

1.1 AQUAD and your computer

AQUAD is a sophisticated program that requires a certain degree of sophistication from your computer. All necessary technical information is provided in chapter 2 of this manual. How to prepare texts written in any text processor (for instance, Word or WordPerfect) for the analysis in AQUAD is described in chapter 3. Very detailed instructions how to prepare multimedia data (pictures, audio or video recordings) are compiled by Leo Gürtler in chapter 4. The most important things for you to know at this point have to do with whether or not your computer is able to accommodate AQUAD. Here are its basic requirements:

- (1) Your computer must be equipped with Microsoft's Windows 98/NT/2000/XP.
- (2) Your computer must have a hard disk with approximately 90 MByte free disk space.
- (3) The program comes on CD-ROM. Your computer must have the appropriate drive.

You must install AQUAD on your hard disk before you can use the program. This is a one-time process; once the program is installed, all you need to do to work with the program is to go to the directory where the program modules are stored on your hard disk and load the program from there. How to install AQUAD is described in chapter 3.

1.2 Some basic principles of AQUAD

1.2.1 Modules and menus

AQUAD offers you menus that list the various things you could do, and you choose the one you want by clicking on it with your mouse or by pressing the Alt-key together with the underlined letter of the function you want.

There are two ways in which to navigate from one menu to another. These two have to do with the distinction of "main menu" and "sub-menu." The main menu corresponds to the major components of the program, called "program modules." They form the basic "architecture" of the program. Their names are present in a headline on the screen when you start AQUAD or after you terminate your work within one of its modules.

You proceed very easily from the main menu to its sub-menus: You place the mouse pointer, usually an arrow, on the choice of action you want the program to perform, and click the left mouse button or you press the Alt-key and the underlined letter together, and the appropriate sub-menu will appear. Here you see the main menu:



The module *Project* gives you an opportunity to determine some "default" parameters for the project you are just working with, i.e., to tell the program to do certain things on a regular basis rather than asking each time, for instance, whether you want to include a particular text file in your analysis or where to save the results of an action.

The module *Files* lets you select or edit a list of all your data files (a "file catalog;" more about this in chapter 5). Within this module you also import text files in ANSI (txt) format or in RTF (Rich Text Format) from your word processor into the AQUAD environment. In case you need space at the end of your texts to add, for instance, socio-demographic codes representing general characteristics of the text creators, this module is where you can add blank lines to your texts. More about that in chapter 6.

The main function of the module *Coding* is to assist you in coding your data. A text file can be called to the screen, and the researcher attaches the code to the end of the line on which the segment ("unit of meaning") begins. Because you do not need to print your texts first, this procedure is called *one-step coding*. The whole procedure is explained elaborately in chapter 6. Alternatively, you can start with a print-out of your line-numbered text files. This *print-out* can be produced by your word processor or from within the module *one-step coding* (see chapter 6 for details). You may then work with this print-out exactly as you would without a computer: mark the beginnings and ends of relevant text portions, and write a code in the margin. In a second step, instead of cutting out the segments and pasting them on other sheets of paper, the coding information is entered into AQUAD, using the line numbers and the code names. This is called *two-step coding*. Details are presented also in chapter 6. The module *Coding* offers additional functions, for instance, if you want to combine systematically different codes under a more generic meta-code or if you want to add short descriptions the code names in your master code file, i.e., an automatically created catalog of all codes used in your project.

The reason AQUAD provides the two-step option is that some researchers prefer to look at a paper print-out of their data, rather than at the computer screen, while they code their data. AQUAD automatically numbers the lines of your data texts consecutively. If you have your data printed out from within AQUAD, the numbers will be visible at each line. Now you can do your coding on the print-out (perhaps using the standard square brackets to indicate the segments). When finished, you would enter the program and provide the code name and the line numbers only for each segment in a mask. The numbers, of course, are the ones that correspond to the lines of your data text.

There may be another reason to use two-step coding: in some text-based studies, researchers do not use transcriptions of texts, but work with copies from books, diaries, documents, newspapers, etc.

Of course, AQUAD is capable of assisting you in more ways than just by managing code entries. The *Retrieval* module allows you writing a list called a catalog of all those codes and words of particular interest in your data text. AQUAD will use every single code or word in a catalog when you choose an adequate program function like retrieval of code sequences (for instance, code overlaps or hierarchical nestings) or counting of code or word frequencies. You can use word catalogs to create a dictionary of conceptually related words, synonyms, etc. Supposed you want to explore statements about your interview partners' families, you could assemble key words like "family", "mother", "father", "sister", "brother", "my folks" etc., in a catalog. This particular catalog would assist you in detecting all segments in your texts where family issues are mentioned.

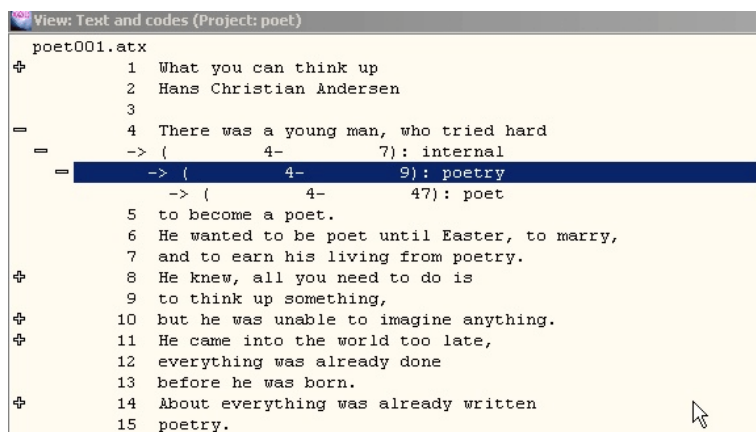
The module *Tables* supports two-dimensional retrieval strategies. Sometimes you may want to find text segments of a particular code only in those texts for which another critical code is valid. For instance, if one of your codes is "male" and another is "female", a third is "vacation", and a fourth is "work", you can tell the program to make a matrix with two rows and two columns. The cells will be filled out with the segments of text from your data in which men talk about vacations, then those in which they talk about work, then with the text containing women's opinions about vacations, and then their opinions about work.

Linkages is one of the two modules most important for theory building in AQUAD. It allows you specifying certain meaningful interrelations of text segments by formulating linkages of more than just two codes in your data files. Then you let the program check whether these linkages occur in the database or not.

The function of the module *Implicants* was mentioned briefly in the introduction and is explained later in chapter 13. It applies the procedure of "logical minimalization" to a complex comparison of configurations of codes appearing in the database. One of these codes is assumed to be an "outcome" of a configuration of the codes - which in turn are assumed to represent potential "conditions" or "causes."

Then there is the module *Memos*, which supports the advice of Glaser (1978) to note immediately everything that crosses your mind while interpreting a text. Maybe you get a hunch about missing codes, about relations, contradictions, potential exceptions from your coding rules, etc., but you cannot elaborate on that particular idea at the moment. Writing memos is a good compromise if you are confronted with the alternatives either to forget some really important ideas or to lose the thread in your process of interpretation. In AQUAD you may relate your notes to the number of the text, to the line number, maybe to a relevant code or to an additional index. Thus, retrieval of memos and the associated text segments is very reliable. When you need your memos again, you can combine retrieval criteria (the text and/or line numbers, codes, etc.). In case you should have forgotten all of a memo's critical markers, you may at least remember the one or the other characteristic word from the memo's text; then you can use the function for memo retrieval by key words.

The module *View* gives - as may be expected - an overview on text files together with codes attached to the beginnings of text segments in an "outline" format (see figure below), which you know, for example, from file lists in WINDOWS dialogues. The same view is accessible all the time also from within one-step coding and two-step coding (see chapter 6).



```

View: Text and codes (Project: poet)
poet001.atx
+ 1 What you can think up
  2 Hans Christian Andersen
  3
- 4 There was a young man, who tried hard
  -> ( 4- 7): internal
  -> ( 4- 9): poetry
  -> ( 4- 47): poet
  5 to become a poet.
  6 He wanted to be poet until Easter, to marry,
  7 and to earn his living from poetry.
+ 8 He knew, all you need to do is
  9 to think up something,
+ 10 but he was unable to imagine anything.
+ 11 He came into the world too late,
  12 everything was already done
+ 13 before he was born.
+ 14 About everything was already written
  15 poetry.

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The module *Help* offers access to general information about AQUAD via a list of contents and via a list of key words. Principally, it functions like all help modules in software developed for WINDOWS. In addition, most AQUAD windows contain a specific help button in a button panel on the right end. This button opens a selection of help topics which may be useful in that particular situation of your work.

The module *Tools* finally is particularly interesting for users of the former version 5, for workgroups, and for researchers, who want to export frequency tables for further quantitative analysis. If you want to continue in AQUAD 6 a project started under version 5, you can convert your available files (codes, memos) into the new format of version 6. Workgroups, whose members are analyzing the same files, will find a tool to merge their codes into one file and remove multiple codings (for instance, because each team member necessarily applied the same "speaker codes" to mark the same data segments).

1.2.2 Individual files and file catalogs

When you start AQUAD, as a default it always loads the project setup and the "catalog" (list) of files you have last been working with. After the installation, the setup of example projects using interview texts ("interview"), audio recordings of the same texts ("a_inter"), video recordings of a playing baby ("baby") and photographs of orchids ("blossoms") are already available. Normally, you would work on only one project, and as one of the first steps of working with AQUAD, you will make a list of all data files you are analyzing in that project and give the list a name. This is done in the modules *Project* and *Files*. Afterwards, whenever you make a selection from the main menu, that catalog is loaded automatically until you select another file catalog or you modify it. If you want to make sure which text files are in the various file catalogs, choose "*Edit a file catalog*", select the catalog you are working with from the list of file catalogs - and just have a look on its content (= the list of file names) without editing anything. Of course, you may add new files to the catalog or do any other editing any time you need to (more on this in chapter 3). You also may make as many catalogs as you want (also chapter 3).

Usually, a researcher would make more than one catalog even when only one research project is being worked on at the same time. For coding, you pick a single file from the code catalog. But if you have reached a stage in coding where you want to run your first analyses, for instance, you want to retrieve nested codes, the program takes *all the files* listed in your code catalog and analyzes them one after another automatically. Now imagine, you have 100 text files, but at the moment you are interested in nested codes only in 10 of them. Or you just want to try an analytic heuristic on a sample of files and not wait much time by waiting for all 100 files to be analyzed. No problem. You create a separate file catalog directly from your original catalog by editing it - in this case by erasing all file names you do not want to be included.

1.2.3 Paper printouts and result transferability

Since you will want to look at the results of your work with AQUAD at times other than when you actually are in the program, AQUAD provides two options for you. You can either have the results of your work printed out on paper, or you can have them stored as an ANSI or RTF file, i.e., a file that can be imported into your word processor, or other programs that deal with text and have import-capability.

For *printing on paper* you push the right mouse button once the results of an analysis are visible on the screen. A small menu window will pop up, from which you then select the option *Print*. In case you want to change fonts, font size, the layout of printed pages (size, margins) or select a particular printer - if more than one is available from your computer - choose the appropriate option in the function bar on top of the screen by clicking on the corresponding icon.

For *saving results in ANSI files* the procedures are similar to those for paper copies. Of course, you always select the *Save* option from the pop-up menu first. This opens an additional window, where you enter a file name for saving this file (the path for result files was already determined during the installation of AQUAD, see chapter 2). After pushing the 'OK'-Button all the results present on your screen or a marked group of result lines are copied to the file you just defined.

Result files are saved in plain ANSI format. You can import them in any word processor, supposing it is capable to read ANSI files (we know of no word processor unable to do this). Here you can re-format the

results, change the layout, etc. as you wish when publishing your study. If the results consist mainly of numerical data – as in frequency counts of codes – you can use result files directly in your statistical package (again supposing it is able to read plain text data). Alternatively, you may convert frequency lists in CSF (comma separated format) tables, which can be imported in some spread-sheet programs.

1.2.4 How to get out of AQUAD

Find your way back to the main menu from wherever you are by either choosing 'OK' or by choosing 'Cancel' from the panel of buttons on the right side of the screen (if necessary several times). Then you choose *Project* from the menu headline, and from the sub-menu, which is now pulled down, you select 'EXIT'. All you have to do is to confirm your choice by selecting 'EXIT' again in a subsequent window – and AQUAD is terminated.

In case something very unusual happens, AQUAD will place a warning on the screen. Please, tell the author of the program about this error and where in the program it happened and what you intended to do within this module. The author's fax-number and e-mail address are shown in the final window before terminating AQUAD. In several cases when AQUAD terminated its work in an unconventional way, we found that a user had decided later to copy the program modules or text files in other sub-directories than originally defined during installation. This leaves some internal parameters unchanged! Please, do not copy the program modules manually from one directory to another, but always use the installation routine, if you want to do so. If you are going to move your project files around, tell AQUAD about the changes by activating "*Edit project settings*" in the "*Project*" sub-menu.

1.3 How AQUAD facilitates categorization

The categorization of text segments is accomplished by an interpretational effort on the part of the researcher who seeks to discern the meaning of a portion of text, and assigns to it a symbol that represents that meaning. Following the use of language by Miles & Huberman (1984) and by most software developers for qualitative analysis, we will call these symbols "codes". Coding of the text transforms the colorful, individual formulations of our subjects' everyday language into a less complex and less ambiguous system of notations. In order to illustrate this procedure, we will give you an example from a research project that we will refer to regularly in this manual:

In a study by Carlos Marcelo at the University of Sevilla, Spain, on problems of beginners in the teaching profession, 105 novice teachers were asked about their experiences at school. According to the model of professional socialization developed by Jordell (1987), Marcelo started the reduction of data with the search for statements by the teachers about "personal", "teaching-specific", and "institutional" influences. The corresponding segments in the interview texts were coded as EAS (personal experiences as student), ELA (experiences in the training as student teacher), UEB (convictions), etc. (Huber & Marcelo, 1993).

When researchers were still coding their data texts by hand, they usually marked in some way the beginning and end of a text segment they found relevant, considered the content, and then wrote the appropriate code in the margin. AQUAD offers the computer user two different ways in which this coding can be done electronically. For the first procedure (called "one-step coding"), the text can be called up onto the computer screen, and the researcher attaches the codes to the line on which the segment begins, typing in the number of the ending-line as well. Again, this procedure is explained elaborately in a later chapter. The boundaries of segments may overlap in any way the researcher desires, and smaller segments may be nested within larger ones. In addition, more than one code may be attached to the same segment.

The alternate procedure is a "two-step" method. The researcher needs a print-out of the data text, i.e. of the "file" on which s/he is currently working. If such a print-out is made using AQUAD, each line of the text will have a consecutive number attached to it. This is important, since the line number tells the computer where to locate things in each file. The researcher may then work with this print-out exactly as s/he would without a computer: mark the beginnings and ends of relevant text portions, and write a code in the margin. In a second step, instead of cutting out the segments and pasting them on other sheets of paper, the coding information is entered into AQUAD, using the line numbers and the code names (details are presented in chapter 6 later in this manual).

It is very important that you have AQUAD line-number your text – and *not* your word processor! For some operations, AQUAD expects the line numbers at a particular location in your text file and adds these numbers "on the fly" whenever they are needed within a particular module -- whereas your word processor would make line-numbers a permanent content of your text files. Please, let AQUAD number the lines of your text transcriptions; this is done automatically when you select a function that needs line-numbered text.

AQUAD will compile automatically a list of all the codes used in all of your files. This list is called the *master code list*. We must distinguish between this code list and those code files which are assembled by AQUAD for every single code in a file, together with the references to the place of their occurrence: number of the text, number of the first and last line of the segments. The code entries in code files can easily be corrected, added to, or modified in AQUAD. Furthermore, the organizing system itself can be restructured by combining particular categories, thus creating "meta-codes". Again, you will learn more about this in chapter 6.

Once some or all of the data files are coded, the computer can be instructed to compile a collection of all text segments that have the same code, meaning that they belong in the same category. Some researchers may want to use the results to look for pervasive themes within one category, so that the category can be described in terms of the commonalities and uniqueness found in the data regarding the topic represented by the category. Researchers who are more interested in the generation of theory will want to inspect the content of their categories to assure consistency of coding, and category integrity.

Depending on these two researcher interests (descriptive/interpretational or theory-building), the nature of the codes will vary. When a researcher wishes to interpret and to create a higher-order analytical description of the data content, codes are more like pointers to a specific topic as alluded to by the subject. They may

occur as often in a single data file as the topic is mentioned. When a researcher is interested in the construction of theory, the text itself is often not important in the later phases of analysis. What counts is the fact that a certain piece of evidence does or does not exist in the data file. The code signifies the occurrence of that piece of evidence. Although the evidence may occur several times in the same file, *one* occurrence is sufficient to characterize the file as "containing the evidence". The code, therefore, represents more a characteristic than a topic. Very simple codes may merely stand for a socio-demographic attribute, such as "male" or "female". Others may represent a particular attitude or experience, or anything else that may become an important category in the research context. More sophisticated codes may represent a sequence of other codes as an indicator of some complex topics found during a linkage analysis. AQUAD will add such 'linkage codes' or 'sequence codes' automatically to your code files, if you wish. More about coding in chapter 6.

1.4 Word retrieval and word frequencies

Often coding is facilitated by locating words and phrases in data, especially in transcripts of interviews where subjects may use them to describe a particular fact, situation, experience, or opinion the researcher is interested in. AQUAD allows you finding such words and phrases in any data text. The frequency with which these critical words occur may be an indication of the strength of the emphasis placed on the concept expressed with them. Therefore, AQUAD will count the frequency of their occurrence. Furthermore, it will construct "key-word-in-context" (KWIC) lists, consisting of a print-out of all the text lines that include the word you are looking for, together with a reference to the place where the word was found in the data. All the researcher has to do then is to decide whether s/he wants to attach a code to this sentence or not.

1.5 Tables or matrices

Matrices are recommended as important forms of data display, especially by Miles and Huberman (1994). With the help of AQUAD, a two-dimensional net for a structured output of text passages can be created. To construct such a matrix, you must define the columns and the rows of the matrix. For the columns only "singular" or "profile" codes can be used, i.e., codes that are only used once in a given text file, as for instance, codes for the gender or age of the subject, or for the interview number, etc. Because these codes represent characteristics of the person interviewed, a site, etc., they are also called "profile codes". The rows are for "interpretational" or "conceptional" codes that are especially interesting for the perspective under which the data are displayed. For example, in the above mentioned study about experiences of beginning teachers we could get an interesting overview of the data simply by creating a table of text passages for which the columns would be defined by the gender of the subjects, and the rows by their "convictions," "worries," and "self-concepts." In this particular display we would see all the text segments from all the texts that correspond to the definition of this 2x3 cells matrix.

If we produce text matrices of this kind, we may well have to accept an enormous consumption of paper – and we need big empty walls in order to hang up the print-outs. As a second option for the display of qualitative data, AQUAD lets you print as the content of the cells only the names of the codes, together with their place of occurrence in the data. This form of matrix is less voluminous and easier to review. It allows you arriving at first ideas about the possible connections between categories. These hunches are the beginning of the development of qualitative hypotheses that you later may wish to test. Even smaller are frequency matrices as results of table analysis. They show only the frequencies of codes defining a row in case the code defining the corresponding column is given in a data text. Of course, you receive less information by this type of analysis.

1.6 Exploration of regularities and linkages

If the coding you have done refers not merely to a particular topic contained in the data (such as "schooling" or "relationship with father"), but tells us something about the actual content or quality (such as "12 years" of schooling, or relationship with father "strained"), AQUAD will help you discover whether there are patterns and linkages in your data. In fact, that is the main point of AQUAD: to assist in theory-building. Perhaps "12 years of schooling" regularly clusters together with "professional success" and "high income". Perhaps "strained relationship with father" appears only in data segments that also hold some other feature you are interested in. In order to find out about these patterns or linkages, you would first need to postulate one; you must know what you are looking for before you can look for it. Then you would make AQUAD examine all your data for such cases, and then draw your conclusions from what AQUAD finds.

Of course, this is a very simplified description of the actual process (later in this manual you will find out how complicated are the linkages you will be able to analyze with AQUAD). But it conveys the basic principles.

AQUAD has preformulated for you a number of search algorithms called "linkages". For instance, you might "hypothesize" that code "ABC" always appears in your data within a short distance from code "XYZ". Just substitute your own codes for the general ones here, make the appropriate choice from a "linkage" menu, and AQUAD will do the rest (all but tell you whether what you have found makes sense). The hypothetical linkages AQUAD has pre-formulated are the following:

1. Two codes occur in the same data document within a specified distance of each other (true for which cases?)
2. Two codes occur in the same data document within a specified distance of each other (true/false for which cases?)
3. Three codes occur in the same data document, with code #2 within a specified distance of code #1, and code #3 within a different specified distance of code #1 (true for which cases?)
4. One or both of two codes occur in the same data document (true for which cases?)
5. One, two, or all three of three codes occur in the same data document (true for which cases?)
6. Two codes occur within a specified distance of each other in a document, which contains a particular third code (true for which cases?)
7. Two codes occur within a specified distance of each other in a document, which contains a particular third and fourth code (true for which cases?)
8. Three codes occur in the same data document, with codes #2 and #3 being sub-codes of code #1 (true for which cases?)
9. Three codes occur in the same data document, with code #2 being a sub-code of code #1, and code #3 occurring within a specified distance of code #1 (true for which cases?)
10. How often do two particular codes both occur in the data documents, how often does code #1 occur by itself, and how often does code #2 occur by itself? (Coefficient of similarity as additional result)
11. Two, three or four codes related to the same speaker or question (cf. "speaker codes"; chap. 6) occur in the same data document within specified distances (true for which cases?)
12. Two particular codes or two alternative codes (or one of the first pair of codes and another code) occur in the data documents within a specified distance (true for which cases?)

13. A particular code or an alternative code occurs in the data documents within a specified distance of a second code or an alternative second code (true for which cases?)

When AQUAD "tells" you what it has found, it does so by referring to the places in your data where the match occurred. If you work with text files as data base, extracted text segments are added, if you mark the appropriate checkbox.

In addition to these pre-formulated linkages, you can formulate your own by logically connecting up to five codes. A special chapter of this manual is devoted to a description on how to do this (chapter 12).

1.7 How AQUAD deals with the exploration of causality

Causality is hard to prove. There are a number of quantitative methods by which researchers try to do so; their description would be beyond the scope of this manual. Ragin (1987) reminds us that quantitative methods (or the "variable-oriented approach", as he calls it) are not the only way to explore causality. In fact, they might be an inferior way, since it is difficult in variable-oriented research to deal with the complexity of multiple causation. Since quantitative researchers are aware of this, they have introduced sophisticated ways of remedying the problem. However, "as the complexity of the causal argument to be tested increases, intractable methodological problems are introduced" (Ragin, 1987, p. 68):

The assumptions of statistical models become more strained in the face of intricate causal arguments, given a restricted sample size (Ragin, 1987, p. 68), and ... the main weakness of the variable-oriented strategy is its tendency toward abstract, and sometimes vacuous, generalizations (Ragin, 1987, p. 69).

While "the main weakness of the case-oriented [qualitative] strategy is its tendency toward particularizing" (Ragin, 1987, p. 69), it will "allow analysis of parts in a way that does not obscure wholes" (Ragin, 1987, p. 83). It does so by "COMPARING wholes as configurations of parts" (Ragin, 1987, p. 84). The method Ragin recommends is the "Boolean method of qualitative comparison", so called because it uses some techniques invented by the mathematician George Boole (1815-1864).

This process of comparison, however, cannot be done without some kind of reduction. The "parts" Ragin is referring to can be understood as items occurring in a data text that are considered by the researcher "conditions" s/he suspects may be prerequisites for an "outcome" s/he is interested in. The items (which may actually consist of an entire text segment) are reduced to a code (as we would use it in the linkages described above), and the presence or absence of the code in the data is reduced to the dichotomous values "1" (present) and "0" (absent). Thus we have entered a still higher level of abstraction.

Let us assume we suspect that there are three "conditions" (A, B, and C) that may have something to do with "outcome" X. Are all three of them necessary to produce that outcome? Does outcome X also occur when none of these conditions are present? Perhaps combination AB or BC or AC is the one that leads to outcome X? Does it do so in all cases? Is it necessary perhaps for B to be absent so that X can result? In order to explore such questions we would begin by constructing tables in which we enter all theoretically possible combinations of the conditions (as zeros and ones), one combination per row (Boole calls these "truth tables"). Then we would examine our data and note first which combination (counting both presence and absence) exists in each case, and then whether outcome X is indeed present in that case. Gradually, we will encounter most of the combinations in our data, and we will also note in our table in how many cases each occurs. Some combinations of conditions may not occur at all in "real life" (as our data represent it), and we would have to enter a "?" in the column that records whether outcome X was obtained or not. The next step is to examine the table to see what it tells us about the connections of the various combinations of conditions to the outcome. This is done with the help of an algebraic method that is actually fairly simple, but requires some concentration to follow. It is explained in more detail in chapter 12. In this part of the manual you will also learn how to transform your qualitative (and quantitative) data into "truth values." The result of the process is the pinpointing of the one or the several constellation(s) of conditions that is/are so invariably connected to outcome X that we will have to accept it/them as the "cause."

AQUAD provides the module *Implicants* that allows you performing Boolean qualitative comparisons on your data. One requirement is, of course, that your data represent a large enough number of cases to make the comparisons meaningful.