Comparing Cases and Groups, Discovering Interrelations, and Using Visualizations

12

Creating categories, coding data, defining variables, and determining code frequencies are key steps in the analysis process. It would be far from accurate to view these steps merely as "preliminary work" for the actual analysis process. This is especially clear if you consider how the category system is constructed, because it usually takes a lot of work and careful reflection to arrive at a sound and effective category system that suits the research question. The category system itself and the assumptions and hypotheses about the relationships between codes both represent independent results of the analysis process and are vital to answering the questions at the heart of a project. Nevertheless, the question "What comes next?" will inevitably arise, or more specifically "What comes after coding the data?" This chapter will address the latter question, while paying special attention to case-oriented and cross-case visualizations, which each play particularly significant roles.

In This Chapter

- Comparing cases and groups
- Using sets to form groups for analysis
- Using quantitative data for qualitative and quantitative group comparisons
- Visually displaying the relationships between cases (documents) and codes
- Comparing the frequency of specific content or statements between groups
- Examining overlaps and interrelationships between codes
- Asking complex questions about the data
- Discovering more types of visualizations

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About Case and Group Comparisons

Consistently comparing cases and groups is one of the core techniques of qualitative data analysis and plays an important role in many analytical methods—especially in grounded theory, in the form of the "constant comparison method" (Glaser & Strauss, 2009, pp. 102–113). These comparisons can be conducted in MAXQDA both as qualitative and quantitative comparisons.

For *qualitative comparisons*, the coded segments of one or more selected categories in cases or groups are compared with each other. For example, "What do Maria, Isabel and Anna say about environmentally conscious nutrition?" or "What do students say about this topic?" Qualitative comparisons work with the coded original texts or with the summaries provided in the Summary Grid and do not require any numeric data.

Quantitative comparisons focus on the number (or the extent) of coded segments. The questions are "How often do Maria, Isabel and Anna talk about the topic of environmentally conscious nutrition?" or "To what extent is the topic covered in the relevant interviews?"

In the simplest case, the groups you want to compare will correspond to your document groups, i.e., the groups that are displayed in the "Document System." For example, if a study was conducted in two cities and the interviews were assigned to two different document groups, let us say "Tokyo" and "New York," then you would be able to compare the coded segments between these two groups.

Another way to form groups is to use *document sets*. In MAXQDA, these are groups that are put together especially for analysis. You can do this by creating a new set (right-click on the word "Sets" in the "Document System" and select the ***New Set*** option) and simply dragging and dropping documents into that set. In most situations, sets are created on the basis of certain characteristics. Sometimes you may want to create sets of documents that contain a particular code or a combination of codes. More often, however, you will probably use certain standardized data stored as document variables in your MAXQDA project to form a document set. For example, you could form the sets "Women in the 30–40 age group," "People with a test result outside the simple standard deviation," or "High-school students who received a mathematics grade of A– or above in their final exams."

Forming Groups Based on Variable Values

As described above, document sets can be put together manually or according to document variable values. Even for purely qualitative studies, it makes sense to store the sociodemographic characteristics of your research participants, as well as other standardized information, in the form of document variables. Indeed, mixed methods studies usually have their own data set containing the quantitative data collected. We will now look at how these document variables can be used to form groups to conduct comparisons.

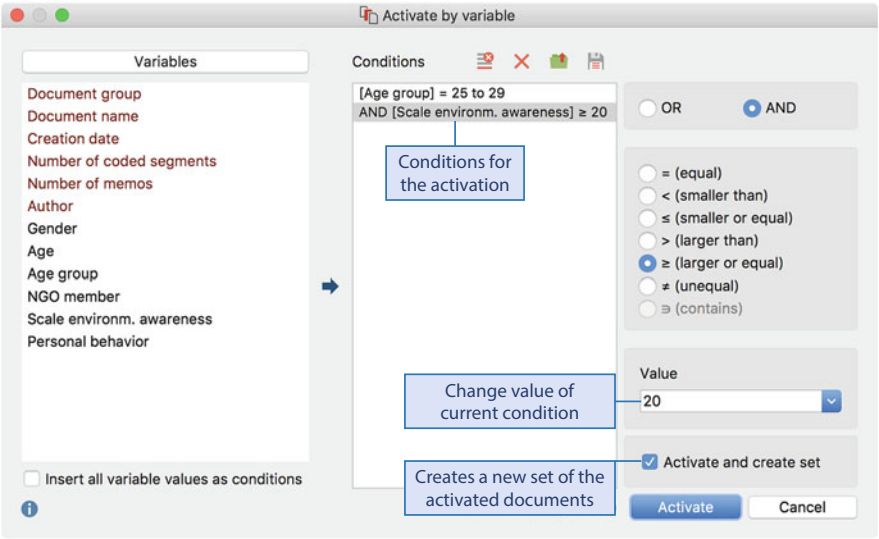


Fig. 12.1 Formulating conditions for the automatic activation of documents

In MAXQDA, you can group documents in this way by selecting ***Activate by Document Variables*** in the context menu that appears when you right-click the top row in the "Document System" or via the corresponding icon in the toolbar of the same window or the first option in the "Mixed Methods" menu ribbon. Once you select this option, the dialog box shown in Fig. 12.1 will appear, where you can configure logical conditions for the activation process.

These conditions have to be defined according to the following rule:

"Variable Name Operator Value"

If you recorded your participants' ages, for instance, by creating age groups like "25–29 years," and then named the corresponding variable "Age group," the formula for selecting people in this age range would need to be configured as follows:

"Age group = 25 to 29 years"

Multiple selection conditions can also be linked according to the AND combination. This way individuals in the age group 25–29 can be selected who, for example, have also been attributed a certain minimum value on the "Environmental awareness" variable scale. In Fig. 12.1 a value of 20 has been set as a minimum selection value.

Selecting the ***Activate and create set*** option not only activates the relevant documents but also creates a new set in the "Document System," which contains all documents that meet the applied variable conditions—a set which is then available for further analysis. The selection formula is automatically added as the new set's name, but this name can of course also be replaced by a name of your choice.

Compared to creating sets manually, this automatic method is clearly much faster and more convenient. Moreover, this analysis function is invaluable, especially when you are analyzing a large number of documents, as may be the case if you have conducted a mixed methods online survey, for example.

A further interesting analysis option can be to transform the frequencies of codes into document variables; you can do this via the context menu for codes (see Chap. 10). After completing the transformation, you can form groups of documents to which certain codes have been assigned or where the frequency of an assigned code exceeds a given threshold value. Please note that the document sets are not dynamically connected to the document variables, unlike the variables themselves which are dynamically linked to the codes and which are updated each time you add or delete a coded segment of a code that has been transformed into a variable.

Document sets differ considerably from document groups in one respect: while each document can only belong to a single document group and is deleted when the group is deleted, a document can belong to any number of document sets. Sets can be removed without deleting the associated documents.

Qualitative Contrasting: Comparing Statements of Cases and Groups

The function ***Analysis*** > ***Compare Groups*** > ***Qualitative*** is used to compare the contents of statements made by individuals or groups. The dialog box that appears (Fig. 12.2) consists of three areas.

Drag and drop at least two document groups, document sets, or individual documents from the "Document System" into the "Groups" area (at the top). Then drag and drop one or more codes from the "Code System" into the middle section "Codes." In the "Compare" section below these, you can select which data you want to compare: the coded segments of the selected codes or the coded segments combined with the comments that have been written for each code. MAXQDA will then generate and display an Interactive Quote Matrix.

If two groups have been formed as document sets as described above, e.g., "Environmental NGO membership = yes" and "Environmental NGO membership = no," the Quote Matrix presents the statements of these two groups side by side in a table format. In Fig. 12.3 this has been done for the code "(Influence) through individuals." In the second column, the corresponding statements made by individuals who are not NGO members are listed, while the third column lists those of NGO members. The previously selected codes are listed in the leftmost column, and from here you can switch between them. You can also choose whether you want the source information and memos to be displayed as well as the code comments displayed below the coded segments.

The Interactive Quote Matrix is connected to the original data: clicking on the source information below a segment displays it in its original context in the "Document Browser." If you want to use this comparison for a presentation or publication, or to integrate it into a poster, you can save it as a text file for Word (RTF format) or as an Excel table.

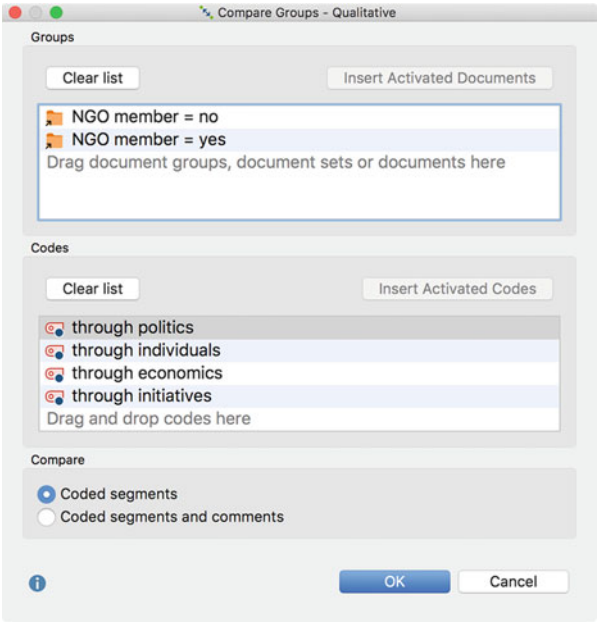


Fig. 12.2 The dialog box for comparing cases and groups

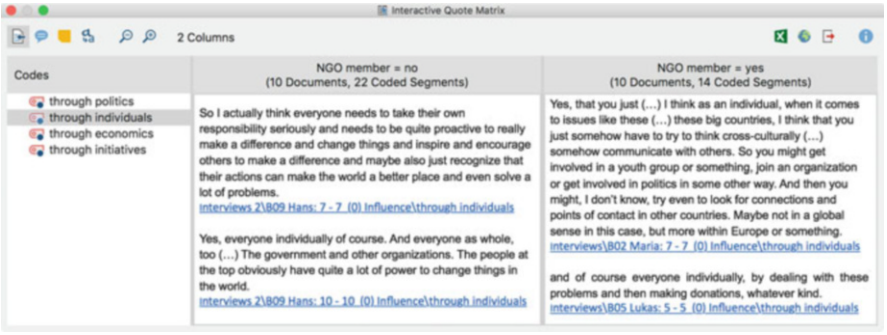
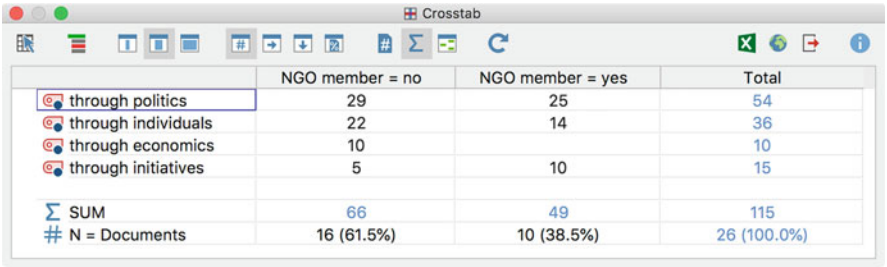


Fig. 12.3 Compare statements made by groups with the Interactive Quote Matrix

Quantitative Contrasting: Comparing Frequency of Statements of Cases and Groups

The Interactive Quote Matrix depicted in Fig. 12.3 allows you to make purely qualitative comparisons of cases and groups. However, you may also be interested in comparing the frequencies of codes for both cases and groups. As with the qualitative comparison, the groups you want to compare must first exist as document



	NGO member = no	NGO member = yes	Total
through politics	29	25	54
through individuals	22	14	36
through economics	10		10
through initiatives	5	10	15
Σ SUM	66	49	115
# N = Documents	16 (61.5%)	10 (38.5%)	26 (100.0%)

Fig. 12.4 Compare code frequencies for groups with the crosstab

groups or document sets in the "Document System." To conduct a quantitative contrast of cases or groups, you can use the function ***Analysis*** > ***Compare Groups*** > ***Quantitative***. A dialog box similar to the qualitative group comparison dialog will appear (Fig. 12.2). This is used to select the cases or groups and the codes for your comparison.

MAXQDA will then generate a crosstab table in which the code frequencies of cases and/or groups are compared.

Figure 12.4 compares the code frequencies of four codes, namely, "through politics," "through individuals," "through economics," and "through initiatives", for members and nonmembers of environmental organizations. The "Σ SUM" row contains the number of coded segments for the respective groups (i.e., 49 coded segments for the members), and the bottom line "# N (Documents)" indicates how many documents in this group are included in the analysis.

The toolbar available at the top of the window opens the following display options, which allow a variety of further analyses:

- ***Display codes with hierarchy***—If you select this option, MAXQDA automatically adds the parent codes of the selected codes to preserve the hierarchical structure of the code system. This has the advantage that the code groups can be aggregated by collapsing them. If this option is switched off, all the codes selected for the analysis are displayed without their hierarchy. This gives you the option of removing unwanted, nonactivated parent codes from the display.
- ***Number of segments***—Shows absolute frequencies, i.e., the number of segments of the respective code for the respective group.
- ***Row percentage***—This is the percentage share of the cell calculated in comparison to the whole row (i.e., the figure in column "Total"). The row shows how the number of coded segments is distributed as a percentage across the selected groups.
- ***Column percentages based on the sum of coded segments (row "SUM")***—This is the percentage of the cell calculated in comparison to the whole column (i.e., the figure in row "SUM"). The column shows how the number of coded segments in the individual groups is distributed as a percentage across the selected codes.

- ***Column percentages based on the number of documents (row "N = Documents")***—Indicates the percentage of documents within the respective group in which each code occurs (the option ***Count hits only once per document*** is selected automatically in this case).
- ***Count hits only once per document***—The documents are used as the unit of analysis. For each document, the system only registers whether the corresponding code has been assigned or not; it does not matter how often a code occurs within a document.

Using Visualizations for Analyses and Presentations

Bar charts and pie charts are ubiquitous as a means of presenting results in both scientific and nonscientific publications. For Eurobarometer surveys, for example, the data of thousands of respondents are summarized in a chart, allowing the data of 27 EU countries to be presented and compared at a glance. It is hard to believe that it has been more than 200 years since William Playfair, a Scottish engineer, invented these forms of representation (Tufte, 2001, p. 3). Bar and pie charts are still used today in quantitatively oriented research—though with far more beautiful designs and more complex structure than originally conceived. These charts also play a role in the analysis of qualitative and mixed methods data, but only for qualitative data if it has been transformed into quantitative data, for example, as frequencies of the occurrence of a particular category. While visualizations for the analysis of qualitative data are still discussed relatively rarely (Kuckartz, 2014; Miles, Huberman, & Saldana, 2013), MAXQDA contains some very useful tools in this respect, which are described below. You can find a detailed discussion on visualizations and how to use the visual tool MAXMaps in Chap. 17.

Code Matrix Browser: Visualizing the Distribution of Codes Per Case or Group

The following question often comes up during analyses: which codes have been assigned to which documents and how often? What you need here is a presentation of these results in a "documents x codes" format, preferably as a table or matrix. In MAXQDA, you can do this with the Code Matrix Browser, a visualization tool you can access via ***Visual Tools*** > ***Code Matrix Browser***. Figure 12.5 illustrates an example that includes seven documents and the category "Biggest world problems" along with its subcodes. The documents are arranged in the columns of the matrix and the code "Biggest world problems" and its subcodes in the rows. The top row contains the names of the seven documents displayed in the columns (here I01 to I07). The individual nodes indicate how many times the relevant code has been assigned in the respective document. The larger the node, the more often the code has been assigned. In Fig. 12.5 a binarized view has been selected, i.e., the Code

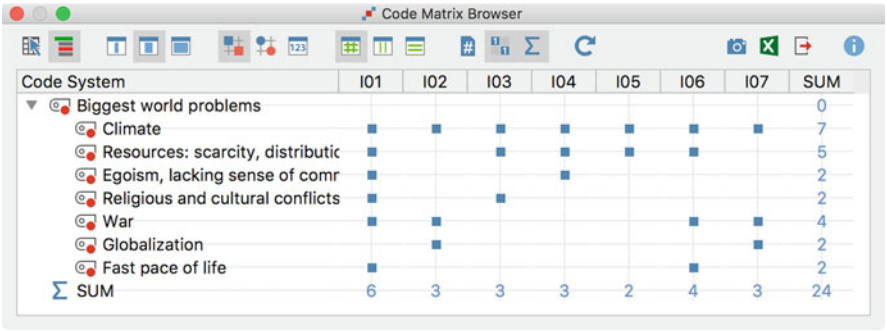


Fig. 12.5 The binarized view in the Code Matrix Browser

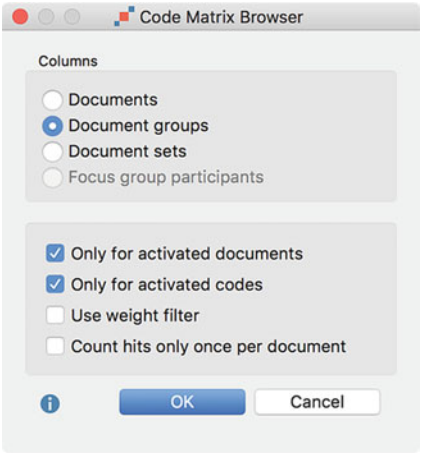


Fig. 12.6 Code Matrix Browser options

Matrix Browser displays whether the relevant code is present in the document or not but not how often it is present in each case. Hence, the nodes displayed are all the same size. Interview B05 only mentions two global problems: "Climate" and "Scarcity of resources." The bottom row is a summary row; it indicates how many of the displayed codes are present in each document. Here you can see that interviewees one and six mention a lot of the problems: six and four, respectively.

Before opening the Code Matrix Browser, you have to decide what you want to display in the columns and rows (Fig. 12.5). To select these documents and codes, simply activate them, as usual, in the "Document System."

The Code Matrix Browser can be used not only to generate "documents x codes" matrices for individual documents, but you can also compare groups of documents. In the dialog box that appears when you open the Code Matrix Browser, select either the "Document groups" or "Document sets" option (Fig. 12.6). It is best to reset all activations in the "Document System" window (using the icon at the top left of the

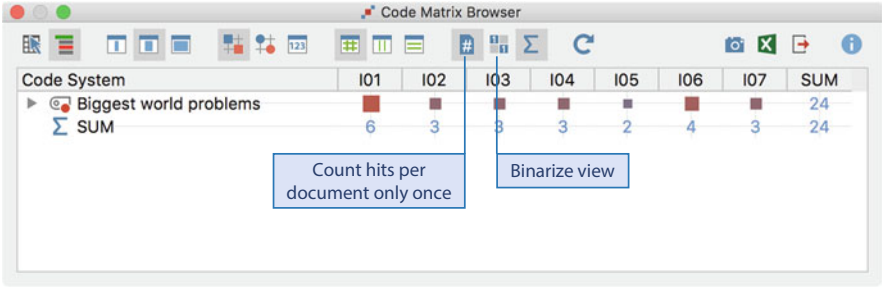


Fig. 12.7 The Code Matrix Browser once the subcodes have been aggregated

window) and then activate the document groups or document sets you want to compare. The weight filter can be used to analyze only the codes that lie within a certain weight range.

Further display options are also available in the Code Matrix Browser:

- You can determine the column width and design of the nodes (as squares or circles).
- You can choose whether the hits per document are counted only once, i.e., where there is no difference whether someone has named environmental issues as the world's biggest problem in three different text segments or only one.

The subordinate levels of the code system can be collapsed in the same way as they can in the "Code System." When you do this, the code frequencies will be aggregated at the upper level. Figure 12.7 illustrates what occurs when the subcodes are collapsed: now the nodes appear in different sizes. The greater the number of codes that have been assigned to a given document, the larger the node. To get this result, the option ***Count hits only once per document*** must be selected, and the option ***Binarize view*** must be deselected. In Fig. 12.7 you can see then that interviewee one mentions the most problems, while interview six also mentions quite a few; the SUM row demonstrates that six and four problems are mentioned in each respective case.

This display of the codes assigned per document in the Code Matrix Browser should demonstrate that visualizations are far more than just eye-catching gimmicks. The visual representation shown in Fig. 12.5 makes it easier for researchers to identify patterns and exceptional or extreme cases. In this example, for instance, it is easier to identify people who only cite "climate" and "scarcity of resources" as the biggest global problems. The display of the nodes in Code Matrix Browser can also be switched from symbols to their numerical values. If you switch back and forth between these two forms of representation, the major advantage of such graphics should become clear: it is much easier to recognize contexts, patterns, and special cases in a visual representation than it is in a large, unmanageable sea of numbers.

The Code Matrix Browser can not only be used for analyses but also for "quality control" purposes. If, for example, you want to differentiate a main category in one

step of inductive coding, it is very easy first to visually check whether the documents in question have actually been coded with at least one of the subcodes or if some documents have been forgotten.

Code Relations Browser: Visualizing Co-occurrences of Codes

Searching for connections and interrelationships between the categories, and not just describing the categories and their subcategories, is certainly one of the most interesting aspects of any research project. Such interrelationships can be examined in MAXQDA in various ways. One option is to investigate the co-occurrence of codes. Now, "co-occurrence" can mean very different things, for example (Fig. 12.8):

- Two codes were *both assigned to a specific document*, for example, someone talks about environmental problems as being the most serious problems facing the world, and the same interview also includes a section on the need for education concerning sustainable development.
- Two codes were assigned to the same text segment, image segment, or video clip, i.e., the code assignments *intersect*.
- Two codes have been assigned *in close proximity to each other*: first someone talks about environmental problems as the biggest global problem and in the next section about education.

Of course, further variations of co-occurrences are also conceivable. You can search for these using the function ***Analysis*** > ***Complex Coding Query***, and they are discussed in detail in the following section "Discovering complex interrelationships of codes."

Various options exist for analyzing the co-occurrence of codes in text, image, or video segments, i.e., intersections or overlaps. Code intersections involving a

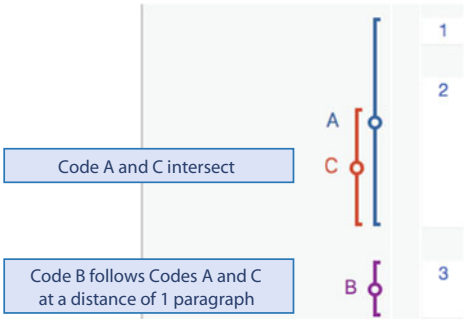


Fig. 12.8 Co-occurrence of codes

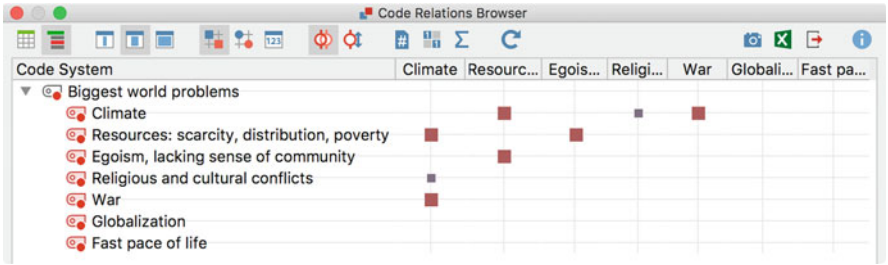


Fig. 12.9 The Code Relations Browser

specific code can be quickly and easily identified by right-clicking on the code in question in the "Code System" and selecting ***Intersections*** in the context menu. The result is a list of intersecting codes sorted by frequency. If you select a code from that list, the relevant intersecting segments are displayed in the "Retrieved Segments" window.

The most important tool for displaying code intersections is the Code Relations Browser, which generates matrices, code by code (Fig. 12.9). You can open this tool via ***Visual Tools*** > ***Code Relations Browser*** and then determine the codes to display in your matrix's rows and columns (all or only activated codes). You can also determine the documents to be used in the analysis via activations; the default is all documents. For the columns, there is the additional option ***Choose top-level code***. If you choose this option, MAXQDA will subsequently open a dialog box in which you can select any number of code groups on the top level of your code system. As with the Code Matrix Browser, you can determine how the column headers and the nodes of the matrix (squares or circles) are to be displayed. The size and color of these individual nodes symbolize how many intersections occur for each respective pair of codes. The larger the node in the corresponding cell, the more intersections occur for those codes across all documents or only the activated documents. Double-clicking on a node displays the relevant segments in the "Retrieved Segments" window. Further options for adjusting the display of these matrices are available in the Code Relations Browser toolbar:

- ***Near (codes)***—searches for codes in close proximity to each other, rather than intersecting codes.
- ***Count hits only once per document***—in this case, the display is not based on the respective number of coded segments, but on the number of documents in which at least one intersection occurs.
- ***Binarize view***—only indicates whether there is any intersection between these codes or not. No matter what the number of intersections, the node will have a uniform size.

Discovering Complex Interrelationships of Codes

Whereas the Code Relations Browser examines the relationships between pairs of codes, the ***Complex Coding Query*** (available in the ***Analysis*** ribbon tab) allows you to examine relationships between several codes. Additionally, beyond searching for intersections and the proximity of codes, you can also ask more complex questions about your data.

In Fig. 12.10 you can see the dialog box that appears when you access the Complex Coding Query function; the first analysis setting, *Intersection*, is selected by default. Functionally, this does the same as the Code Relations Browser, however, not just for two but for any number of codes. MAXQDA then finds the places in all your documents (or only in the activated documents) where all of these codes intersect. If you select four codes and *Intersection*, then only segments where all four codes are present together will be reported. The image to the right of the dialog box outlines how each setting works: only the simultaneous occurrence of the two selected codes results in a hit, and only the inner, intersecting area of these two codes is displayed in the "Retrieved Segments" window.

Various settings can be configured for your analysis: the subcodes of the selected codes can be included, and the search can also be limited to activated documents or code assignments made by specific users.

The analysis settings *Intersection (Set)* and *Overlapping* are used to investigate further forms of the co-occurrence of codes. If there is an *Intersection (Set)*, the system checks whether at least a predefined number of selected codes have been

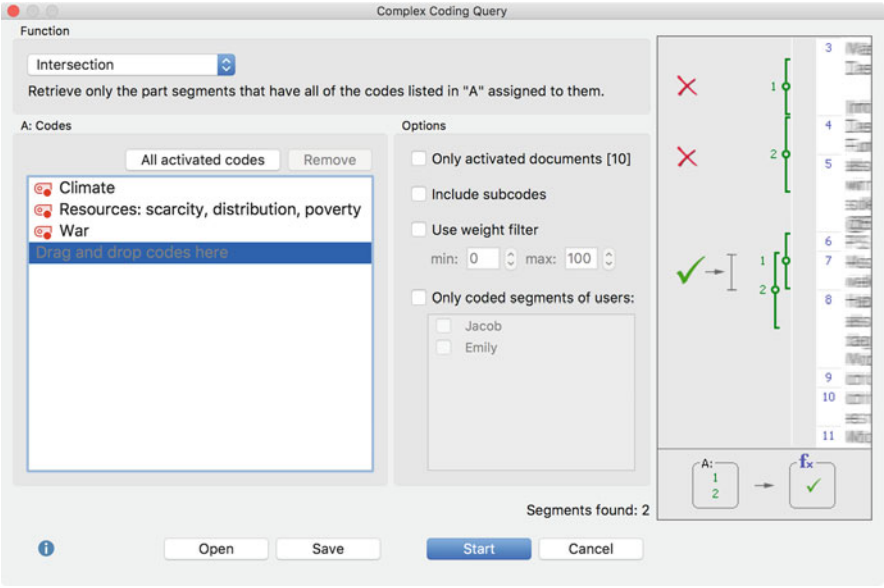


Fig. 12.10 Complex Coding Query for code intersections

Table 12.1 Additional settings for the Complex Coding Query

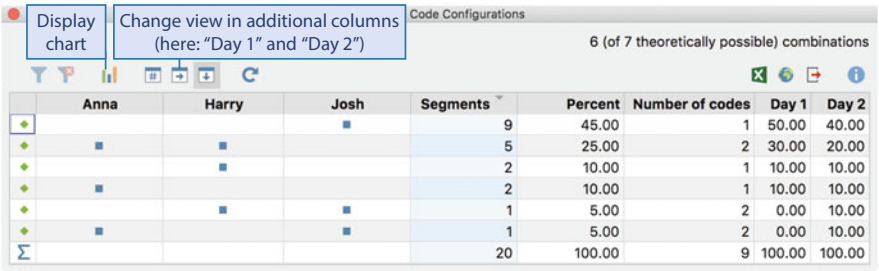
Analysis setting	Description
Only one code	Search for segments that have been assigned one—and only one—code from a predefined list of codes
Only this code	Search for segments to which only one specific certain code has been assigned and no other
If inside	Search for segments that have been assigned a certain code, but only those segments that are completely within the coded segments of a different, specified code
If outside	The counterpart to "If inside": search for segments that have been assigned a certain code, but only those that are completely outside coded segments of a different, specified code
Followed by (ignores code assignments in PDFs and images)	Search for segments of a certain code that are followed, at a specified maximum distance, by text passages assigned with a different, specified code
Near (ignores code assignments in PDFs and images)	Very similar to "Followed by," but this analysis function does not depend on the sequence (B follows A), but only on the proximity of the assignments of two different codes

coded simultaneously. The *Overlapping* setting works in a similar way to the *Intersection* setting: not only the inner, intersecting area of the segments is displayed in the "Retrieved Segments" window, but instead the larger section between the outer segment boundaries is displayed.

The functionality of the other six analysis settings is explained in Table 12.1. By careful selection of documents, codes, settings, and parameters, an enormous range of detailed questions about your coded data can be answered. Note that while you are specifying the parameters, the dialog displays the number of segments found to match the current settings ("2" in Fig. 12.10), so you need not run a query which you can see has no hits.

Code Configurations: Identifying Multidimensional Patterns

The ***Analysis*** > ***Code Configurations*** function can be used to determine how often selected codes were assigned simultaneously to a segment or within the same document. Code Configurations are a powerful tool for analyzing the interrelationships of several aspects or dimensions. These different dimensions are to be found in almost every research project. In classroom research, for example, the dimensions "teaching phase," "teacher action," and "student reactions" may all be the focus of a study. And in a research paper on the effects of the increasing digitization of vocational trades, the following question might be asked: "Which 'new technologies' are used in which 'work processes' and which 'skills' are required for this?"



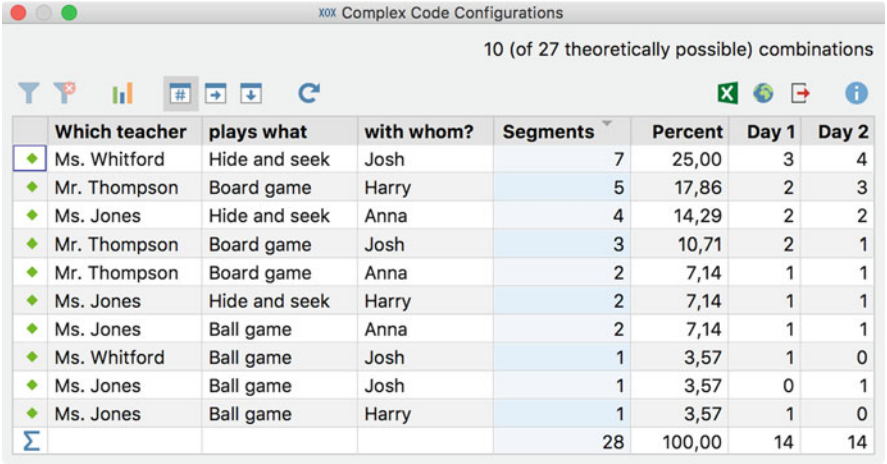
Anna	Harry	Josh	Segments	Percent	Number of codes	Day 1	Day 2
		■	9	45.00	1	50.00	40.00
■	■		5	25.00	2	30.00	20.00
	■		2	10.00	1	10.00	10.00
■			2	10.00	1	10.00	10.00
	■	■	1	5.00	2	0.00	10.00
■		■	1	5.00	2	0.00	10.00
Σ			20	100.00	9	100.00	100.00

Fig. 12.11 Simple Code Configurations results table for the unit "Segments"

In order to use the Code Configurations function, you need to have defined these dimensions as codes and their partial aspects as subcodes in the "Code System," and you need to have coded the data with these categories. Let us take a look at a simple example to illustrate this: during a video analysis conducted at a day care center, three top-level categories were used to code which teachers (1) played which game (2) with which child (3). The function ***Analysis > Code Configurations > Simple Code Configurations*** will then show how often these individual codes co-occur. Figure 12.11 illustrates the result of one such analysis, in which you can easily see how often the individual children played together or by themselves. Each row contains one of the configurations of codes found in the data; for example, you can see from the second row that Anna and Harry played in pairs during five observations. Throughout the observation period as a whole, the children never played together as a group of three—no row contains a square in all three code columns. The number of code configurations that occurred from all the theoretically possible configurations is shown at the top right of the results window.

In the options dialog box that appears when you open this function, you can restrict the analysis to currently activated documents, and you can opt to have the table differentiated by document, by document group, or by document set. A differentiation of this kind was also chosen for this example, so that the two observation sessions could be displayed in two additional columns and analyzed separately. The icons in the example allow you to toggle the display of the values in the columns for documents, document groups, and document sets between absolute values and row and column percentages, making systematic comparisons easier. As always, the results table is interactively linked to the original data: double-clicking on the second row will list all five segments in which Anna and Harry played together in the "Retrieved Segments" window.

When you open the function ***Analysis > Code Configurations > Complex Code Configurations***, an options dialog box will appear into which you can drag and drop several parent codes for your analysis. MAXQDA will then generate a table, which displays how often combinations of the respective subcodes of these codes were assigned to the same segment in your data. Figure 12.12 illustrates the result of such an analysis. Each row represents one combination of the subcodes that occur in the data material. In the first row, you can see that in seven observations (coded



Which teacher	plays what	with whom?	Segments	Percent	Day 1	Day 2
Ms. Whitford	Hide and seek	Josh	7	25,00	3	4
Mr. Thompson	Board game	Harry	5	17,86	2	3
Ms. Jones	Hide and seek	Anna	4	14,29	2	2
Mr. Thompson	Board game	Josh	3	10,71	2	1
Mr. Thompson	Board game	Anna	2	7,14	1	1
Ms. Jones	Hide and seek	Harry	2	7,14	1	1
Ms. Jones	Ball game	Anna	2	7,14	1	1
Ms. Whitford	Ball game	Josh	1	3,57	1	0
Ms. Jones	Ball game	Josh	1	3,57	0	1
Ms. Jones	Ball game	Harry	1	3,57	1	0
Σ			28	100,00	14	14

Fig. 12.12 Complex Code Configurations results table for the unit "segments"

segments), Ms. Whitford played hide and seek with Josh. This corresponds to 25% of the total of 28 observations that were analyzed.

The Simple and Complex Code Configurations tables can be set to display their results using either coded segments or documents as a unit. To do this, choose the appropriate setting in dialog box once you have opened either function. If you choose documents as the unit, the co-occurrence of codes in a document as a whole is analyzed. It does not matter whether the code was assigned more than once or where in the document. If two codes occur at least once in the document, this is treated as a co-occurrence.

The benefit of all four variants of MAXQDA's Code Configurations (simple/complex, segments/documents) is clear: they effectively support the discovery of patterns in the data and provide a good foundation for developing types and typologies.

Document Portrait: Visualizing the Encodings of a Case

If you have assigned colors to the codes following a logical scheme of some kind, it can be very interesting from an analytical perspective to display the coded segments within a document visually as an image. The Document Portrait (opened via ***Visual Tools*** > ***Document Portrait***, or a document's context menu) is an innovative visualization tool in MAXQDA with which you can generate a case-oriented visualization of selected documents. The Document Portrait is based on the idea that codes can be assigned a color or, if you use the emoticode function, a symbol in the style of an emoji. This means that a connection has already been established between a category and a visual element, that is, either a color or an emoji symbol.

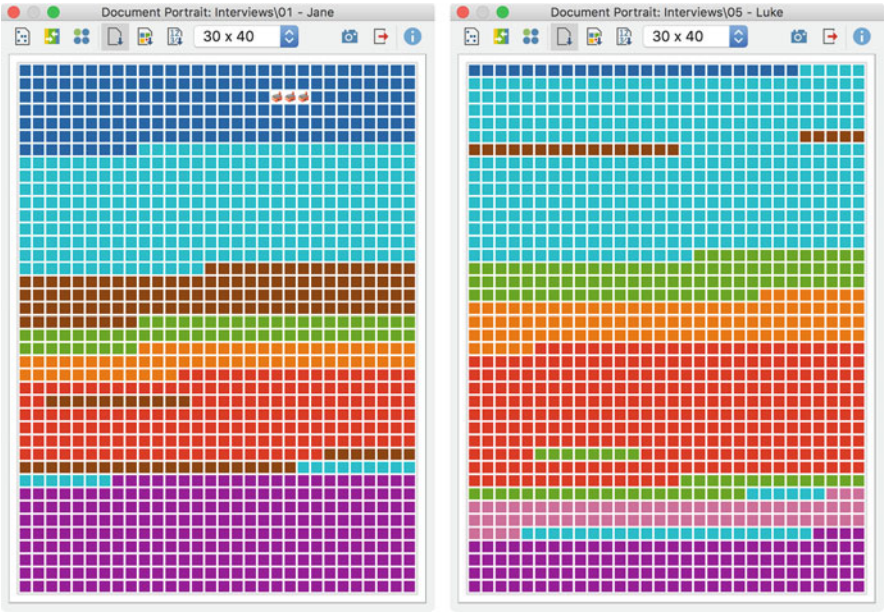


Fig. 12.13 Document Portraits for two guided interviews

The document portrait thereby displays a document as an image of its coded segments in sequential order; in other words, the image starts at the top left with the color (or symbol) of the first code assigned to a text or video (Fig. 12.13).

How the Document Portrait Works

A document portrait always consists of a certain number of tiles (30 × 30, 30 × 40, 40 × 30, 40 × 40, or 40 × 60), which can be displayed as squares or circles of a certain color or as emojis. The Document Portrait visually represents the coded segments of the selected document, i.e., the same segments that would be listed in the Overview of Coded Segments for that document. The first column of the latter overview table contains small colored circles, namely, the color of the corresponding code. The sequence of colors in this overview table is the starting point for the Document Portrait; however, the length of a segment is used as a weighting factor for this visual representation, while in the Overview of Coded Segments, each segment always corresponds to exactly one row of the table, regardless of the length of the coded segment. Moreover, in the Document Portrait, the code colors are not displayed one below the other, but next to each other. The picture, consisting of 900, 1200, 1600, or 2400 tiles, depending on the setting you choose, is similar to a classic TV screen, structured line by line and starting at the top left. In a television screen, the electron beam scans the screen line by line from left to right. In the same way, the Document Portrait starts in the upper left corner and builds up a portrait line by line, i.e., at the end of a line, the system jumps back to the start of the next line.

And, since it does make a difference here whether a coded segment is 3 or 30 lines long, the length (or size) of a segment is taken into account when calculating the number of tiles allocated to that segment.

Figure 12.13 shows example Document Portraits for two guided interviews. The presentations allow you to make a direct comparison of the progression of the key topics covered in each interview. In both portraits you can also see how individual topics come up again and again in the course of the interview. Extensive use of the Document Portrait was made by d'Andrea, Hodgen, and Heaton (2016) in a study on the communication of consultants, in which their use of skills and the timing of their application were brought into focus.

As shown in Fig. 12.13, all of the existing coded segments of a document are visualized immediately one after the other—without any space between the individual segments. Using the ***Visualize entire document or coded text*** option (at the far left of the toolbar), parts of the document that have not been coded can also be included in the display. With this option, the entire document is projected onto the tiles of the portrait, and sections of the document that have not been assigned a code appear as white tiles in proportion to their length.

The appearance of the Document Portrait can be adjusted via the following settings:

- Mixed colors for overlapping codes yes-no: this determines how the tiles are displayed if several codes are assigned to a segment instead of just one. If this setting is switched off, the coded segments (i.e., the colors) are displayed sequentially one after the other. If this setting is switched on, however, the colors of the codes involved are mixed to form a new color, reflected in the corresponding tiles.
- You can choose circles instead of squares as tiles.
- Ordered by document: the order of the coded segments in the Document Portrait is determined by the order of the coded segments in the document (default setting and the one used in Fig. 12.13).
- Ordered by color: the order of the coded segments in the Document Portrait is sorted by color, i.e., the same colors are grouped together. In this display it is not apparent if any topic has arisen several times.
- Sorting by color frequency: in this display setting (Fig. 12.14), the document portrait is "tidied up." First, the tiles of the same color are stacked as individual columns. The column with the most tiles, i.e., with the largest coded portion of the document, is placed on the far left, the column with the least coded portion on the far right. Only the most common 20 colors are displayed.

The Document Portrait is also interactively linked to your project data: clicking on one of the tiles with the left mouse button displays the corresponding coded segment in its original context in the "Document Browser." By right-clicking and selecting the option ***Retrieve Coded Segments with this Color***, MAXQDA compiles all the coded segments of this color within the displayed document in the "Retrieved Segments" window.

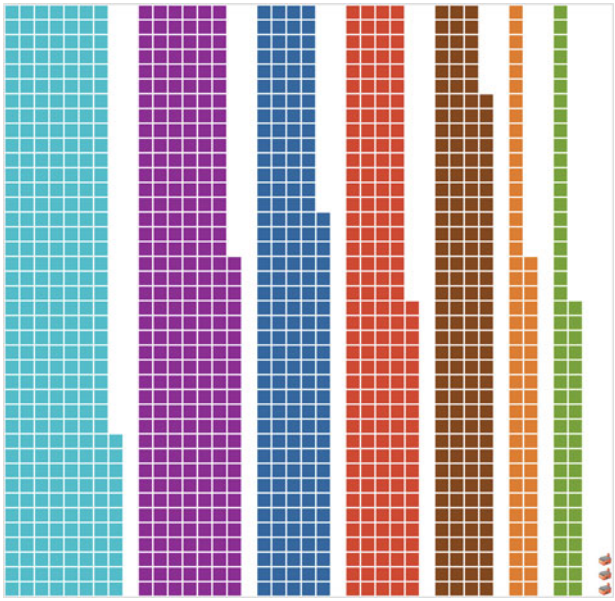


Fig. 12.14 Document Portrait ordered by color frequency

On the right side of the Document Portrait toolbar, you will find two additional icons for exporting and saving the displayed image. By clicking on the "Camera" icon, you can copy the current display to the clipboard and paste it into a PowerPoint presentation, for example. By clicking on the "Export" icon, you can export the current display as a PNG or SVG file, among other formats.

Codeline: Representing Timelines and Sequences of Codes

While the Document Portrait converts an entire document, such as an interview, into an image, the Codeline visualization tool (opened via ***Visual Tools*** > ***Codeline***, or via the document's context menu) focuses on displaying the progression of interviews or focus group discussions. The resulting visualization is structured like a musical score in which the individual instrumental parts are arranged one below the other, so you have an overview of each musical moment. In the columns texts are divided into sections (paragraphs) for the Codeline, tables into their rows, and videos into minutes or seconds.

In Fig. 12.15 you can see a Codeline from a research project by Hatani (2015) that analyses the first 14 sections of a panel discussion on global health. Six speakers are arranged in the top rows, namely, the moderator and the five participants of the focus group. Below, the coded topics of the panel discussion have been visualized. As with the Document Portrait, the code colors here have both an aesthetic and analytical function. You can use two icons in the Codeline toolbar and the slider to customize

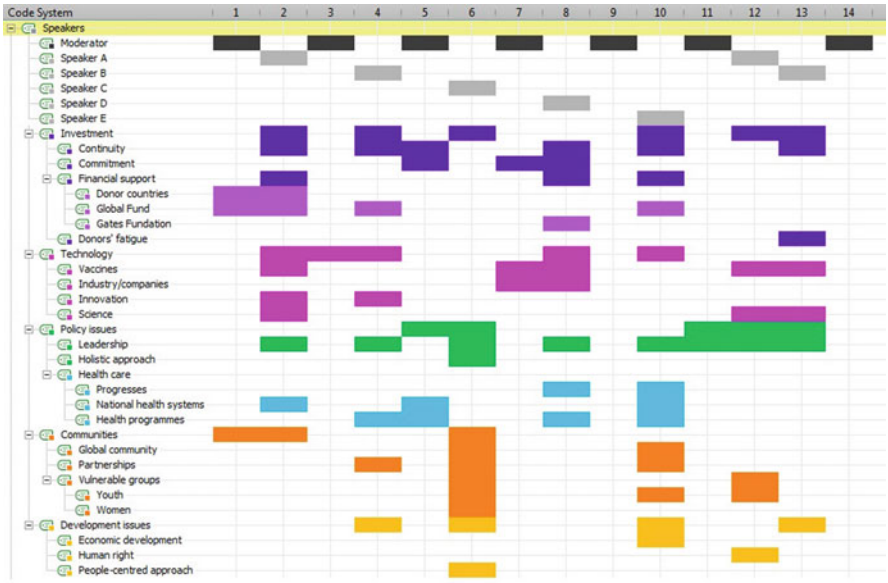


Fig. 12.15 The sequence of contributions to a group discussion (source: Hatani, 2015, http://www.qualitative-research.net/index.php/fqs/article/view/2208, Creative Commons Attribution 4.0 License)

the display on the x-axis. For example, you can adjust the width of the Codeline to suit the size of your window; it will then be "compressed" horizontally so that it perfectly fits your screen.

What can you tell from the Codeline above? The first thing you might notice is that the moderator—at least at the beginning of the focus group—tries to let all participants speak one after the other, because the moderator and speakers alternate up to and including paragraph 10. Then, once they have completed a full round, the moderator addresses "Speaker A" again, and in paragraph 13, there is direct interaction between two speakers: "Speaker B" reacts to "Speaker A" without being addressed by the moderator. Let us now look at the topics of discussion: the topics "Financial Support" and "Communities" are talked about by the moderator at the outset. Speaker A expands on the topics and—like the speakers that follow—immediately addresses the topic of "Leadership." This presentation allows a very detailed analysis of the sequence of speakers and the progression of the topics covered in the discussion. So, what can the Codeline be used for?

- First, the Codeline can display the sequence of speakers very clearly for analyses of focus group discussions and can also make the connection between speakers and certain topics apparent.

- Second, this visual tool can be used analytically to track certain codes throughout the course of a text. If you display activated codes only, you can make targeted comparisons between different codes.
- Third, using the Codeline during the exploration stage of a project can help you detect the simultaneous appearance of certain codes.
- Fourth, the tool provides a general overview of your code assignments, which makes it universally applicable. It is particularly useful for systematic comparisons of the temporal progression across multiple cases.

If you hover your cursor over one of the blocks of a particular color, a tooltip will appear; double-click on it to jump to the corresponding text position in the "Document Browser." Like all MAXQDA visual tools, the current Codeline display can be exported or copied to the clipboard by clicking on the camera icon and then pasting it into Word, PowerPoint, or other programs.

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