Q methodology: A sneak preview

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Preface

Q methodology enjoys increasing popularity and use among scholars and students in the Netherlands. Many people that develop an interest in Q methodology, however, find it difficult to gain access to the relevant background literature and instructions for use. The basic handbook by Steven Brown - *Political Subjectivity* - has been off the shelf for quite some time and is hard to come by.[*] The key journal presenting methodological issues and applications of Q methodology – *Operant Subjectivity* – is also hard to find. In recent years many of our students searching for a suitable methodology for their thesis ran into this problem and on occasions it was an obstacle to go on with Q methodology. For that reason we decided to write down the basics and make this document easily accessible.

This document is compiled from what we think is the key literature on Q methodology. References are provided throughout the text and readers are encouraged to look up the original materials.

We gratefully acknowledge Steven Brown for his comments and suggestions to a concept version of this document and his overall guidance on Q matters.

[*] Recently, a scanned version of *Political Subjectivity* was made available at the Kent State University Library (go to: http://reserves.library.kent.edu/courseindex.asp; from the "Select an instructor" drop-down menu, select "BROWN, Steven" and then click GO; at the next location, click on "POL Reference," and that should bring up the book).

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1. What is Q methodology?

Q methodology provides a foundation for the systematic study of subjectivity, a person's viewpoint, opinion, beliefs, attitude, and the like (Brown 1993). Typically, in a Q methodological study people are presented with a sample of statements about some topic, called the Q-set. Respondents, called the P-set, are asked to rank-order the statements from their individual point of view, according to some preference, judgement or feeling about them, mostly using a quasi-normal distribution. By Q sorting people give their subjective meaning to the statements, and by doing so reveal their subjective viewpoint (Smith 2001) or personal profile (Brouwer 1999).

These individual rankings (or viewpoints) are then subject to factor analysis. Stephenson (1935) presented Q methodology as an inversion of conventional factor analysis in the sense that Q correlates persons instead of tests; "[w]hereas previously a large number of people were given a small number of tests, now we give a small number of people a large number of test-items". Correlation between personal profiles then indicates similar viewpoints, or segments of subjectivity which exist (Brown 1993). By correlating people, Q factor analysis gives information about similarities and differences in viewpoint on a particular subject. If each individual would have her/his own specific likes and dislikes, Stephenson (1935) argued, their profiles will not correlate; if, however, significant clusters of correlations exist, they could be factorised, described as common viewpoints (or tastes, preferences, dominant accounts, typologies, et cetera), and individuals could be measured with respect to them.

The factors resulting from Q analysis thus represent clusters of subjectivity that are operant, i.e., that represent functional rather than merely logical distinctions (Brown 1993; 2002[b]). "Studies using surveys and questionnaires often use categories that the investigator imposes on the responses. Q, on the other hand, determines

categories that are operant" (Smith 2001). A crucial premise of Q is that subjectivity is communicable, because only when subjectivity is communicated, when it is expressed operantly, it can be systematically analysed, just as any other behaviour (Stephenson 1953; 1968).

The results of a Q methodological study can be used to describe a population of viewpoints and not, like in R, a population of people (Risdon et al. 2003). In this way, Q can be very helpful in exploring tastes, preferences, sentiments, motives and goals, the part of personality that is of great influence on behaviour but that often remains largely unexplored. Another considerable difference between Q and R is that "Q does not need large numbers of subjects as does R, for it can reveal a characteristic independently of the distribution of that characteristic relative to other characteristics" (Smith 2001).

To summarise the above, a statement from Steven Brown about Q methodology:

> *Most typically, a person is presented with a set of statements about some topic, and is asked to rank-order them (usually from 'agree' to 'disagree'), an operation referred to as 'Q sorting.' The statements are matters of opinion only (not fact), and the fact that the Q sorter is ranking the statements from his or her own point of view is what brings subjectivity into the picture. There is obviously no right or wrong way to provide "my point of view" about anything—health care, the Clarence Thomas nomination, the reasons people commit suicide, why Cleveland can't field a decent baseball team, or anything else. Yet the rankings are subject to factor analysis, and the resulting factors, inasmuch as they have arisen from individual subjectivities, indicate segments of subjectivity which exist. And since the interest of Q-methodology is in the nature of the segments and the extent to which they are similar or dissimilar, the issue of large numbers, so fundamental to most social research, is rendered relatively unimportant.*

Brouwer (1999) argued that one of the important advantages of Q is that questions pertaining to one and the same domain are not analysed as separate items of information but rather in their mutual coherence for the respondent: "[s]ubjective feelings and opinions are most fruitfully studied when respondents are encouraged to order a good sample of items from one and the same domain of subjective interest (instead of just replying to single questions)".

Because Q is a small sample investigation of human subjectivity based on sorting of items of unknown reliability, results from Q methodological studies have often been criticised for their reliability and hence the possibility for generalisation (Thomas and Baas, 1992).[1] The most important type of reliability for Q is replicability: will the same condition of instruction lead to factors that are schematically reliable – that is, represent similar viewpoints on the topic - across similarly structured yet different Q samples and when administered to different sets of persons. According to Brown (1980) an important notion behind Q methodology is that only a limited number of distinct viewpoints exist on any topic. Any well-structured Q sample, containing the wide range of existing opinions on the topic, will reveal these perspectives.[2] Based on the findings of two pairs of tandem studies, Thomas and Baas (1992) concluded that scepticism over this type of reliability is unwarranted. The more common notion of statistical reliability, regarding the ability to generalise sample results to the general population, is of less concern here. The results of a Q methodological study are the distinct subjectivities about a topic that are operant, not the percentage of the sample (or the general population) that adheres to any of them.

Interested readers will find more information on the methodological background of Q in Stephenson (1953) and Brown (1980; 1986); a guide for Q technique in Brown (1980; 1986; 1993); and a recent discussion and review of applications in Smith (2001).[3]

2. How does Q methodology work?

This section provides those unfamiliar with Q methodology a very basic introduction to Q, largely based on Brown (1980; 1993). Performing a Q methodological study involves the following steps: (1) definition of the concourse; (2) development of the Q sample; (3) selection of the P set; (4) Q sorting; and (5) analysis and interpretation. A comprehensive discussion of each step follows.

2.1 Definition of the concourse

In Q, concourse refers to "the flow of communicability surrounding any topic" in "the ordinary conversation, commentary, and discourse of every day life" Brown (1993). The concourse is a technical concept (not to be confused with the concept of discourse) much used in Q methodology for the collection of all the possible statements the respondents can make about the subject at hand. The concourse is thus supposed to contain all the relevant aspects of all the discourses. It is up to the researcher to draw a representative sample from the concourse at hand. The concourse may consist of self-referent statements (i.e., opinions, not facts), objects, pictures, et cetera. A verbal concourse, to which we will restrict ourselves here, may be obtained in a number of ways: interviewing people; participant observation; popular literature, like media reports, newspapers, magazines, novels; and scientific literature, like papers, essays, and books. The gathered material represents existing opinions and arguments, things lay people, politicians, representative organisations, professionals, scientists have to say about the topic; this is the raw material for a Q. Though any source may and many have been used, "[t]he level of the discourse dictates the sophistication of the concourse" (Brown 1993).

2.2 Development of the Q set

Next, a subset of statements is drawn from the concourse, to be presented to the participants. This is called the Q set (or Q sample) and often consists of 40 to 50 statements, but less or more statements are certainly also possible (e.g., Van Eeten 1998). According to Brown (1980), the selection of statements from the concourse for inclusion in the Q set is of crucial importance, but remains "more an art than a science": the researcher uses a structure for selection of a representative miniature of the concourse. Such a structure may *emerge* from further examination of the statements in the concourse or may be *imposed* on the concourse based on some theory. Whatever structure is used, it forces the investigator to select statements widely different from one another in order to make the Q set broadly representative (Brown 1980). Different investigators or structures may thus lead to differing Q sets from the same concourse. This is not regarded as a problem for two reasons. First, the structure chosen is only a logical construct used by the investigator. Whatever the starting point, the aim is always to arrive at a Q set that is representative of the wide range of existing opinions about the topic. Second, irrespective of the structure and of what the researcher considers a balanced set of statements, eventually it is the subject that gives meaning to the statements by sorting them (Brown 1993). The limited number of comparative studies that have been carried out indicate that different sets of statements structured in different ways can nevertheless be expected to converge on the same conclusions (Thomas & Baas 1992). Finally, the statements are edited where necessary, randomly assigned a number, and statements and the corresponding number are printed on separate cards – the Q deck – for Q sorting.

2.3 Selection of the P set

As discussed before, a Q methodological study requires only a limited number of respondents: "...all that is required are enough subjects to establish the existence of a

factor for purposes of comparing one factor with another […] P sets, as in the case of Q samples, provide breath and comprehensiveness so as to maximise confidence that the major factors at issue have been manifested using a particular set of persons and a particular set of Q statements" (Brown 1980). This P set usually is smaller than the Q set (Brouwer 1999). The aim is to have four or five persons defining each anticipated viewpoint, which are often two to four, and rarely more than six. The P set is not random. It is a structured sample of respondents who are theoretically relevant to the problem under consideration; for instance, persons who are expected to have a clear and distinct viewpoint regarding the problem and, in that quality, may define a factor (Brown 1980). Eventually, the number of persons associated with a factor is of less importance than who they are; in the total population the prevalence may be much higher (Brown 1978).

2.4 Q sorting

The general procedure is as follows (Brown 1993). The Q set is given to the respondent in the form of a pack of randomly numbered cards, each card containing one of the statements from the Q set. The respondent is instructed to rank the statements according to some rule – the *condition of instruction*, typically the person's point of view regarding the issue - and is provided with a score sheet and a suggested distribution for the Q sorting task. The score sheet is a continuum ranging from *most* to *most*, for instance: with "most disagree" on the one end and "most agree" on the other;[4] and in between a distribution that usually takes the form of a quasi-normal distribution. The kurtosis of this distribution depends on the controversiality of the topic: in case the involvement, interest or knowledge of the respondents is expected to be low, or a relatively small part of the statements is expected to be salient, the distribution should be steeper in order to leave more room for ambiguity, indecisiveness or error in the middle of the distribution; in case respondents are expected to have strong, or well

articulated opinions on the topic at issue, the distribution should be flatter in order to provide more room for strong (dis)agreement with statements. Usually, respondents are requested to adhere to the distribution provided.[5] The range of the distribution depends on the number of statements and its kurtosis: according to Brown (1980), nowadays most Q sets contain 40 to 50 statements and employ a relatively flattened distribution with a range of -5 to +5.

The respondent is asked to read through all of the statements carefully. In this way (s)he gets an impression of the type and range of opinions at issue. The respondent is instructed to begin with a rough sorting while reading, by dividing the statements into three piles: statements (s)he generally agrees with (or likes, finds important, et cetera), those (s)he disagrees with and those about which (s)he is neutral, doubtful or undecided. The number of statements in each pile is recorded to check for agreement-disagreement balance in the Q set. Next, the respondent is asked to rank order the statements according to the condition of instruction and to place them in the score sheet provided. It is recommended to have the Q sort followed by an interview. The Q sorter is invited to elaborate on her/his point of view, especially by elaborating on the most salient statements - those placed at both extreme ends of the continuum on the score sheet. This information is helpful for the interpretation of factors later on.

Though many feel that because the Q sorting procedure is complex and unfamiliar to the lay public, it requires administration in a face-to-face interview setting. Van Tubergen and Olins (1979), however, argue that Q studies may just as well be conducted by mail. They found results from Q sort self-administration to be highly congruent with those from in-person interviews. Reber, Kaufman and Cropp (2000) performed two validation studies comparing computer- and interview-based Q sorts and concluded that there is no apparent difference in the reliability or validity of these

two methods of administration. Nevertheless, interviews usually enable the researcher to understand the results better, and this often leads to a more penetrating interpretation. I would only mail a Q sort if there were no other way. Mail- or computer-based Q sorts may be desirable in case the theoretically relevant sample has a wider geographical distribution, and because of lower costs of administration.

2.5 Analysis and interpretation

Brown (1980; 1993) provides a comprehensive overview of the analysis of the Q sorts. Because nowadays many software packages are available to perform the analysis, we will only give a very concise overview of the subsequent steps.[6]

The analysis of the Q sorts is a purely technical, objective procedure – and is therefore sometimes referred to as the scientific base of Q. First, the correlation matrix of all Q sorts is calculated. This represents the level of (dis)agreement between the individual sorts, that is, the degree of (dis)similarity in points of view between the individual Q sorters. Next, this correlation matrix is subject to factor analysis, with the objective to identify the number of natural groupings of Q sorts by virtue of being similar or dissimilar to one another, that is, to examine how many basically different Q sorts are in evidence (Brown 1980; 1993). People with similar views on the topic will share the same factor. A factor loading is determined for each Q sort, expressing the extent to which each Q sort is associated with each factor. The number of factors in the final set depends on the variability in the elicited Q sorts.[7] It is however recommended to take along more than the number of factors that is anticipated in the next step of the analysis – factor rotation – to preserve as much of the variance as possible: "[e]xperience has indicated that 'the magic number 7' is generally suitable" (Brown 1980).

This original set of factors is then rotated to arrive at a final set of factors. Rotation may be either *objective*, according to some statistical principle (like varimax), or *theoretical* (or *judgmental*), driven by theoretical concerns, some prior knowledge or preconceived idea of the investigator, or an idea that came up during the study (e.g., from a salient Q sort or during a follow up interview).[8] By rotating the factors, the investigator muddles about the sphere of opinions, examines it from different angles. A judgmental rotation looks for confirmation of an idea or a theory, a theoretical rotation for an acceptable vantage point by statistical criteria (though the investigator has to judge about the acceptability of this solution). Rotation does not affect the consistency in sentiment throughout individual Q sorts or the relationships between Q sorts, it only shifts the perspective from which they are observed. Each resulting final factor represents a group of individual points of view that are highly correlated with each other and uncorrelated with others.[9]

The final step before describing and interpreting the factors is the calculation of factor scores and difference scores. A statement's *factor score* is the normalised weighted average statement score (Z-score) of respondents that define that factor.[10] Based on their Z-scores, statements can be attributed to the original quasi-normal distribution, resulting in a composite (or idealised) Q sort for each factor. The composite Q sort of a factor represents how a hypothetical respondent with a 100% loading on that factor would have ordered all the statements of the Q-set. When the factors are computed, one can look back at the Q sorts and see how high their loadings are on the different factors. When a respondent's factor loading exceeds a certain limit (usually: $p < 0.01$), this called a *defining variate* (or *variable*).[11] The *difference score* is the magnitude of difference between a statement's score on any two factors that is required for it to be statistically significant.[12] When a statement's score on two factors exceeds this difference score, it is called a *distinguishing* (or *distinctive*) *statement*.[13] A statement

that is not distinguishing between any of the identified factors is called a *consensus statement*.

Factor scores on a factor's composite Q sort and difference scores point out the salient statements that deserve special attention in describing and interpreting that factor. Usually, the statements ranked at both extreme ends of the composite sort of a factor, called the *characterising statements*, are used to produce a first description of the composite point of view represented by that factor. The distinguishing and the consensus statements can be used to highlight the differences and similarities between factors. Finally, the explanations Q sorters gave during the follow-up interview can be helpful in interpretation of the factors, in ex-post verification of the interpretation, and as illustration material (sometimes a single quotation says it all).

3. Some examples

For reasons of illustration we present some brief examples of recent Q studies on a wide range of subjects. Main advantage of using examples from our own work is that the related papers and data from these examples can be obtained from the authors (for educational purposes only and insofar as authorship rights permit).

3.1 Bankers' conceptualisations of their customers

[This example is taken from De Graaf, 2001, 2005]

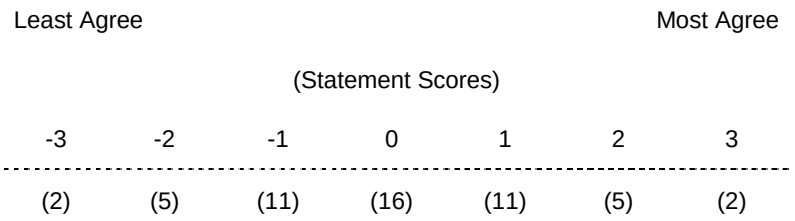
Commercial banking in the relatively small Dutch financial market is dominated by three players: ABN-Amro, ING and Rabobank. All are international companies with large interests outside Holland. While it might be expected that competitive pressure lessens their dissimilarities, their mission statements support it. The core values of ABN-Amro (respect, professionalism, integrity and teamwork) resonate those of Rabobank (respect, expertise and integrity). ING aligns comparably with integrity, entrepreneurship, professionalism, responsiveness and teamwork. The mission statements lead to a conclusion that the three banks are similar. Do Dutch bankers, then, treat their customers similarly?

There are various ways to investigate the customer relationships of bank managers. One would be to ask the bank directors directly how they treat their customers, but one would be sceptical of the answers. They might be socially desirable ones, that is to say, promotional statements. In stead, we studied how bankers talk about their customers. The study focussed on internal discourses, their conversations. Do bank managers talk about their customers as instruments to make money (with the understanding of treating customers well, otherwise they will soon cease to be customers), or as means to improve the world? Are the banks only interested in making

as much money as possible, or do they see environmental concerns as a task for themselves?

Thirty bank directors (the P-set) were given a deck of fifty-two cards containing the statements (the Q-set). They were then asked to arrange the cards according to the degree they agreed with the statements, with scores ranging from –3 to +3 (Figure 1).

Figure 1: Fixed Distribution for the Q-set



Analysis led to five factors, that is, five different ways bankers talk about their customers. These discourses were compared and moral aspects were shown in contrast.

One of the questions discussed was whether Rabobank was right when it claims that it is different from other banks in treating its customers. The answer, the research revealed, is both yes and no. Discourse B_b (Using the Bank to Improve the Region) clearly seems to be a Rabobank discourse. Only one other defining variable was found in this discourse. Furthermore, the loadings among the other bank directors on factor B_b are very low (see Table 1). The conclusion it begs is yes; the discourse within Rabobank backs its claim. Yet only five of the ten Rabobank directors (see the table below) define factor B_b, while those that load on other factors have extreme low loadings on factor B_b. This indicates

they do not identify themselves with it. Thus, even though a Rabobank-specific customer treatment exists, not all Rabobank managers employ it. A random customer going to a random Rabobank would not, it seems, be able to count on a Rabobank-specific treatment.

Table 1: Factor loadings

Q sorts			Factors				
			A_b	B_b	C_b	D_b	E_b
Rabobank	large	1	.02	.10	.34	(.44)	.30
		2	.15	.04	.10	(.49)	.37
		3	.26	.25	.33	.25	(.46)
	medium	4	-.02	(.67)	.19	.24	.12
		5	.08	.09	(.65)	.25	.10
		6	-.03	(.57)	.02	-.02	.16
		7	.10	(.45)	-.16	.38	.27
	small	8	.12	(.67)	.15	.24	.05
		9	-.01	.08	.09	.34	.01
		10	.04	(.65)	(.50)	-.07	-.24
ABN-Amro Bank	large	11	.30	.40	-.11	.33	(.43)
		12	.24	.16	.23	.39	(.53)
		13	.26	.23	.15	.12	(.59)
	medium	14	.41	.06	.26	(.47)	(.48)
		15	.15	.22	.20	.20	(.71)
		16	.23	.26	.30	.02	(.59)
		17	-.01	(.65)	.06	(.52)	.18
	small	18	(.68)	.33	.11	.35	.11
		19	(.49)	-.01	-.18	.36	(.48)
		20	.41	.06	.14	(.47)	.17
ING Bank	large	21	(.61)	-.21	.07	.03	.22
		22	.34	.37	-.06	(.49)	.17
		23	(.44)	.02	-.01	.31	(.56)
	medium	24	.35	.09	-.05	.21	(.47)
		25	(.56)	-.03	.24	-.01	.35
		26	.18	.20	(.55)	.16	.29
		27	.41	.00	.21	.33	.28
	small	28	.13	.24	.17	(.50)	.23
		29	(.44)	.29	.02	-.03	.19
		30	.37	.39	.11	.11	.36

Notes: [1] In parenthesis are the *defining variates* (loadings that exceed .43, $p < .001$). [2] The first three subjects of each bank are located in large cities (CBS urbanisation score 1 or 2); the next four subjects are located in medium size communities (score 3); the last three subjects of each bank group are located in small villages (score 4 or 5).

3.2 Veterinarians' conceptualisations of animals and their owners

[This example is taken from: De Graaf 2005]

Veterinarians have two customers: animals and animal owners. With both types of customers, they have complicated relations. Many times the interests of both types of customers conflict. Using Q methodology as a method for discourse analysis, the following questions were answered: How do practising veterinarians conceptualise animals and their owners and their professional responsibility towards both? And: How do veterinarians deal with conflicts of interest between animals and their owners?

Four different discourses were found on animals and their owners and on veterinarian professional responsibilities that prevail among veterinarians. The factual images veterinarians have of animals and their owners are connected to different normative questions and solutions to these questions. Trying to group veterinarians into animal-oriented versus client-oriented practitioners or into those who do good versus those who do well turns out to be an oversimplification that does not do justice to their positions. Most veterinarians found it impossible to qualify themselves as either animal-oriented or client-oriented because the question is much too simple. They feel a responsibility to both animal and owner. The answer would depend on the situation. It is no choice, really. In their daily practice, the veterinarian cannot view the interests of animals apart from the interests of its owner and vice-versa. The conclusion must be that *both* animals and owners are seen by veterinarians as customers. This does not mean that all veterinarians treat animals and their owners the same way. There are clearly tensions between the interests of animals and the interests of their owners. And there are four different ways in which veterinarians conceptualise these problems and deal with them.

3.3 Operant approaches to travel decision making

[This example is taken from Van Exel et al. 2003; 2004]

Transport policies in the last decades failed to seduce more people to reduce their travel or to use public transport more often. Travel behaviour sometimes is the result of reasoned choice, other times it resembles an inert continuation of a past, habitual, satisfactory behavioural pattern, often best characterised by low involvement and cognitive effort. The aim of this study was to investigate how people approach medium-distance travel decisions, with the underlying objective to distinguish between reasoned and inert travel behaviour.

We collected statements addressing instrumental-reasoned and symbolic-affective characteristics of travel modes and the travel decision-making process from newspapers, periodicals, advertisements from public transport companies, a survey by the Dutch public transport travellers association, popular and scientific literature, and during two previous studies. We selected a balanced set of 42 statements and asked non-captive/choice travellers to identify those aspects that are most relevant to their travel behaviour. Our condition of instruction for Q sorting was: "*To what extent do you agree with the following statements concerning car and public transport as travel alternatives for middle-distance trips (30-100 kilometres)?*". This Q study was administered by mail. The questionnaire we used for this Q study is included in annex A as an example.

Analysis of 39 Q sorts revealed four operant approaches to medium-distance travel decision making: *choice travellers with a preference for car*; *choice travellers with a preference for public transport*; *choice travellers with car as dominant alternative* (see Figure 2); and *conscious car dependent travellers*. In the paper we describe these four

factors and discuss the implications for transport policy in relation to influencing travel behaviour in full detail. The results indicate that the policy that is most likely to succeed in achieving some change in travel behaviour is investment in public transport quality and that not too much should be expected from (modest) pricing policies. Current transport policy in the Netherlands focuses on privatisation of public transport companies, with a demonstrated detrimental effect on service quality, and on investment in road infrastructure and congestion pricing policies. Quite the opposite, thus. This study contributes to our understanding of peoples travel attitudes and behaviour and, subsequently, to better transport policy making.

Figure 2 Composite sort of "choice travellers with car as dominant alternative"

6 Public transport is for people who can not afford a car	20 On a day when I do not have my car at my disposal for a day, I am greatly inconvenienced	2 As a result of all those different timetables and lines, travelling by public transport is too complicated	1 For private use I do not need a car	5 I'd rather look out of the compartment window to the passing Dutch landscape than to the bumper of the car before me	3 What really matters is reaching my destination and getting back, the mode of travel does not matter much	7 All things considered, to me the car is superior to public transport	13 For me, travelling by public transport is more expensive than travelling by car	22 A car is not a necessity, but it does make life a whole lot easier
23 For me the car is more than a mode of transport, it is a part of my identity, a way to distinguish myself from others	35 I am a dedicated follower of the four-wheel-credo. The car can maybe do without me for a day, but I can not do without my car	4 I am not really price- or time-sensitive, environmental aspects are most important to me	9 The last time I travelled by public transport was a complete disaster	8 I know the public transport system pretty well because I make use of it frequently	21 I often feel unsafe when using public transport and on stations, especially at night	15 It is important to me to have control over my journey	18 I find the reliability of travel time important	40 Door to door travel time plays an important role in my mode choice
	41 The Netherlands is a car country. We could just as well pave all railroads and transform all stations into parking garages	25 Before every trip, I draw a comparison between car and public transport regarding travel costs, time and so forth, and select the best alternative	10 Things like comfort, privacy and safety are more important to me than travel costs and travel time	16 For the greater part my travel behaviour is routine, I do not really give it much thought	29 Driving a car is a great pleasure. The sound of the engine, accelerating sportily at traffic lights, cruising on the highway, listen to music	19 I find it pleasant to plan my trips in advance and to have everything well organised before I leave	34 Travel costs play an important role in my mode choice	
		38 My family and friends appreciate it when I travel by public transport	11 I'd rather not drive in big cities... lots of traffic, lots of traffic lights, problems with parking	17 I am well aware of the costs of a trip, by car as well as by public transport	30 For an active social life I need a car. Without a car I would visit my family and friends less often and would make fewer leisure trips	27 Once you own a car, you'll use it for all your travel		
		39 Public transport is much too dirty and unsafe to be an alternative for the car	12 For my work I need a representative mode of transport	24 I recall the day I got my first car very well, I had been looking forward to that day for quite a while	31 In the train you sometimes meet nice people. I enjoy that. The car is much duller and more lonesome	42 A big advantage of travelling by train is that you can do something useful en route: do some reading or take a nap		
			14 I know very well where in my neighbourhood I can get on public transport to the rail station and I have a fairly good notion of the timetable	28 A better environment starts with yourself. Therefore, everyone should use public transport more often	32 A lovely view, a pleasant encounter, a surprising book, a brain wave. A train journey often is an experience			
			26 You are what you drive	36 Only the car takes me where I want, when I want it	33 As far as I am concerned, car and public transport both are good transport alternatives			
				37 I always travel in the same way and find it satisfactory				

4. Concluding comments

One of the great side effects of conducting a Q study is that Q sorters often spontaneously indicate they have enjoyed participating in the study and that they experienced it as instructive. After finishing their Q sort, people can oversee their opinion or preference regarding the subject of the study reflected on the score sheet lying in front of them, and can make changes if they disagree. These aspects of recognition and flexibility generate a sense of control of their contribution and of reliability of the study as a whole. Q sorting perhaps requires greater involvement than standard survey analysis, but apparently does so in a very pleasant and comprehensible manner.

This nice side effect should however not distract you from the fact that conducting a Q methodological study, as may have become clear, is an intensive process. This is also true with respect to the fact that Q is a small sample methodology. Q by no means is a quick and easy trick; it demands a lot of the researcher in the design, analysis and interpretation phases.

We think Q methodology is a valuable addition to any researcher's toolbox. It is a suitable and powerful methodology for exploring and explaining patterns in subjectivities, generating new ideas and hypotheses, and identifying consensus and contrasts in views, opinions and preferences. Q methodology combines qualitative and quantitative aspects, field and desk research, interaction and reflection. In spite of its long history, Q is still an innovative – and therefore sometimes suspect - methodology in many disciplines, journals and countries. Though the tide is turning (but that is a lingering threat), you may run into problems with finding funding for your research and acceptance for your results and your manuscript. We have taken this as a challenge, and continue enjoying the strife!

Notes

[1] Because there is no external criterion for a person's point of view, the issue of validity of Q sorts does not apply (Brown, 1980).

[2] Test-retest reliability of Q sorts has been demonstrated to range from 0.80 upward (Brown, 1980).

[3] Various documents and manuscripts are available from the QArchive at the University of Wisconsin (http://www.uww.edu/personal/fac/cottlec/QArchive/qindex.htm) and from Peter Schmolck's QMethod page (http://www.rz.unibw-muenchen.de/~p41bsmk/qmethod/). We also recommend the website of the International Society for the Scientific Study of Subjectivity (http://www.qmethod.org/).

[4] Sometimes a continuum range from *least* to *most* on the same judgement item is used. For theoretical reasons, however, "most" to "most" (with absence of feeling in the middle) should be used wherever possible (Brown 1980). Alternative items that enable Q sorters to express their point of view next to "(dis)agree" for instance are "important", "relevant", "desirable" and "attractive". The range of the continuum must match the conditions of instruction provided to Q sorters.

[5] This forced distribution is practical but not necessary, it hardly has any effect on factors emerging from the data (Brown, 1980).

[6] For instance, PCQ by Stricklin (www.pcqsoft.com) and PQMethod by Schmolck and Atkinson (freeware: www.rz.unibw-munchen.de/~p41bsmk/qmethod/; you'll also find WebQ here).

[7] The number of factors in the final set can be anticipated by: (1) the number of original factors with at least two significant loadings, or more stringent, factors of which the cross-product of its two highest loadings (ignoring sign), exceeds twice the standard error; (2) the number of original factors with an eigenvalue (i.e., the sum of squares of the factor loadings) in excess of 1.00.

[8] Objective rotation is based on the structure of the data and therefore referred to as an objective or rational procedure. Theoretical (or judgmental) rotation gives more room to the aims and subjectivity of the investigator, who is nevertheless constrained by the structures that emerge from the data (see also Brown & Robyn, in press).

[9] Secondary statistics include: (1) factor eigenvalue; (2) percent of total variance of the correlation matrix; (3) communality, the sum of squared factor loadings per respondent, representing the part of a person's response that is associated with the factors - that (s)he has in common with the other respondents.

[10] The weight "w" is based on the respondent's factor loading "f", and is calculated as: $w=f/(1-f^2)$. The weighted average statement score is then normalised (with mean of 0.00 and standard deviation of 1.00) to remove the effect of differences in numbers of defining respondents per factor, and making statements' factor scores comparable across factors. Statements with a Z-score larger than 1 (or smaller than –1) are referred to as *characterizing* for that factor.

[11] The limit for statistical significance of a factor loading is calculated as the multiplier for the desired level of statistical significance divided by the square root of the number of statements in the Q set [multipliers: 3.29 for $p<0.001$; 2.58 for $p<0.01$; 1.96 for $p<0.05$].

[12] The difference score is based on the standard error of the factor scores (SE) and a multiplier for the required level of statistical significance. See Brown (1980) for full detail.

[13] Though a statement may be distinctive between two factors, usually a statement will be printed out as distinguishing only if it distinguishes one factor from *all* the other factors.

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Annex A: Instructions to the travel behaviour survey (section 3.3)

RESPONDENT NUMBER: ____

INSTRUCTIONS TO THE SURVEY

These instructions will guide you through the survey step by step. Please read each step to the end before you start carrying it out.

1. Take the deck of cards [*see Annex B*] and the score sheet and go sit at a table. Lay down the score sheet [*see Annex C*] in front of you. All 42 cards in the deck contain a statement about travelling or travel modes. We will ask you to rank-order these statements from your own point of view. Our question to you is: "To what extent do you agree with the following statements". The numbers on the cards (from 1 to 42) have been assigned to the cards randomly and are only relevant for the administration of your response.

2. This study is about travel behaviour. We are interested in **your attitude towards car and public transport as travel alternatives for middle-distance trips (30-100 kilometres)**.

3. Read the 42 statements carefully and split them up into three piles: a pile for statements you tend to disagree with, a pile for cards you tend to agree with, and a pile for cards you neither agree or disagree with, or that are not relevant or

applicable to you. Please use the three boxes “AGREE”, “NEUTRAL OR NOT RELEVANT” and “DISAGREE” at the bottom left of the score sheet. Just to be clear, we are interested in your point of view. Therefore, there are no right or wrong answers. When you have finished laying down the cards in the three boxes on the score sheet, count the number of cards in each pile and write down this number in the corresponding box. Please check whether the numbers you entered in the three boxes add up to 42.

4. Take the cards from the “AGREE” pile and read them again. Select the two statements you *most agree* with for *middle-distance trips (30-100 kilometres)* and place them in the two last boxes on the right of the score sheet, below the “9” (it does no matter which one goes on top or below). Next, from the remaining cards in the deck, select the three statements you *most agree* with and place them in the three boxes below the “8”. Follow this procedure for all cards from the “AGREE” pile.

5. Now take the cards from the “DISAGREE” pile and read them again. Just like before, select the two statements you *most disagree* with for *middle-distance trips (30-100 kilometres)* and place them in the two last boxes on the left of the score sheet, below the “1”. Follow this procedure for all cards from the “DISAGREE” pile.

6. Finally, take the remaining cards and read them again. Arrange the cards in the remaining open boxes of the score sheet.

7. When you have placed all cards on the score sheet, please go over your distribution once more and shift cards if you want to.

8. Please explain why you *agree most* with the two statements you have placed below the “9”.

card nr.: … :

card nr.: … :

9. Please explain why you *disagree most* with the two statements you have placed below the “1”.

card nr.: … :

card nr.: … :

10. When you are finished, please write down the number of the cards in the boxes you placed them on.

Annex B: Cards with 42 statements

For private use I do not need a car 1	I know the public transport system pretty well because I make use of it frequently 8	It is important to me to have control over my journey 15
As a result of all those different timetables and lines, travelling by public transport is too complicated 2	The last time I travelled by public transport was a complete disaster 9	For the greater part my travel behaviour is routine, I do not really give it much thought 16
What really matters is reaching my destination and getting back, the mode of travel does not matter much 3	Things like comfort, privacy and safety are more important to me than travel costs and travel time 10	I am well aware of the costs of a trip, by car as well as by public transport 17
I am not really price- or time-sensitive, environmental aspects are most important to me 4	I'd rather not drive in big cities… lots of traffic, lots of traffic lights, problems with parking 11	I find the reliability of travel time important 18
I had rather look out of the compartment window to the passing Dutch landscape than to the bumper of the car before me 5	For my work I need a representative mode of transport 12	I find it pleasant to plan my trips in advance and to have everything well organized before I leave 19
Public transport is for people who can not afford a car 6	For me, travelling by public transport is more expensive than travelling by car 13	On a day when I do not have my car at my disposal for a day, I am greatly inconvenienced 20
All things considered, to me the car is superior to public transport 7	I know very well where in my neighbourhood I can get on public transport to the rail station and I have a fairly good notion of the timetable 14	I often feel unsafe when using public transport and on stations, especially at night 21

A car is not a necessity, but it does make life a whole lot easier 22	Driving a car is a great pleasure. The sound of the engine, accelerating sportily at traffic lights, cruising on the highway, listening to music 29	Only the car takes me where I want, when I want it 36
For me the car is more than a mode of transport, it is a part of my identity, a way to distinguish myself from others 23	For an active social life I need a car. Without a car I would visit my family and friends less often and would make fewer leisure trips 30	I always travel in the same way and find it satisfactory 37
I recall the day I got my first car very well, I had been looking forward to that day for quite a while 24	In the train you sometimes meet nice people. I enjoy that. The car is much duller and more lonesome 31	My family and friends appreciate it when I travel by public transport 38
Before every trip, I draw a comparison between car and public transport regarding travel costs, time and so forth, and select the best alternative 25	A lovely view, a pleasant encounter, a surprising book, a brain wave. A train journey often is an experience 32	Public transport is much too dirty and unsafe to be an alternative for the car 39
You are what you drive 26	As far as I am concerned, car and public transport both are good transport alternatives 33	Door to door travel time plays an important role in my mode choice 40
Once you own a car, you'll use it for all your travel 27	Travel costs play an important role in my mode choice 34	The Netherlands is a car country. We could just as well pave all railroads and transform all stations into parking garages 41
A better environment starts with yourself. Therefore, everyone should use public transport more often 28	I am a dedicated follower of the four-wheel-credo. The car can maybe do without me for a day, but I can not do without my car 35	A big advantage of travelling by train is that you can do something useful en route: do some reading or take a nap 42

Annex C: Score sheet for Q sorting

RESPONDENT NUMBER: _____ *NAME:* _____