FQS FORUM: QUALITATIVE SOCIAL RESEARCH SOZIALFORSCHUNG

Volume 2, No. 1, Art. 5
February 2001

Sociological Explanations between Micro and Macro and the Integration of Qualitative and Quantitative Methods

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Key words: triangulation, mixed method designs, validity, life course research, individualisation, micro-macro link, methodological paradigms

Abstract: Despite the ongoing "war" between methodological camps this paper will argue for an integration of qualitative and quantitative methods in the sociological research process. For this purpose a short overview about important methodological discussions addressing basic questions of mixed (qualitative and quantitative) method designs will be given focusing on the term "triangulation" which is seen by many authors as a central concept for method integration. However, this notion carries systematic ambiguities, at least when transferred to the integration of qualitative and quantitative methods—triangulation does not represent a single integrated methodological concept but a metaphor with a broad semantic field. Three different understandings of the triangulation metaphor will be discussed: Triangulation as mutual validation, triangulation as the integration of different perspectives on the investigated phenomenon and triangulation in its original trigonometrical meaning. These understandings of triangulation will be contrasted with examples from sociological life-course research projects which combined qualitative and quantitative panels in order to answer certain research questions. The examples clearly demonstrate that each of the three understandings may have a value by showing different possibilities for relating qualitative and quantitative results in one research project to each other. However, none of these three concepts may serve as a general methodological model for the integration of qualitative and quantitative methods.

In the final section of the paper it will be argued that the most crucial problem of the methodological discussions surrounding mixed-method (qualitative and quantitative) designs is that epistemological and methodological concepts are not sufficiently linked to theoretical considerations about the nature of the investigated social structures and social processes. In its concluding section the paper will briefly outline some ways that the already-discussed examples from sociological life course research as well as the discussions about triangulation could be integrated into a more general theoretical framework. The focus of these considerations will lie on the distinction between the micro- and macro-level of sociological description and on current discussions about individualisation processes in modernising societies. Thereby it will be shown that an understanding of triangulation in its original trigonometrical sense (although it cannot be considered as a methodological model suitable for all aspects of method integration) may be helpful in gaining a deeper insight into theoretical aspects of method integration in sociology.

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1. Introduction

The debate about the correct methodology for social research can now look back on a history of several decades, with the proponents of qualitative and quantitative approaches forming the most prominent camps in the ongoing "paradigm war". Qualitative as well as quantitative "paradigm warriors" (cf. TASHAKKORI & TEDDLIE 1998) like LINCOLN and GUBA (1985) or SMITH (1983) have emphasised the incompatibility of the different epistemological positions underlying these research traditions. In contrast, qualitative and quantitative methods often have been used together in the same research project and in many cases such an integration has resulted in illuminating insights about the investigated social phenomena. Consequently one can find a considerable amount of writing about the integration of qualitative and quantitative methods (e.g. BRYMAN 1988; BRANNEN 1992; CRESSWELL 1994; ERZBERGER 1998; ERZBERGER & PREIN 1997; DENZIN 1978; FLICK 1992; 1998; FIELDING & FIELDING 1986; KELLE & ERZBERGER 1999; TASHAKKORI & TEDDLIE 1998), ranging from rather abstract and general methodological considerations to practical guidelines for mixing methods and models in one research design. [1]

In these discussions several writers have argued against the incompatibility thesis with various arguments: it has been stated that qualitative and quantitative methods are not exclusively tied to a specific epistemological standpoint and that the epistemological positions often connected to different methodological traditions (as for example "postpositivism" and "constructivism") converge at several points—proponents from both "paradigms", for instance, accept the theory-ladenness of empirical observation, that means that they would criticise a naive empiricist or naturalist concept of research which assumes that a researcher can approach his or her empirical field without any theoretical preconception whatsoever. Furthermore, qualitative and quantitative methods

now have been used for many years in empirical research, both methodologies are accepted by funding bodies, have led to generally accepted research results and thus influenced policies (cf. TASHAKKORI & TEDDLIE 1998, p.11). Consequently, many researchers and a growing number of methodologists adopt a pragmatic perspective on paradigm wars which may be described as "Take whatever seems adequate from each paradigm or methodology for your research questions and leave the rest". [2]

One crucial problem of the whole debate is that it has been overburdened with *methodological* and *epistemological* in contrast to *theoretical* arguments. Whereas many "paradigm warriors" showed a strong preference for general epistemological assumptions about the nature of reality (emphasising for example, that there are "multiple realities"), "pacifists" or "integrationists" have mainly developed methodological guidelines for methods integration, regarding theoretical sociological aspects as a matter of the concrete research project and research questions. [3]

Any serious methodological consideration in the framework of any science should, however, regard the nature of the investigated phenomenon first, and thereafter address the question which method may be adequate to describe, explain or understand this phenomenon. Thus, methodological concepts alone cannot answer questions like "Which method should be used for the investigation of which social and societal phenomena, and should qualitative and quantitative methods be integrated in this endeavour?" Instead of basing discussions about an adequate methodology for the social sciences exclusively on an abstract methodological and epistemological level it may be more helpful to link methodological and substantial considerations to each other by examining the usefulness of methodological concepts with the help of examples from research practice. Thus one purpose of this paper will be to evaluate a specific concept, the concept of "triangulation", which has often been used to account for the combination of qualitative and quantitative methods in sociology, especially in sociological life course research. [4]

In the following section of the paper I will briefly summarise some of the discussions surrounding this notion and will thereby demonstrate that this term, initially invented in the context of quantitative psychological research, carries systematic ambiguities when transferred to the realm of mixed (qualitative and quantitative) method designs. In the third section I will relate these considerations to three examples coming from the practice of sociological life course research. In the final section of the paper an attempt will be made to link these empirical examples and their methodological implications to some more general theoretical considerations about the relation between micro- and macrosociological reasoning. [5]

2. Triangulation—A Metaphor and its Limits

Qualitatively-oriented social scientists have often used the notion of "triangulation" to argue in favour of an integration of qualitative and quantitative methods (see, for example, DENZIN 1978; FLICK 1992; 1998; FIELDING & FIELDING 1986). Although these debates mainly take place in the field of sociological methodology the term was initially borrowed from the realm of quantitative psychological methodology: within the framework of a theory of psychological testing CAMPBELL and FISKE (1959) proposed to supplement or to further test empirical results by the use of different instruments. According to these authors, "Multitrait-multimethod matrices" should be constructed using correlation coefficients between scores obtained with different tests. These matrices should then serve as a means to determine the degree of convergence as an indicator for the validity of research results: "Validation is typically convergent, a confirmation by independent measurement procedures" (CAMPBELL & FISKE 1959, p.81). In their book about unobtrusive measures WEBB and his colleagues picked up CAMPBELL's and FISKE's idea and transferred it to a broader methodological framework (cf. WEBB, CAMPBELL, SCHWARTZ & SECHREST 1966), arguing that the collection of data from different sources and their analysis with different strategies would improve the validity of results: "Ideally, we should like to converge data from several different data classes, as well as converge with multiple variants from within a single class" (WEBB et al. 1966, p.35). This idea was picked up by a dedicated advocate of qualitative methods in social research. In his famous monograph "The Research Act" DENZIN used the argument of WEBB and colleagues that a hypothesis which had survived a series of tests with different methods could be regarded as more valid than a hypothesis tested only with the help of a single method. Since different methods entail different weaknesses and strengths, DENZIN opted for "methodological triangulation" which consists of a "complex process of playing each method off against the other so as to maximize the validity of field efforts" (DENZIN 1978, p.304) leading to a reduction of "threats to internal and external validity" (op.cit., p.308). "Triangulation", as another author puts it, "reduces the risk of systematic distortions inherent in the use of only one method" (MAXWELL 1998, p.93) [6]

However, the idea that research results produced with different instruments can be used for mutual validation has been criticised by many authors (e.g. FIELDING & FIELDING 1986; FLICK1992; 1998). FIELDING and FIELDING, for example, tried to call attention to the fact that researchers may misinterpret commonalities and differences between data collected with incompatible methods by falsely assuming "a common epistemic framework among data sources" (p.31). Consequently "using several different methods can actually increase the chance of error." Also other critics of DENZIN's approach (e.g. HAMMERSLEY & ATKINSON 1983, p.199; BRYMAN 1988, p.133) have rejected the assumption that a mere convergence of research results has to be interpreted as a sign of validity. This problem is already relevant for CAMPBELL's and FISKE's original concept of triangulation through multitrait-multimethod matrices. There may be strong correlations between the results of tests but these may occur because the

tests are biased in a similar way, so that the convergence between two research results can either be the result of the fact that both results are *right* or that they are *wrong* in the same way. Research methods are often developed within differing research traditions carrying varying epistemological and theoretical assumptions with them. Thus the combination of methods may add "breadth or depth to our analysis" (FIELDING & FIELDING 1986, p.33), but not lead to more valid results. The potential *complementarity* of qualitative and quantitative research methods has been emphasised by others, among them FLICK, who comes to the conclusion: "Triangulation is less a strategy for validating results and procedures than an alternative to validation (...) which increases scope, depth and consistency in methodological proceedings." (FLICK 1998, p.230). [7]

Hence two meanings of triangulation have emerged in these debates: triangulation as a process of cumulative validation or triangulation as a means to produce a more complete picture of the investigated phenomena. This difficulty in defining a clear meaning for the term triangulation may be seen as a direct consequence of the metaphoric use of this word. Whereas the term represents a straightforward concept in its initial frame of reference it carries a systematic ambiguity when transferred to the realm of social research methods. In the field of navigation and land surveying triangulation refers to a simple method for determining the position of a point C using observations from two points A and B (see figure 1). If the observer has sufficient information about the distance between A and B he may easily determine the distances between B and C and A and C respectively if the angles a and b as well as the distance AB were correctly measured.

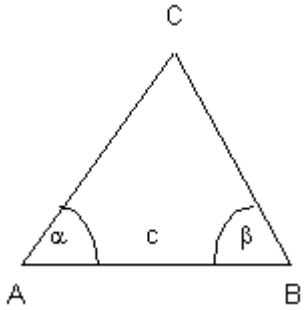

Figure 1: Triangulation [8]

Terms like "spatial position of a point" or "distance between two points", clearly defined in the field of navigation or land surveying, are no more than ambiguous metaphors in the domain of social research. Determining the position of a point by different acts of measurement may either mean that the *same social phenomenon* (the whole "triangle", so to say) is investigated with the help of different methods or that *different social phenomena* (the two angles a and b and the distance AB) are the object of qualitative and quantitative investigations whose results may then be integrated to form a more complete picture. [9]

This differentiation is more than a sophisticated play upon words: research results would only be useable for mutual validation if they relate to the same

phenomenon, since only then can differing results correctly be interpreted as indicators of validity problems. But this possibility of mutual validation requires a rather metaphorical use of "triangulation" far remote from its original meaning in the context of trigonometry. In this context a wrong result of one of the measurement operations (if, for example, the result referring to angle a is wrong) cannot be corrected by the other two measurement operations (relating to b and AB). If one of the three results is wrong, the whole triangle would give a false picture. If we use the metaphor of triangulation in such a way that we regard the results of qualitative and quantitative methods as analogous to the results of the single measurement operations in triangulation, that means that we wish to describe *different* aspects of the same phenomenon or even different phenomena with the help of two methods, and one will naturally expect different (but not contradictory!) results. [10]

Thereby, the initial trigonometrical context from which the term triangulation comes suggests a restrictive understanding of method combination: since the location of a certain point requires different measurement operations, one single observation (determining, for example, only the angle a) would not only lead to an incomplete or partial result but, as far as the question "How long is the distance between C and A and C and B" is concerned, to no result at all. If one transfers this argument to the realm of mixed (qualitative and quantitative) method designs this would mean that qualitative and quantitative methods *have to be combined* in order to produce sound sociological explanations.[1] [11]

Which one of these three understandings of the metaphor "triangulation" is theoretically and methodologically adequate for the combination of qualitative and quantitative methods? Should triangulation be considered as *mutual validation* of methods and research results in order to identify "threats for validity", should triangulation serve as a means to produce a more complete and "fuller" picture of the social phenomena under study, or is triangulation of qualitative and quantitative methods even a necessary prerequisite for sociological explanation at all? [12]

In the following section these three methodological ideas will be contrasted with examples from empirical research. For this purpose results from different projects in the field of sociological life course research will be presented. The examples come from research carried out by the German National Research Council's "Special Collaborative Centre 186" ("Sfb 186") in Bremen (see http://www.sfb186.uni-bremen.de/frames/programme.htm) (broken link, FQS, May 2003). The work of this research centre focuses on the relationship between social structures, social change, life-course patterns and individual biographies during the modernisation process in Germany. Thereby special emphasis is laid on life-course transitions and social status passages as products of the coordination of different individual and social time structures supported by the socio-politically conceived life-course regimes related to the systems of education, employment, social insurance, social assistance and retirement. [13]

1 This would also point to the necessity to employ methods whose characteristic errors do not coincide.

In this framework a variety of different quantitative and qualitative panel studies were carried out which are related to specific trajectories and risks in the life course, thereby investigating, for instance, transitions between the educational system and the labour market or between the employment sector and the pension system. In many of the research projects of the Sfb 186, qualitative and quantitative methods of data collection and data analysis were combined, mainly by combining standardised panel studies with large data sets on the one hand with open ended interviews with small samples on the other hand. Thereby, the integration of research methods and results posed a variety of methodological and theoretical challenges which can be related to the previous discussion about triangulation. [14]

3. Integration of Qualitative and Quantitative Methods in Practice: Results from Empirical Life Course Research

It should have become clear from the previous discussion that triangulation should not be considered as a single unique method, but as a somewhat vague metaphor with different possible meanings that can be related to a variety of different methodological problems and tasks. The following discussion will concentrate on a form of "between-method triangulation" quite often used in sociological life course research whereby qualitative and quantitative data are collected and analysed separately and the results are related to each other. If qualitative and quantitative methods are combined in this way to answer a specific research question, in principle one of the following three outcomes may arise (cf. ERZBERGER & PREIN 1997; ERZBERGER 1998; KELLE & ERZBERGER 1999):

1. qualitative and quantitative results may *converge*: in this case these results lead to the same conclusions,
2. qualitative and quantitative results may relate to different objects or phenomena, but may be *complementary* to each other and thus can be used to *supplement* each other,
3. qualitative and quantitative results may be *divergent* or *contradictory*. [15]

How do these three possible outcomes of the combination of qualitative and quantitative methods systematically relate to the three different meanings of the triangulation metaphor outlined in the last section?

1. If one considers *cumulative* or *mutual validation* of research results as the purpose of triangulation the convergence of research results must be considered as the primary goal of method combination. Contradictory results would then have to be interpreted as a sign of invalidity of one (or both) of the methods used or results achieved. Complementary results would be not expected by this approach and where they occur they would have to be considered as anomalous.
2. If *complementarity* is considered as the central purpose of triangulation, one would consider convergent findings as worthless (for they cannot be used to

> produce a picture of the investigated phenomenon which is more complete than that which a single method could have provided). Just as the validation approach does not allow for complementary findings, divergent or contradictory findings would have to be regarded as anomalous within a complementarity approach, since contradictory results would indicate that the different methods relate to the *same* (and not to different albeit complementary) aspects of the investigated phenomenon. [16]

Consequently, triangulation in the sense of complementarity (and also in its original trigonometrical meaning discussed above) would exclude divergent (=contradictory) findings. If such findings nevertheless occur, for logical reasons one would have to consider some (or all of) the results of the different methods as invalid and thus to switch to the model of triangulation as mutual validation: within the framework of the validation model divergent findings simply mean that the results of one of the methods obtained are invalidated by another method. On the contrary, the occurrence of complementary findings within the framework of the validation approach would clearly mean that triangulation had failed since, following this approach, triangulation should either validate the different results through convergent findings or invalidate them through divergent results. However, as the following examples clearly demonstrate, both complementary and contradictory results can occur when qualitative and quantitative methods are combined. Drawing on these examples I will argue that neither the validity approach nor the complementarity model of triangulation can suffice as a *general methodological model* for the integration of qualitative and quantitative methods. In discussions about such models their potential relations to theoretical considerations about the studied phenomena are often neglected. However, the construction of a multimethod design requires that methodological tools are selected in regard to theoretical assumptions about the nature of the social reality under investigation. Quantitative and qualitative methods usually provide information on different levels of sociological description: quantitative analyses show phenomena on an aggregate level and can thereby allow the description of macrosocial structures. Although qualitative data may also relate to phenomena on a macrosocietal level, their specific strength lies in their ability to lift the veil on social microprocesses and to make visible hitherto unknown cultural phenomena. In order to formulate adequate sociological explanations of certain social phenomena it will often be necessary to combine both types of information, and thus use a "trigonometrical" understanding of the triangulation metaphor (which does not mean that this specific use of triangulation will be adequate in *every* methodological context, in other cases it will also be reasonable to talk of triangulation as mutual validation). [17]

3.1 Example 1: Processes on the microlevel of social actors as explaining arguments for statistical correlations

The transition from school to the labour market in Germany is traditionally linked to the dual system of "Vocational Education and Training" (VET)—the apprenticeship. If one looks at the VET from a sociological perspective, the question arises how this system mediates social stratification in terms of social

class as well as stratification in terms of gender differences. In order to get a full picture of the entire status passage from school to the labour market, one of the research projects of the Sfb 186 conducted a panel study in two cities (HEINZ, KELLE, WITZEL & ZINN 1998; KELLE & ZINN 1998). From the top ten training occupations two crafts (hairdressing, and car mechanic), two office occupations (bank executives and office workers) and a technical-industrial occupation (industrial mechanics) were selected. In 1989 all school leavers in Bremen and Munich who had started three years of vocational training in one of these apprenticeships were interviewed. Three more waves of standardised questionnaires followed in 1991, 1994 and 1997. The quantitative part of the study was set up to collect sociodemographic information and event history data about the respondents' occupational life course. From the large quantitative sample a smaller subsample (n=120) was drawn and three qualitative (semi-structured) interviews were conducted with these respondents in 1990, 1992 (n=113) and 1994 (n=93) focusing on work experiences, aspirations and reflections on careers during the first years of their occupational life courses. Thus the research project built up a quantitative panel consisting of standardised data as well as a qualitative panel comprising textual data from several waves of open-ended interviews. [18]

The statistical data showed strong relations between access to training in particular occupations on the one side and the sex of respondents on the other side. Two occupations (industrial mechanics and car mechanics) were almost exclusively dominated by male apprentices, while 87% of the hairdressers were female (see figure 2).

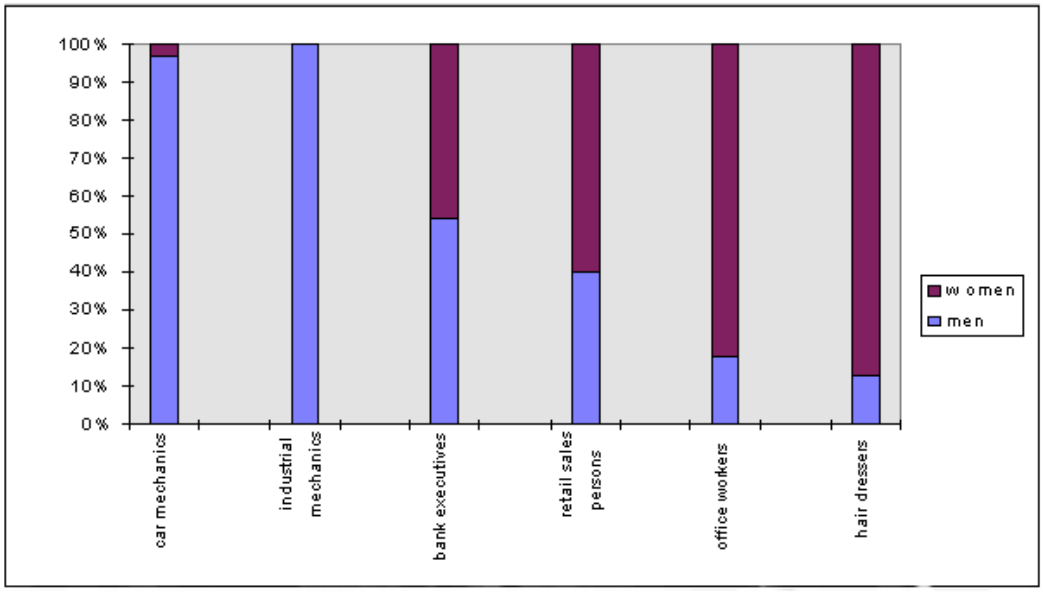

Figure 2: Distribution of men and women in six different training occupations among school-leavers in Bremen and Munich in the year 1989 [19]

But how does exclusion of women from certain occupations take place? Is this process primarily set in motion through gender discrimination in the companies

where the trainees are selected, through gender-specific socialisation at school and in the homes of the trainees, or through self selection? How do parents, schools, peers or the girls themselves interact in the process of producing gender inequality? The statistical data provide almost no material which could answer such questions. Instead one would have to describe processes which underlie the statistical association between "gender" and "occupation trained for", processes which produce social closure in micro-settings. The following passage from a *qualitative interview* with a master craftsman who works as a trainer for apprentices in a technical occupation gives an excellent example of such processes:

> Question: Hm. So what would happen then if, say, a girl applied for the job?
>
> Answer: Can't be done. Just for social reasons. 'Cos then I'd have to reorganize everything, have separate social areas, like toilets, changing rooms. Those are things that I'd have to consider. I couldn't just do it. There'd be problems. We thought we could do it, we tried two years ago, had a female apprentice. But then the tension got too high, the demands were too much for the girl as well. The physical situation, the purely physical work, that was too much for her. Then there were the social problems too, I couldn't do anything about them. We had all the facilities she needed, she got changed up there where the accounts people sit. But then they started to hassle us about her going upstairs in dirty shoes, and, er, and then there was her relationships with the others ... with the male apprentices. That I'd expected to be O.K., but that was where the tension was. It was, er, what should I say, our male mechanics and apprentices, they felt shown up some how when this girl had done her work and had done it better than they could have done ... [20]

A further example can illustrate how the combination of qualitative and quantitative results can be used to explain statistical phenomena on an aggregate level which are difficult to understand at the first glance: by comparing the occupational status of our respondents at the time when the second wave of the quantitative panel survey was conducted (four years after finishing vocational training) remarkable differences could be found with regard to the respondents' tendency to *re-enter the educational system*. Almost immediately after finishing their vocational training a considerable number of *bank executives* leave their job to attend university. After having finished their military service a third of the bank executives go to university, most of them studying law, economics or business studies. Similarly, a quite considerable proportion of the industrial mechanics *re-enter the educational system*. This normally requires special educational efforts, since most of the industrial mechanics would have to go back to school first in order to achieve the highest school level exam, the *Abitur*, which would allow them to enter university. Four years after the end of the apprenticeship, almost one quarter of the industrial mechanics have taken the strenuous route through the educational system in order to achieve a degree at university or at a higher technical college. Compared to that the other occupational groups do not show similar efforts to attain further educational qualifications: four and five years after their apprenticeship, hairdressers, car mechanics, retail sales persons and office workers either work in the occupation trained-for or in other occupations.

	in occupation trained for	not in occ. trained for	returned to school	enrolled in university
bank employees (229)	53.7%	9.6%	0.4%	31.9%
office workers (319)	60.2%	22.6%	0.3%	6.9%
industrial mechanics (177)	40.7%	23.2%	10.2%	14.1%
car mechanics (103)	37.9%	37.9%	1%	5.8%
hairdressers (80)	42.5%	33.8%	2.5%	1.3%
retail sales persons (130)	43.8%	36.2%	0	5.4%
	49.8% (517)	23.9% (248)	2.2% (23)	12.9% (134)

Table 1: Occupational status of apprentices in six different professions (school leaver cohort 1989) in Bremen and Munich four to five years after vocational training[2] [21]

Multivariate modelling with the quantitative data suggested that the high proportion of bank executives who returned to the educational system can be mainly explained by the high proportion of those who had achieved the Abitur. This, however, is not true for the industrial mechanics—their tendency to gain additional qualification is independent of the level of attainment at school. Furthermore, respondents from occupations with similar low educational status, namely office workers, hairdressers, shop assistants and car mechanics, rarely make attempts to further invest in their educational capital. [22]

To understand this statistical finding, information about norms relevant for certain occupational life worlds had to be used: *industrial mechanics* are often trained in large companies in the old core industries, especially in the domain of engine building and the automobile industry. The trainees there work under the supervision of highly qualified master craftsmen whose single task was to train apprentices. Compared to the situation in small crafts workshops, where apprentices have to do routine tasks most of the time, these training workshops really equipped the young workers with a variety of specific skills. Apart from that, the industrial mechanic has always been regarded as one of the most prestigious occupations in this sector, with members of this occupation representing, especially in earlier times, some sort of working class aristocracy. After having finished their vocational exam, most of the industrial mechanics got offered permanent employment contracts by their companies. But, since our industrial

2 For reasons of readability the residual category (containing categories like without job, on sick leave, pregnant, maternity leave, imprisonment, abroad, military service) has been omitted. Therefore the row percentages do not add up to 100%.

mechanics entered the labour market in a period of economic slowdown, which has hit the German manufacturing and mechanical engineering industry very hard, the work situation for most of them after the apprenticeship was much less privileged than the training had been. While only a small minority got jobs that presented them with challenging tasks (like monitoring the ongoing production process, or repairing machines) the majority had to perform tasks that did not differ from the work of unskilled and semi-skilled workers. [23]

Many industrial mechanics expressed their disappointment with this situation in the qualitative interviews of subsequent panel waves, but only a proportion of them made attempts to gain higher qualifications, while others stayed in their occupation. To understand these differences one had to draw on knowledge about occupational aspirations and action orientations of the individual actors contained in the *qualitative data* collected with the help of open ended interviews: by comparing the respondents aspirations, realisations and assessments over some years of the life course it became clear that most individuals developed a characteristic and stable mode of coping with the opportunities and constraints of their occupational situation (HEINZ et al. 1998). Actors with a mode one could call "improvement of opportunities" saw work as the crucial domain in life, and worked hard to develop their competencies and career. Since they also regarded work as a means of self-fulfilment, they heavily opposed any kind of routine work and expected a high degree of variation and alternation concerning their tasks. In an occupational context which is characterised by highly routine work and restricted career prospects, as with the industrial mechanics, this mode of action orientation leads the respondents to redirect their life course by studying to attain their higher school level degree and entering university or a higher technical college. Industrial mechanics who stayed in their occupation often developed a mode of action orientation which can be called the "workmen's habit": they regarded good working conditions and good salary as the most crucial things in their work. Their attitudes towards their job and concerning career opportunities were rather sober: they did not see work as a means of self-fulfilment but as a way of bread-winning and developed strategies to avoid being exploited and worn out. [24]

At first glance the results of this project may serve as a good example of the *complementarity model* of triangulation: qualitative and quantitative findings were combined to give a fuller picture of the investigated phenomenon. However, one must not forget that the quantitative results *alone* were not a sufficient basis for a valid sociological explanation of the industrial mechanics' educational behaviour —these results *had* to be combined with information derived from qualitative interviews in order to produce a meaningful picture of the social processes under investigation. Consequently, the *trigonometrical* interpretation of triangulation (which may be considered as a strict version of the complementarity approach) seems to provide the most adequate metaphor for the integration of research methods and results concerning the industrial mechanics' educational behaviour. The statistical data alone could not provide enough information for their sociological understanding, they had to be supplemented with knowledge on the meso- and microlevel of sociological description: specific cultural knowledge about the investigated domain and knowledge about specific aspirations and

action orientations of the workers had to be used to interpret a certain statistical correlation. Statistical reasoning in the social sciences often means the interpretation of statistical facts (which represent phenomena on the macrolevel of sociological explanation) in the light of knowledge stemming from the mesolevel of cultural phenomena and the microlevel of individual action orientations and action patterns. This kind of reasoning between macro-, meso and microlevel (cf. COLEMAN 1990, p.10ff.) often remains hidden when sociological arguments are based on data from empirical social research since a large part of the necessary cultural and local knowledge is almost trivial and easily accessible to the researcher as well as to the reader. The tendency of the bank executives to re-enter the educational system after the apprenticeship may serve as a good example—this tendency is easily understandable by drawing on the fact that most bank executives have gained the highest level school exam (the *Abitur*) which opens up the way to university. Readers who are acquainted with the German three tier school system will easily understand the differences between educational aspirations of bank executives and apprentices from many other occupational fields by using their common sense knowledge and without being forced to collect further sociological data (whether qualitative or quantitative). The application of such a "heuristic of common sense knowledge" may turn out to be unproblematic in many cases, but it may lead to serious misinterpretations if sociological domains and life worlds are investigated which are remote from the life world of the sociological investigator. In this case the researcher may not have the necessary local knowledge to formulate valid and meaningful sociological explanations of quantitative results and would be well advised to draw on qualitative data material which can provide such information. [25]

3.2 Example 2: Structures on the aggregate level as explaining arguments for processes on the microlevel of social action

As the previous example illustrates, it can often be necessary to describe phenomena on the micro- or mesolevel of sociological description with the help of qualitative data in order to sociologically explain statistical phenomena. But this type of reasoning represents only one possibility of formulating sociological arguments by combining qualitative and quantitative results: it is also possible to use knowledge about relations on the aggregate level of statistical phenomena to gain a deeper understanding of microprocesses of social action and interaction which were initially investigated with the help of qualitative methods. [26]

The following results from an empirical research project about the occupational and family biographies of a cohort of women who completed an apprenticeship in Germany shortly after World War II gives a good example of that. The women in the sample had received training as hairdressers, nursery maids, tailors, shop assistants and business executives (cf. BORN, KRÜGER & LORENZ-MEYER 1996; KRÜGER, BORN & KELLE 1989). A mail survey with members of this cohort provided information about their individual occupational careers (especially concerning times when they worked in their occupation and times in other occupational fields) and about relevant events in their family biographies (as for example marriages, birth of children, divorces etc.). In addition, qualitative

interviews were conducted with a subsample of women and their husbands focusing on the respondents' subjective perspectives on their life courses. [27]

Multivariate analyses of the numerical data clearly showed a strong influence of the occupation the women were trained for on the shaping of the occupational careers. Since other variables which have an impact on womens' careers (especially the marital status and the number of births) were controlled, it became clear that occupation influences the life course independently of other factors: on average business executives spend a longer span of their life in paid work than members of the other occupations, tailors and shop assistants work in occupational fields for which they were not trained for longer periods than members of the other occupations, while a relatively greater proportion of hairdressers leave their occupational field after some years and never return to paid work. These differing life course patterns can certainly be interpreted as a result of occupation-specific labour market conditions in the 1950s and 1960s as well as a consequence of gender-specific opportunity structures of the different occupations: some occupations make it easier than others for women to reconcile the requirements of work and family life (BORN, KRÜGER & LORENZ-MEYER 1996, p.207; BORN 1993). [28]

Most interestingly, such aspects were never mentioned when respondents reflected in the qualitative interviews about the reasons for their job-related decisions. Wives and husbands likewise emphasised that womens' decisions to stay in their occupation or to re-enter the labour market after a period of being exclusively concerned with family work were only dependent on bargaining processes between the spouses. Thereby the approval of the male partner was always regarded as one of the decisive factors for job-related decisions, while no attention was paid to the specific opportunities related to the occupation for which the women were trained (ERZBERGER 1998, p.190). To relate the results of qualitative and quantitative analyses to each other in a more meaningful way a deeper analysis of the qualitative material had to be performed, based on the insights provided by the statistical results. Among other facts these further analyses showed that negotiations between wives and husbands were in many cases the result of job offers the women had received. Furthermore, the job opportunities in the occupations for which they were trained equipped the women with different resources for arguing with their spouses: it was mainly women whose occupation allowed for supplementing family income in a considerable way and offered opportunities to combine paid work and family work who were successful in their attempts to gain acceptance from their spouses for their re-entry into the labour market. [29]

What lesson can be learned from this example? Qualitative and quantitative research provided different kinds of information about potential causes of the womens' different labour market participation. On the one hand the influence of structural constraints on individual biographies can be made visible through multivariate analyses of statistical data. On the other hand the qualitative analysis of social microprocesses can show how social interaction on the microlevel of social networks and family relations influence decisions about occupational

careers. However, the collection and analysis of qualitative and quantitative material in the same research project can lead to different explanations of the same phenomenon. Each of these isolated explanations may not be sufficient to fully describe the process which caused the investigated phenomenon: an explanation drawing exclusively on empirical results at the statistical level may neglect the role of social microprocesses. Also an explanation which is solely based on qualitative data may only tell part of the story: explanations which mainly draw on the perspectives of the actors in the investigated field may suffer from their structural "nearsightedness": unlike sociologists, lay actors do not regularly compare different social situations and their possible effects with each other, and therefore often do not reflect on the societal and structural conditions of their own living conditions. Consequently the question "What would be my opportunities to re-enter the labour market if I had learned another occupation" may never come to their minds and thus will never be expressed in an interview. It is not necessary to draw on social psychological concepts like "false consciousness" to explain such nearsightedness, it can be seen as the simple result of the fact that lay actors usually do not make the kinds of comparisons on the aggregate level with which sociologists are acquainted. But structural nearsightedness clearly limits the explanatory power of research results derived exclusively from the qualitative investigation of actors' perspectives. In the qualitative data material, structural constraints were initially hidden in the description of bargaining processes and could not be uncovered before information about these structural facts became available on the aggregate level. The investigated phenomenon could also not be fully explained only on the basis of statistical information about structural influences—both qualitative and quantitative data had to be analysed and the results had to be combined in order to produce an adequate sociological explanation which takes into account structural influences as well as microsocial processes. [30]

3.3 Example 3: The divergence of qualitative and quantitative findings as a results of divided societal realms of discourse

A further example from research practice may illustrate how easily misinterpretations of quantitative findings may arise, if the interpretation of statistical results is not guided by valid local knowledge. The goal of this research project was to analyse the status passage between the educational system and the employment sector in the former communist part of Germany before and after the democratic revolution or *Wende* (SACKMANN, WEYMANN & WINGENS 2000). For this purpose members of different birth cohorts who had experienced the transition from education to employment before and during the transformation of the political system were interviewed in subsequent waves of a standardised panel. As with the other two projects qualitative interviews were performed with the members of a subsample drawn from the large quantitative sample. [31]

One focus of the research was on the interplay between bureaucratic regulation and individual action strategies in the transition between education and work (WINGENS 1999). In official government sources it was emphasised that East Germany had established a highly formalised transition system between

education and employment. The central idea behind it was that the output of the educational system could be regulated in accordance with the requirements of the national economy. For this purpose rough productivity and economic growth targets were defined at the top level of the planning administration. On this basis a governmental planning commission calculated requirements concerning the number of university graduates and employees. To meet these requirements a highly bureaucratised career guidance system was set up: the status passage between graduation and work, for instance, was supervised at each university by a graduate allocation bureau which had to direct school leavers to their jobs. [32]

According to the quantitative survey data this system of state control over individual career paths and trajectories worked very well. Around 60% of university graduates from the cohort that had experienced the transition from university to work before the *Wende* named the official allocation authority as the source of information for their job seeking activities. Personal networks, and direct information from the factories, were important only for, respectively, 17%, and 18%, of the respondents. If one takes the quantitative data as the only information source one would easily come to the conclusion that the system of rigid control over individual careers promoted by the official ideology of the communist party in power was rather successful. [33]

However, the analysis of the qualitative data clearly showed that the impression of strict bureaucratic control and individual passivity reproduced an incorrect image: individual actors were able to influence their individual careers to a remarkable extent, if they were creative enough. For instance, it was possible to strategically use the formal procedures developed to allow for delegation of employees to universities by their companies to promote individual career plans. The bureaucratic allocation of graduates to their workplaces—the core of the system of state control over individual life courses—turned out in many cases to be nothing more than a legitimation for individual job seeking: graduates looked for companies which were interested in employing them (which often turned out not to be very difficult since in almost every sector of the East German economy there existed a profound need for skilled personnel). After the graduate and the company had made an agreement the company had to manage to complement the list of vacancies at the allocation office, which in most cases was relatively easy to do. [34]

Without the detailed stories of the status passages between education and work given by the respondents in qualitative interviews it would have been almost impossible to uncover this interplay between structural constraints and individual action. Using this material the opportunities for personal decisions encapsulated within a system which on the surface seemed to exercise total control over individual agency could be discerned. One can easily imagine that these (certainly limited) avenues for individual freedom helped to stabilise the fragile and inefficient economy while it also helped to uphold the official ideological claims of the central planning authorities. However, the obvious tendency of respondents to conform to the norms of "double speak" even after the collapse of the socialist system produced a "Potemkin village" in the quantitative survey (cf.

ERZBERGER 2000). Only with the help of qualitative material were the researchers able to gain insight into the events behind the facades of ideology. [35]

4. Macro-micro-explanations and the Need for Method Integration

How do the examples discussed so far relate to the different understandings of the triangulation metaphor? In the first project, which investigated the first years of occupational life of a specific cohort of school leavers in Bremen and Munich in 1989, quantitative data provided knowledge about the relation between structural constraints (especially concerning gender and educational resources) on the one hand and occupational careers on the other hand. Qualitative interviews yielded additional information which then helped to develop adequate sociological explanations for phenomena on the aggregate statistical level: for example, a complete explanation of the industrial mechanics' tendency towards further educational efforts had to draw on knowledge about aspirations developed in specific occupational life worlds. The second research project which worked on the occupational life courses of women trained in the late 1940s showed that knowledge about the actors' individual perspectives, interpretations and motives often cannot suffice to produce valid and meaningful sociological explanations. When explaining womens' careers one needed to examine not only the family-related events which these women themselves regarded as relevant for their life course. It was also necessary to have regard to structural phenomena which had to be described with the help of statistical data. [36]

In these two cases qualitative and quantitative methods served to provide *complementary findings*. However, both projects provide arguments for the *strong version* of a complementarist concept which is entailed in the original trigonometrical meaning of the word triangulation: concerning Project 1 and 2, qualitative and quantitative methods had to be combined to allow for adequate explanations of the studied phenomena. In both cases qualitative or quantitative data alone could not provide sufficient information to understand the social processes under scrutiny: neither was it possible to explain the tendency of industrial mechanics to attain further qualifications without information about cultural patterns of occupational aspirations contained in the qualitative material. Nor was an adequate understanding of the bargaining processes of married couples concerning the wives' occupational careers possible if statistical results about sociostructural influences on female careers were not taken into account. However, a "complementarity model" could not serve as a *general* methodological concept for the integration of qualitative and quantitative methods—the third example shows that the validation approach of triangulation may be applicable in some cases: qualitative methods were used there to invalidate findings produced with the help of quantitative methods. [37]

These considerations should have made it clear that the different ideas and concepts which are developed around the term triangulation could not be regarded as general methodological models, but as metaphoric understandings, with each one of them useable for limited purposes. In some cases, that is for some research projects, a certain understanding of triangulation (e.g.

triangulation as providing different, complementary perspectives) may be well suited to gaining a better insight into the process of method integration and of its results, for other projects another understanding (e.g. triangulation as determining the position of a point with two measurement operations) may fit better. What these examples from research practice show, above all, is that it is not sufficient to discuss the integration of qualitative and quantitative methods exclusively on the basis of epistemological considerations and methodological models (whether centred on "complementarity" or "mutual validation"), but that methodological reflections on the integration of methods have to be based on theoretical considerations about the social processes under investigation. Thereby one must pay attention to the nature of social structures and social actions in the empirical field and to the ways that structures and actions are related to each other. [38]

In relation to this issue the three examples have a common denominator: they illuminate difficulties for sociological explanation which arise from the flexibility and contingent nature of social structures. The partial contingency of social structure has been addressed by social theorists in various ways. The most prominent approaches which stressed the active role of people within the social structure certainly came from the interactionist tradition of sociology: from its earliest beginnings in the 1920s through to its latest constructivist followers it has focused on the actors' interpretations and definitions of situations, thereby maintaining that the normative order of society leaves scope for social actors to construct their own patterns of meaning. Later theorists like GIDDENS or HABERMAS have further developed the idea that the understanding of social structures has to take into account the ability of human actors to form purposes and meanings and the resulting potential creativity and freedom of social action, even if this freedom can be constrained in several ways. In his theory of structuration GIDDENS had emphasised that structures of social action are themselves constituted through processes of interpretation and can thus be transformed if actors follow new patterns of interpretation (GIDDENS 1984). One will find this view also in theoretical approaches far-off from the qualitative camp: proponents of contemporary Rational Choice approaches have stressed the importance for social theory of acknowledging the freedom of individuals to decide about (at least some of) their actions (cf. COLEMAN 1990). Such approaches accentuate the idea that individual action is not fully determined by social constraints, whether it may be normative orders or other structural influences. Social actors often make choices between different courses of action, although their action space may be limited in various ways. The extent to which subjective interpretation and individual decision-making is considered as an integral part of social action corresponds directly to the extent to which social structures have to be regarded as flexible and contingent. By utilising action spaces social actors may change culturally defined patterns of behaviour not only for themselves, but new patterns may also emerge if other members of their social group take over these patterns. [39]

The supposed ability of actors to interpret social norms and rules and thereby to develop their own meaning structures and courses of action within certain limits

may not only explain societal change, but will also raise problems for a specific strategy of explaining sociological macrophenomena. Usually any explanation of statistical facts which serve as representations of macrophenomena requires that certain assumptions about phenomena on the microlevel of social action are made. Those assumptions which refer to action orientations and interpretations of those actors who collectively bring about the macrophenomena are often implicit —when reasoning about changing patterns of occupational careers among members of different cohorts, occupations or genders, for instance, one must rely on certain presumptions about the aspirations, values and definitions of the situation of these actors. The validity of explanations of macrophenomena often rests on the existence of widespread and typical aspirations, values and definitions of situations in the field under study. Common sense knowledge about cultural patterns which social researchers have at hand as competent members of their society is regularly used for the explanation of statistical macrophenomena. In many cases the application of this *heuristic of common sense knowledge* would cause no major harm, especially if research takes place within the researcher's own culture or subculture. The already-mentioned fact that bank executives tend to go to university after having finished their vocational training may serve as a good example for that: a high proportion of bank executives come from the *Gymnasium* and the graduation they obtain there is connected with the opportunity to attend university. Given these facts one would need no further investigation to conclude that many of the bank employees knew from the beginning of their training that an apprenticeship would only be an interlude in their career programs. [40]

However, the shortcomings and limitations of a common sense heuristic can easily be discerned if foreign cultures or unfamiliar domestic subcultures or populations are the object of scientific inquiry. Not being a member of those cultures or populations, researchers do not possess sufficient knowledge to formulate valid assumptions about typical norms, aspirations and patterns of action. In these cases a common sense heuristic can be harmful, seducing the researcher into deriving assumptions from his or her personal knowledge that would completely fail to account for the goals the actors in the empirical field really have and the means they use to attain these goals. The examples described above, namely the tendency of industrial mechanics to re-enter the educational system and the flexible use East German university graduates made of a rigid system of job allocation, are excellent examples of this. They also show that relevant cultural knowledge may be restricted to small subcultures unknown to the researcher and can be carefully hidden beneath official rhetorics. Then the necessary local knowledge can only be uncovered through the thorough collection and analysis of qualitative data. [41]

In the discussions about the present state and future development of industrialised societies the role of individualisation processes has often been stressed (esp. BECK 1992, BECK, GIDDENS & LASH 1994; GIDDENS 1992; 1994): As a consequence of an increasing tendency of 'erosion of traditions' or the liberation of the individual from the guidance of collective norms, values and attitudes, individual actors gain more and more autonomy for their own courses of

action and form their own biographies. By generating growing action spaces and opportunities, modernisation processes will also enhance (sub) cultural pluralisation and fragmentation: the variety of lifeworlds which offer the members of industrial societies different values, norms and patterns of interpretation will increase and these lifeworlds will undergo rapid changes more frequently then in earlier times. If such a diagnosis of macrosocietal change is correct a plethora of problems will lie ahead for empirical social research, for the heuristic of common sense knowledge will then fail more often than it did in former times. [42]

This should make the case for a frequent use of an understanding of the triangulation metaphor in its original trigonometrical meaning: the best way to obtain valid explanations of social phenomena is by combining quantitative survey technology on the one hand and ethnographic investigations into the structures of meanings and local knowledge in limited cultural settings on the other. Looking at the challenges which are posed by modernisation processes, sociologists who do not wish to give up claims to understand and explain macrosocial phenomena are well-advised not to invest too much effort in methodological warfare but to make intensive use of the richness of differing methodological traditions. [43]

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Citation

Kelle, Udo (2001). Sociological Explanations between Micro and Macro and the Integration of Qualitative and Quantitative Methods [43 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *2*(1), Art. 5, http://nbn-resolving.de/urn:nbn:de:0114-fqs010159.

Revised 7/2008