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RESEARCH NOTE

Excel spreadsheet as a tool for social narrative analysis

José A. Amozurrutia · Chaime Marcuello Servós

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Abstract Qualitative research is an open field where different researchers from several disciplines deal with social meanings and with the issue of understanding. During the last two decades, the use of computers and software has extended to become a relevant part of our daily landscape and also a basic device of social research, even in relation to a qualitative approach. There are many applications of qualitative research software specially designed by a diversity of firms and institutions producing different levels of sophisticated tools that can be used in the social research process. This paper presents a protocol for using an Excel spreadsheet as a tool for analyzing social discourses. We will show how to work with the documents produced in the empirical data collection and the criteria to structure the components of the application and its main representations. Finally, we offer a methodology for developing a personalized application in order to orient social design as a powerful and reflexive tool that contribute to a social thinking immersed in continuous improvement.

Keywords Qualitative analysis · Qualitative approach · Content analysis · Spreadsheet social analysis

J. A. Amozurrutia (✉)
Laboratorio de Desarrollo e Investigación en Comunicación Compleja (labCOMplex), en el Centro de Investigaciones Interdisciplinarias en Ciencias y Humanidades (CEIICH), de la Universidad Nacional Autónoma de México (UNAM), Mexico City, Mexico
e-mail: j.amoz@yahoo.com

C. Marcuello Servós
Third Sector's Social and Economics Studies Group (GESES), de la Universidad de Zaragoza (UZ), Saragossa, Spain
e-mail: chaime@unizar.es
URL: http://geses.unizar.es/

1 Introduction

During the last two decades, the use of computers and software has extended to become a relevant part of our daily landscape and also a basic device of social research, even in relation to a qualitative approach. There are many applications of qualitative research software specially designed by a diversity of firms and institutions producing different levels of sophisticated tools that can be used in the social research process.

In this paper, we do not develop an overview of the different types of available software (NUDIST, NVIVO,[1] XSIGHT, ATLAS-TI[2]…). Our aim is to show a "simple and creative" way of using a spreadsheet as an alternative tool to develop a personalized and rigorous model of social narrative analysis.

The text is divided into seven parts including the introduction and references. First, we describe in general terms our view of empirical work using as a basis the Western approach to science. Second, we clarify how to deal with and process the empirical data. Next, we focus on the definition of a protocol for using Excel spreadsheet as a tool for analyzing the data. Following this we present an example, i.e. a focus group analysis, of our proposal. Finally we offer some conclusions.

2 Approaching the empirical work

Our Western and modern idea of Science is inextricably linked with the notion of empirical contrast. Experimentation is the way of moving forward in a cave. It is the "only way" to go out of the darkness and show where the light is, even more so, to resist saying "eppur si muove". Any kind of statement,—with some exceptions in mathematics—, must be put to the test of empirical work. Trial and error are two sides of this coin, both define the process of experimenting with diverse methods of doing something until one finds the most successful—i.e. right, truth, science…—, until new experimentation reveals a new finding.

Khun (1992) set out his view of the history of scientific revolutions, and Feyerabend (1994) defended the notion that there is something more anarchic in their history, where Science, in general, and social sciences in particular, build their world… where scientists seem to be Sisyphus' heirs. We could delve into the history of ideas, going from rationalism to empiricism, or look more deeply into Windelband's nomothetic-idiographic distinction, or the Diltheyian division of *Geistwissenshaften* and *Naturwissenschaften*, however this is not the aim of this paper. Nor do we wish to discuss Karl Popper's "critical rationalism" and in particular its revision of empirical approaches (Popper 1972, 1994). In recent decades Popper has won "pole position" in philosophy of science rejecting empiricism and proposing the notion of "falsation" as the only possibility for testing theories because we cannot verify them using scientific methods. Popper's view of Science is an evolution of solutions to life problems where the target is to find the one that fits best. Scientific knowledge is no more truth than falsehood; it solves or or is a better fit for confronting a problem. Kjellman (2002) accurately discussed the "object oriented approach" and offered his "subject oriented approach" to deal with the epistemological issues overlapping the ontological consequences. Kjellman introduces the relevance of feelings in the construction of the "real world" and the relevance of the feed-back loop in the modelling of our brains in order to produce observations and descriptions of our cosmos (Kjellman 1999, 2001).

[1] http://www.qsrinternational.com/products.aspx.

[2] http://www.atlasti.com/.

However, "empiria"—as the collection of objects, things, facts, events and everyone's tangible matters…—is the field where we need to work when we seek to evolve social sciences. It would be impossible to study social science if we forgot about daily life, the praxis of people… as highlighted in praxeology (Collen 2003). We can theorize about social systems as Luhmann (1998) and others did, but we need to refer to observation of the practical affairs of people. Thus, observation is the basis and the problem. We have to be grounded in facts, feelings, social codes, communication, interactions or any other possible explanation… and we need a protocol for carrying out empirical work (Giddens 1994).

The first step used to be a question or a problem. There is 'something' that is crying out to be answered in the mind of anyone who wishes to discover how to solve it. It could be a pain in the leg, a thirsty person looking for water or an economist thinking of how to earn more money in the midst of a general crisis. Nevertheless, we can only think in terms of "objects" in our constellation of "signifiers" and "signifieds", i.e. recognizable by our language and thoughts in relation to the available meanings of our social system. Processes of innovation and sedimentation (Ricoeur 1988) come and go building a corpus of explanations, words, language and theories about "our" world experience. Some of these questions have already been answered and many of them are collected in texts,—different levels of precision and rigour distributed in an ocean of information—and most relevant questions were answered after Adam and before any of us existed… Even, official institutions are permanently creating statistics and reports based in empirical processes. Nevertheless, "empirical sciences" always refer to a revision of the actuality, each question pointing to a target of research.

This target defines the goal of the empirical work and constrains the possible method of research depending on the kind of problem and the "size" of the object (Ibáñez 1986). A microscope allows us to view microbes… and "macroscopes", the stars, i.e. micro/meso/macro—social issues require different strategies of planning and developing research. Most research questions demand a holistic approach, which includes a study of qualities and quantities[3]; although it is commonly located in one side of the deceptive division of two cultures of research, a qualitative or a quantitative approach.

The following research steps are related to this target and are deeply rooted in the "empiria". The techniques and methods are well described in basic sociology handbooks. In the end, we have to delve into the praxis to gather data. Such data could be enumerated in figures or in words. If we want to describe the 'imaginaries' or symbolic universes of people we collect their voices and discourses. Next we can accumulate piles of raw material… However, empirical science and social sciences are not simply an accumulation of raw materials. We don't need a new and even larger reproduction of the real world. We need to theorize after processing the data in order to answer our original question. To do this, we need ways of translation, from the raw discourses to the theory. Analysis of content is one of the necessary steps, but it has a wide spectrum of possibilities and theories. We do not go into depth on these: Ricoeur (1988) explained very well how social action can be considered as a text. We will now show how the spreadsheet is useful for passing from the raw transcriptions of discourses to the theory.

3 Dealing with and processing the empirical data

There is a wide literature on narrative analysis (Abell 1987, 1993, 2004; Smith 2007) and on the quantitative considerations of it (Franzosi 2008, 2009). We do not discuss these

[3] Ibáñez said in Spanish: "palabrería" (words) and "numerería" (numbers) (Ibáñez 1986).

approaches and their main contributions. We aim to offer, as stated, a simple and creative tool available on the majority of computers for dealing with discourses as raw material, as empirical data.

The empirical material which the analyst is finally faced with is a text, a transcription—a set of statements immersed in each actors own syntax and his interaction with the other actors—in which the following components can be distinguished:

- Identification of the participating actor
- Indication of the approximate time, in seconds and/or minutes of his intervention
- Identification of the paragraphs to be interpreted. As with the previous elements the delimitation of each intervention that refers directly or indirectly to one or more statements expressed by each actor is possible
- Short descriptions of what happened during the intervention (laughs, comments, confusions, etc…)

Using this information the analyst has two main possibilities for carrying out analysis of the narration:

(a) To start from a previously established category scheme and with a base for defining the way in which the interventions are related to the categories.
(b) To work out the category scheme starting from a process of analysis of the explicit or implicit statements in the transcription. This process is necessarily carried out by means of a heuristic strategy in which the analyst finds the most adequate category structure which allows classification and evaluation of the greatest number of statements.

However, strategy (a) could deal with paragraphs which may not fit into the theoretical framework and must be resolved either by expanding the category framework or, in the worst scenario, leaving them out. Strategy (b) could build proper thematic areas—that through the analysis will constitute and evolve into a category framework—which of course may lack coherence and could be approached with certain relativism with respect to a more consistent frame or reference. Good research will find a solution to either approach and will construct a well-established framework of reference with its own coherence and consistency.

In this approach, we have taken the second route: a methodology linked to Grounded Theory (Glaser and Strauss 1967). We are faced with the challenge of establishing thematic areas for the diverse statements that are presented in the transcription and staring from these, establishing variables and categories which allow us to understand the relations and distribution of their relevance and meaning in the text. This is done by means of a parallel strategy for analysing which quantitative tendencies give us an initial approximation of variables and category tendencies using normal frequencies and then to understand the relevance of their contents in order to make qualitative inferences by means of weighted frequencies. In the first phase of work, we started with a bottom–up analysis and afterwards we applied a top–bottom reflexive analysis. In both cases we had a dialectical process in which variables and categories were fixed, changed and renewed.

In the next section we describe the way in which we deal with the transcription and the heuristic strategy in order to establish a category scheme which allows us to make final inferences.

4 Using a spreadsheet: a guide and protocol

The spreadsheet is a main class of software that allows the modelling of a great quantity of processes. It is a three dimensional matrix space arranged in rows, columns and sheets or

levels, which allow multiple relationships to be woven between the contents in the cells. All kinds of relations may be established in addition to operating between them by means of mathematical operators and numerical and non-numerical intrinsic functions.

Although the design of applications using spreadsheets requires a basic knowledge of mathematics and creativity in order to understand the essential language syntaxes and systems-thinking approach to social sciences, it is not a big challenge to social researchers. In our approach the relationships between the contents of the cells and the possibilities of the functions that apply to text contents will allow us to show the potential that it offers greatly improve narrative analysis, in particular analysis of focus group discussions.[4]

4.1 Basic elements for narrations modelling

The spreadsheet space provided by the cells can be arranged in a hierarchical structure of cell zones that may have diverse functionality. The most important for our application are:

- Zones for organizing the system inputs in tables from which we build a database
- Zones for establishing areas for calculations and transformation of information and
- Zones for representation/illustration of results.

Using these criteria, we organize spreadsheet space in the following zones or application parts (see Fig. 1):

1. Narrative text zone with the transcription to be analysed
2. Variables and categories definition zone with a set of tables for variables and categories description, identification, numerical weights values and weight meaning
3. Text mark-up zone for the specification and labelling of the most significant statements and the variables assignation and weighting index valuation
4. Code substitution zone in which several Excel formulas convert marked text into numerical values based on variable and category definition tables. Weighting values are normalized between zero and one and are defined by the researcher in accordance with a meaning valuation for each statement
5. Formula calculation zone with organized formulas in order to evaluate normal and weighted frequencies and integration of variables to generate categories
6. Graphs and maps representation zone in which basic and new information is re-organised to construct synchronic and diachronic representations of variables and categories.

Each zone is on one sheet, except zone 6 which needs several sheets. There are three zones of special interest which we will describe later: the Text Mark-up zone, the Code substitution zone and the Graphs and maps representation zone.

All zones are linked to one another by means of formula addresses. The most important challenge of the analysis lies in three main operations:

1. Converting[5] linguistic statements into numerical values established in zone 2 by means of *valuation factors*
2. Assigning numerical weights to variables and establishing category integrations in zone 4, and

[4] The strategy that we put forward could be generalized to many techniques associated with text analysis (in-depth interviews, life histories, discourse analysis, etc…), (Amozurrutia et al. 2008).

[5] This conversion is a kind of transformation based in the mapping between linguistic domain to numerical domain.

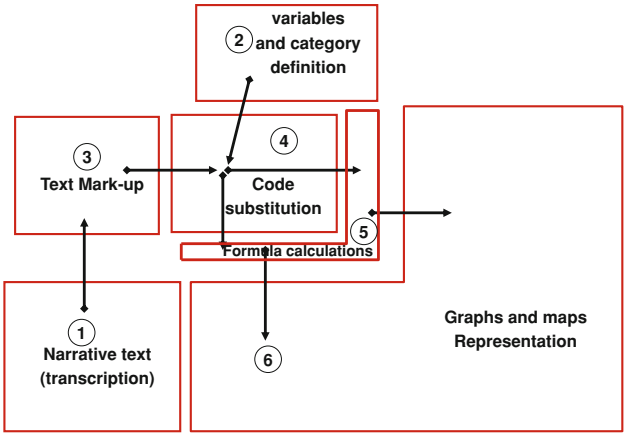

Fig. 1 Spreadsheet information zones

3. Converting numerical values calculated into meaningful representations and text sentences in zone 6. This process makes it necessary to construct conversion forms based on the valuations established in zone 2 in terms of levels of meaning and on valuation of the actors' interventions during the narration and established in zone 3.

The integration of functions, codes, structures and processes is fixed within a non-trivial system construction approach (Amozurrutia 2007b) that will be summarized in the following section.

4.2 Levels of importance and valuation of the variables

One of the most important components of the proposed model lies in the importance and levels of valuation of each variable. There are two or more tables associated with each variable i.e. proposed by the research group, other research groups or a specialist in the theme, in the Variables definition zone (Fig. 1). Here we establish several options or nuances for each variable that range from the *most desirable value or nuance*—to which we assign the numerical value of one—*the least desirable or possible variable value*, to which we assign the value of zero. Between them there are a set of values associated with different nuances of the variable in question. In this application, we consider up to nine options with intermediate values between zero and one. This correspondence between levels of importance of one variable and evaluative criteria—referred to as *valuation factors*—, establishes a function that we refer to as the "inter-phase function".[6]

In Fig. 2 we show two tables associated to the variables **t1** and **TB**. The upper table shows different characteristics linked to the transparency of the information associated with the variable "**t1**" that were assigned in an initial phase of text analysis. In that phase it was not possible to distinguish between the characteristics and/or attributes of the transparency, such as its relationship with its *normativeness* or with other associated thematic fields. Either the characteristics of production of accounts or its visibility, amongst others things, were not well known. In the first instance all the initial numerical values assigned were approximations and were necessarily modified later.

[6] This approach is based on the Membership Function Concept of Fuzzy Logic and adapted to sociological perspective in Amozurrutia (2007a).

1	t1	Transparency: characteristics	
index	weight	description	comment
1	1.00	Facilitating information access	
2	0.95	Activity Publicity	
3	0.90	Offer and explain the origin and understanding of Founds	
4	0.88	Make Funds publicity	
5	0.85	Offer internal operation information of the Fundation	
6	0.80	To be impartial to information solicitudes	
7	0.70	Manual memory diffusion	
8	0.67	To have established procedures	
9	0.60	Web diffusion	

2	TB	Transparency as basic disposition	
index	weight	description	comment
1	1.00	Best disposition to information offering	
2	0.95	Best disposition to information disposition	
3	0.85	Good disposition to information offering	
4	0.80	Good disposition to information disposition	
5	0.50	Unresolved case	
6	0.50	Wrong disposition to information offering	
7	0.40	Wrong disposition to information disposition	
8	0.10	Inexistence disposition to information offering	
9	0.10	Inexistence disposition to information disposition	

Fig. 2 Variable tables for interphase functions

In the lower table of Fig. 2 the variable **TB** "Transparency as basic disposition" (which refers to the statements about the importance of the handling of information in the initial stages is shown, and was worked out later. In this case the variable distinguished only two characteristics of transparency, the level of disposition and the offering of information. These were referred to by the participants in the focus group and selected as one of the main variables.

The first column of the tables refers to the "valuation index" and is an identifier that is introduced in the Text mark-up zone. An index value of 5 refers to an unresolved case that must be considered later. The second column has the normalized numeric value corresponding to each variable nuance and corresponds to the first system axiology level. The third column describes the variable nuance. The model includes two or more variable tables for valuations of other analysts or research groups that have arrived at a consensus for defining the factors of valuation of the inter-phase functions.

4.3 Integration of categories

The factors associated with the variable nuances are equivalent to *levels of meaning or significance* of the statements given by the researcher. In order to integrate two or more variables within a category the model uses weighting criteria in the Variables and Category definition zone. These weights are considered as a second level of system axiology. They are treated as an analogy with synapses in the neural network model and represent system memory which operates as a permanent source of system knowledge in construction.[7] With this approach it is possible to establish equivalent numerical values associated with a category. These integrated values define new levels of meaning and valuation associated with categories which represent part of the meanings in the text and may be represented in different forms.

[7] Additional considerations of Neural Network interactions applied to sociological thinking are presented in Amozurrutia (2007a, b).

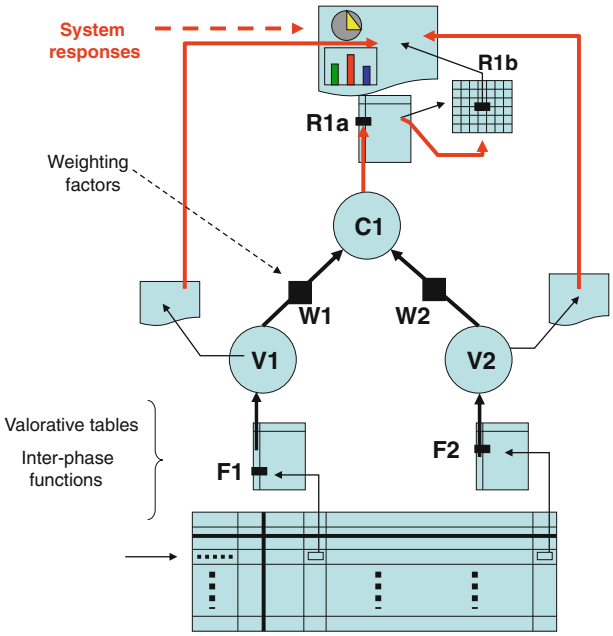

Fig. 3 Model components for narrative text analysis

In Fig. 3 we set out an illustrative scheme of the integration of the variables tables, their weighting process in category constitution and their later treatment in order to generate the system responses.

The numerical value derived from the weighting of variables may be represented in a map or in a graph and must be converted into a meaningful sentence in order to be understood as a system result. In the next section we will describe the criteria for marking-up the text and establish the basic functions in the Code substitution zone.

4.4 Text mark-up zone

Starting with the transcription, generally stored in a text processor, it is necessary to divide the paragraphs into smaller sentences into which we insert "labels" that contain the variable names and the valuation index that the analyst assigns them. Each paragraph or sentence can be marked in the following way:

> …beginning of paragraph….**#TBn** beginning of statement of interest and what one wishes to associate it with, for example, to the variable VA whose importance –valuation-, is shown by a number "n", which is explained later….**#** …continue with the paragraph information…,

This can be synthesized in the mark-up expression:

. . .**#VAn**. . .xxxxxxxxx..#.. ..ec.1

The label for the statement begins with the sign **#** followed by two letters **VA** which allude to the identification of one of the variables previously defined, and it is immediately followed

by a number—indicated in the "**n**"—which will allow us to understand the value equivalent to the importance assigned by the analyst.

The identification of the variable and the valuation factor can be updated at any time and given the characteristics of calculations in the spreadsheets, the results—summings-up and graphical representations—are updated immediately.

4.5 Code substitution zone

From the labels inserted in the sentences, the value of the *valuation index* "**n**" is substituted with the real value assigned in the variable table. What remains in the cells of this zone are the valuation factors extracted from the marked label and they will be added up to obtain normal frequencies and *weighted frequencies*. They will also be used in the *Graphs and Maps representation* zone to construct the diachronic map of the sentences with its level of meaning and importance given by the researcher.

Within the operations required in this zone, several character functions are needed for the extraction of the information—the variable name, the valuation factor and the marked paragraph. The method and code is as follows:

1. Identify the first position of sign in cell content, "#". The following function can be used:

   =SEARCH("#"; cell_sentence_address;1)

   (and assume this result is in cell X10)

2. Identify the second position of sign in cell content. "#". The following function can be used:

   =SEARCH("#"; cell_ sentence_address;X10+1)

3. Extract variable identification. The following function can be used

   =EXTRACT(cell_sentence_address;X10;200)

The extraction of the valuation factor and the selected text in the sentence is similar to the third function. The value of 200 takes into account the fact that there will not be sentences of more than 200 characters. This can be modified to a higher value.

The instruction for the valuation index substitution with the valuation factor is:

=VLOOKUP(index_value; Address_TableVariable; Specialist_id) ec.2

- The index_value is the value assigned in "n"
- Address_TableVariable is the Address of the table associated to the Variable in question) (Fig. 2)
- Specialist_id refers to a number that refers to the analyst who defined the values of the table

In the Formula Calculations Zone the functions required are:

=sum.if(range, crit_sum, range_sum) and =count(range)

where "range" is a pair of addresses that represent the limits of the cells that may be counted or totalled; "crit_sum" is an expression with the condition that determines which cells are totalled; and "range_sum" is the limits values of the cells totalled. With this information we can calculate frequencies.

Finally, for the rearrangement of the values that will allow the construction of the information that will be represented in the diachronic graphs the following function may be used:

=CONCATENATE(cells_address_of_interest)

4.6 Graphs and maps representation zone

This zone is distributed between various sheets of the application in order to construct four types of representations:

- Synchronic representation in terms of weighted frequencies
- Diachronic representation in terms of evolution of themes throughout the narrative
- Hierarchical representation of weights in variables and categories, and
- Configurational representation of the variables.

Each case requires a special method of material organization. For the diachronic and synchronic representations calculations in zone 5 of Fig. 1 are used. For the hierarchical representation of variables and categories a table that condenses the sum of the weighted frequencies and the weighting factors is required.[8]

4.7 General methodology in the application

The methodology to construct the application described is based on the following steps:

1. Prepare the text (transcription) to be analyzed dividing large paragraphs into smaller sentences through first reading inspection. Each sentence must be identified and placed in a one column cell within the *Narrative Text Zone*.
2. Define thematic areas or specific fields of interest to initial name variables or categories in the *Variables and Category definition* zone.
3. Mark-up sentences. Each label implies the assigning of a variable name and an index factor that corresponds to a valuation factor. This process is an interaction between zones 1 and 2.
4. Consult graph and map representations and reflect on the consistency between what has been done and what has been thought through reflexive analysis. At the beginning of the analysis consult the weighted frequencies and later on the synchronic and diachronic representations. Go back to step 3 if it is necessary to correct the labelling.
5. If a thematic area requires more nuances, generate new options. Go back to step 3 if it is necessary to correct or adjust labelling.
6. With the initial definition of thematic areas identify the first groups of variables, assign weighting factors to them and make a first approximation of categories. Consult graph and map representations and reflect on the consistency between what has been done and what has been thought through reflexive analysis.
7. Once all paragraphs have been labelled and categories established, consult the weighted frequencies and synchronic maps once again to reflect on the consistency between what has been represented and what has been defined.

[8] All of the graphics are types covered in versions of Microsoft Office Excel i.e bars, lines, pies, three dimensional and surface bars.

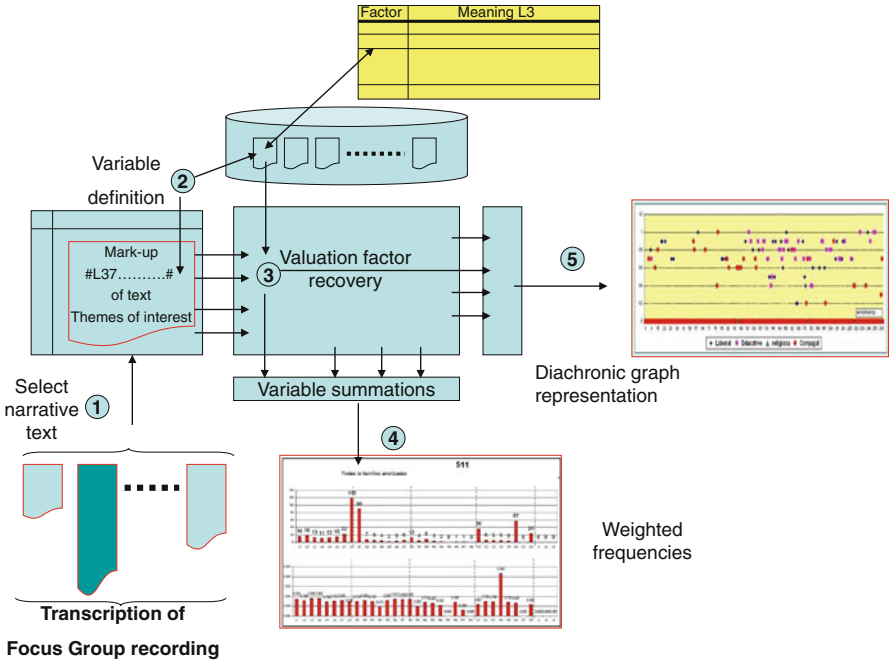

Fig. 4 Basic structure of the application

5 Applying the tool: an example

The following analysis is made using the transcription of a focus group of professionals in the field of management of information in Social Management Institutions that receive financial support from foundations. The main theme of interest is the importance of transparency of information offered by supported institutions to third parties.

The components of the application are shown in Fig. 4.

The general methodology is synthesized in the following diagram (Fig. 5). Here we can see that throughout the three general stages of the category diagram the analysis evolves by means of a trial and error approach. Originally thematic areas were associated with general characteristics related to transparency and subsequently with the definition of variables and tentative evaluation factors. The analysis later rectified these values and established initial values of weighting values and criteria to category integration.

Finally, the main areas associated with transparency in the institutions differentiated various aspects such as a duty, necessity or obligation, the most important requisites and characteristics, associated fears, and special or very difficult cases, such as aspects of reports and information circulation in general. All of this information and a considerable list of nuances were related to variables and categories in order to establish final variables and categories.

In a third phase of the analysis, after reflecting on the synchronic and diachronic representations, the variables were grouped into different categories in order to integrate the aspects analyzed within a more general perspective known as a *Cybercultur@ approach* (González 2003; Maass 2006; González et al. 2007).

The three central categories were established as the "presence of a culture of information, communication and understanding" on the transparency of the focus group. Figure 6 shows

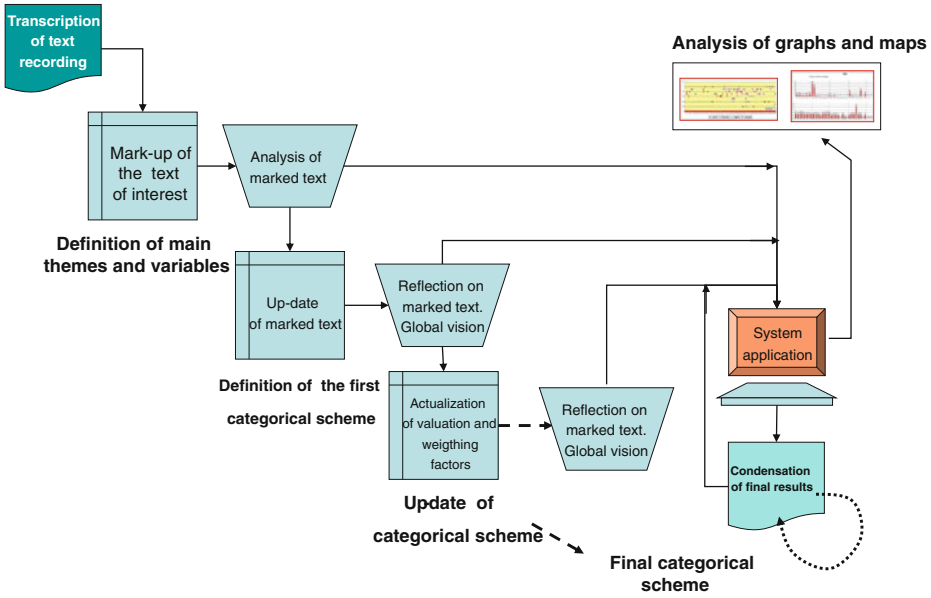

Fig. 5 General methodology of analysis and variable construction

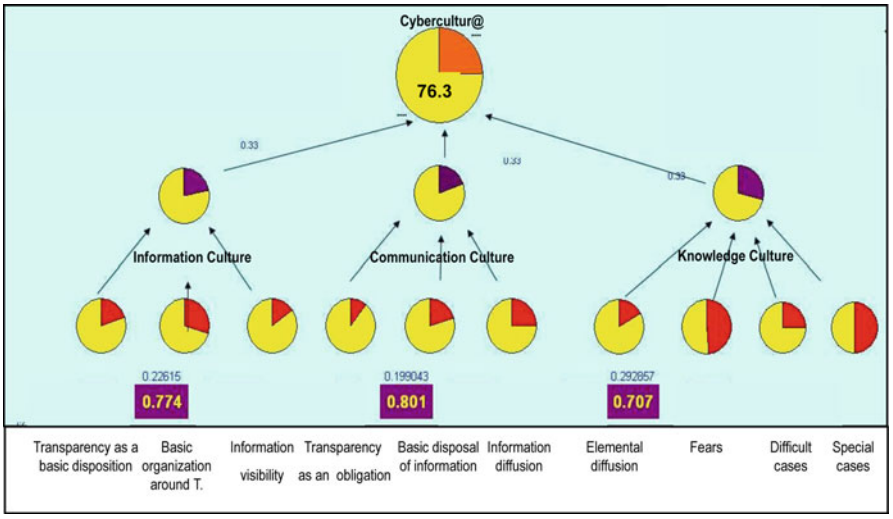

Fig. 6 Hierarchical representation of variable and categories

the category diagram within the synchronic representation of the results of the analysis. At the upper right-hand side of Fig. 6 is a pull down menu (not shown) which allows modification of the weights—established from different points of view—assigned between the variables of the categories. The final variables are shown in the lower part of the diagram.

One of the most important representations that can be generated with a spreadsheet based on the criteria described is the comparison between normal frequencies and axiological weighted frequencies (Fig. 7). We consider that one of the most important representations

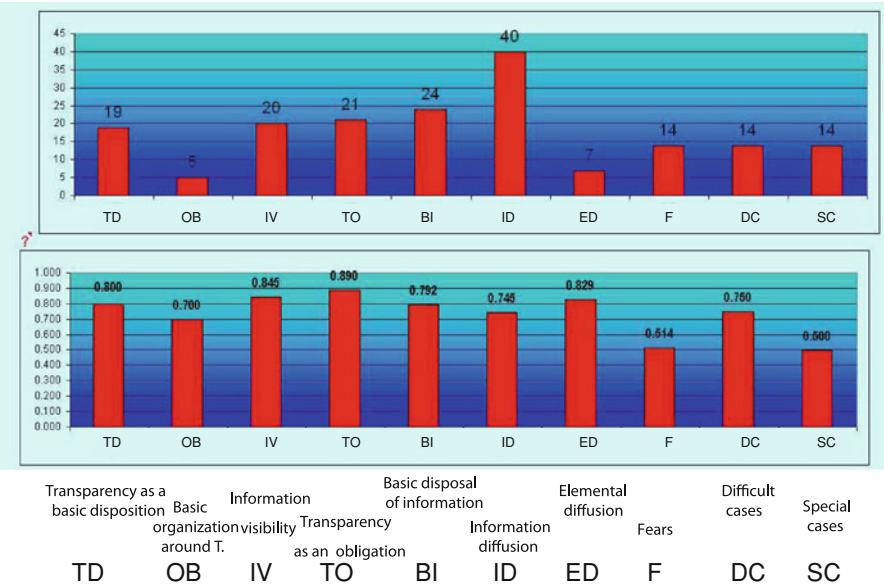

Fig. 7 Normal frequencies (upper graph) y weighted frequencies (lower graph)

is precisely the weighted frequencies, which give us a "qualitative/quantitative perspective that is much more approximate and real than the normal frequencies. Figure 7 shows the differences for the analysis described.

A diachronic type representation of the interventions is presented in Fig. 8. Here we can see the thematic presence and its valuations of several variables throughout the discussion. In this representation it is possible to see trajectories and the interactions between the variables.[9] In the application it is possible to select the presence of any of the variables registered and reflect on the possible interactions between themes. In Fig. 8 five variables are shown and it especially highlights the trajectory or the presence—throughout the 510 paragraphs—of the variable TD -transparency as basic disposition related to offering information to third parties.

6 Some conclusions

Social analysis has always been a challenge to the researcher, especially when classic statistics are not the mainstay of his approach. Quantitative and qualitative contents are inseparable and must be treated together without making strong distinctions. The use of weighted frequencies and category integration by means of factors and weights supported by an axiological framework and by a permanent rectification process involved in a trial and error heuristics depends on the research group's commitment to social analysis. It is a strategy that may be carried out without computers but is impossible achieve such a powerful approach without them. The strategy requires basic knowledge of systems thinking and a set of simple functions present in all spreadsheet software.

[9] This representation acquires special importance in the analysis of life histories and in the evolution of activities in family histories. (Amozurrutia et al. 2008).

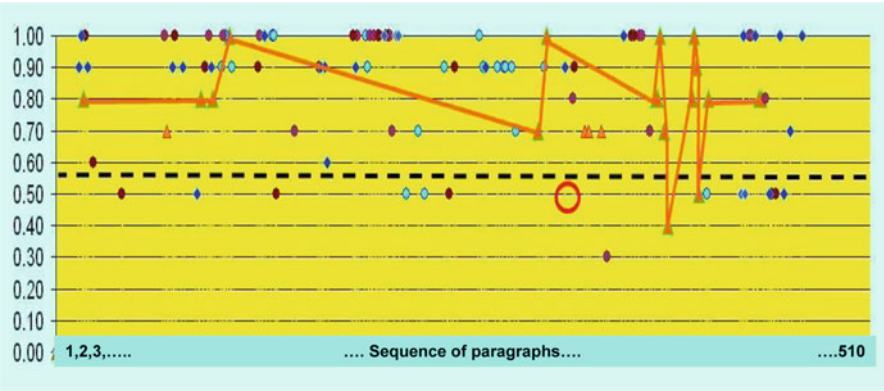

Fig. 8 Variable trajectories. Line of "Transparency as a basic disposition"

As we show in this application, it is possible to construct a spreadsheet system oriented to the design of powerful and reflexive representations that contribute to a social thinking immersed in continuous improvement. Once you know the basic functions and the organization of formulas and tables, there is a wide scope for developing the creative imagination that is required today in sociological research. With this approach we believe it is possible to put behind us the distinctions between qualitative and quantitative perspectives. Instead we may think in terms of creating permanent constructions of social schemes built from a kind of alchemy derived from empirical manifestations constructed as observables of social reality.

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