Arabic language.

Official numbers pronunciation

The same example would be pronounced informally in the following manner: "Eight and Twenty may, One thousand, Nine Hundred, Eight and Ninety".
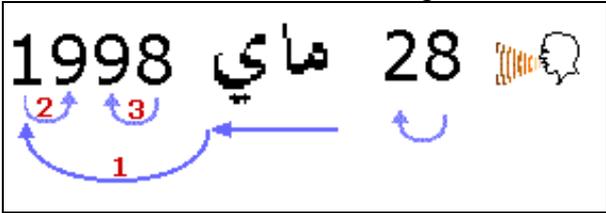
Informal numbers pronunciation

The only distinction in this polemic between the transcription factor and the pronunciation of numbers in a hybrid Arab mode, is the large consensus to pronounce units and tens in a right-to-left direction meanwhile the graphic act of further numbers complexity is let to many other factors due to personal styles, learning systems and habits.

This phenomenon is not limited to the values of units and tens only. It is rather situated at level of the two first positions from the right within a group of three digits. It is only from the third position (hundreds) that inversion in pronunciation takes effect. The value 21 is articulated "One and Twenty". The value 121 is pronounced "One hundred, One and Twenty" and so forth as shown in the illustration underneath.

Oral structure of numbers in an Hybrid Arabic mode

This paradox constitutes an important theme of research in the domain of socio-linguistics. When digging further in this investigation approach, we discovered an awkward resemblance between the articulation mechanism of the number in hybrid Arabic and German.

German language, by opposition to all other Latin and Germanic languages (slight resemblance with English anyhow!), units and tens are pronounced in a right to left directionality. Once the third level (hundreds) is reached, directionality is partially inverted to left-to-right exactly on the way hybrid Arabic functions.

The following table summarizes this comparison.

Num. Values	German	Arabic[(*)]	French	English
1	Eins	Un	Un	One
10	Zehn	Dix	Dix	Ten
11	Elf	Un et Dix	Onze	Eleven
12	**Zw**ölf	**Deux** et Dix	**Dou**ze	**Tw**elve
19	**Neun**zehn	**Neuf** et Dix	Dix **Neuf**	**Nine**teen
20	**Zw**anzig	Vingt	Vingt	**Tw**enty
21	Eins Und Zwanzig	Un et Vingt	Vingt et Un	Twenty One
99	Neun Und Zwanzig	Neuf et Quatre Vingt Dix	Quatre Vingt Dix Neuf	Ninety nine
100	Ein Hundert	Cent	Cent	One hundred
101	**Ein Hundert Eins**	**Cent et Un**	**Cent et Un**	**One Hundred One**
121	Ein Hundert Eins Und Zwanzig	Cent et Un et Vingt	Cent ***Vingt et Un***	One hundred ***Twenty One***
1998	Ein Tousand neun Hundert ***Acht Und Neunzig***	Mille et Neuf Cent et ***Huit et Quatre Vingt Dix***	Mille Neuf cent Quatre Vingt Dix Neuf	One Thousand Nine Hundred Ninety Eight

(*) = Hybrid Arabic transliterated for communicability reasons and comparison with Latin equivalents

Comparisons between morphologic structures of numbers in different languages

Conclusion

What is the morality of the story? Localization has overcome a large a mount of linguistic and cultural differences and complexities that led in former times to the isolation of many languages and the exclusion of many people from the information scenery and from the Information technologies. We came to an extent where ITs are touching every place and concerning every person. The question however was about the real promoters of localization industry: was it the user commodity and real estate or was it just a commercial and profit making synergy that tries, under the logic of the market forces, to respond to an economic primacy and welfare? In any case, localization has still a lot to do to overcome the cultural differences and the languages diversity in their small subtle details. End-users are still very sensitive to their cultural and linguistic identities although the prevailing technical solutions "imposed" by the "Big Brothers" which succeed to penetrate deep in the intimate choices of the individuals and the groups. But can we talk about choices in these cases or is it just a Diktat of the "haves" imposed to the "Have nots".

Notes

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[3] John Harris and Ryan McCormack. Translation is not enough : Considerations for global Internet development. Sapient Report, Sapiens corporation, July 2000

[4] Reinhard Schäler. New Media Localisation : LINGLINK Report for the European Commission DGXIII. January 1999

[5] John Harris and Ryan McCormack. Op.Cit.

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[11] John Harris and Ryan McCormack. Op.Cit., p.33

[12] John Harris and Ryan McCormack. Op.Cit., p.33

[13] Sharon Correll. Extensible Rendering for Complex Writing Systems. Tamil Internet 2002, California, USA, pp.298-309

[14] Introduction to ICU : the Bidi Algorithm. http://oss.software.ibm.com/icu/userguide/bidi.html (Visited on 10th may 2003)

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