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【연구경향】

## THE FUNDAMENTALS OF Q METHODOLOGY

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### ABSTRACT

*This article introduces readers to the fundamentals of Q-methodology, which was invented by William Stephenson in 1935 and refined thereafter. This methodology is composed of two parts: philosophical and methodological background and q-technique (Q-method). Q aims at discovering one person or multiple persons' subjective viewpoints, such as feelings, opinions, beliefs, or evaluations, not objective facts. Q researchers capture research participants' subjectivities by asking them to express their viewpoints through ranking a sample of statements on cards or a computer screen. The sample comes from a concourse of statements that is collected from interviews, mass media, and literature review. It emphasizes a random sample of questions rather than a random sample of research participants. Like qualitative methods, Q focuses on finding people's schema of thoughts about a research topic, what ideas are important to them, and how ideas are patterned. Furthermore, Q is not interested in generalization of a research result to the entire population from which a sample was derived. Research participants are selected mostly from stratified sampling to garner as many viewpoints as possible. Q takes a holistic, gestalt approach to collect statements from a wide different spectrum, rather than an algebraic approach where interactions are often ignored among variables. Q belongs to qualitative methods, even though it is aided by a numerical tool of factor analysis. Using a small number of research participants, Q can test theories and/or generate hypotheses. It adopts an abductive approach to find the most plausible explanation, rather than a deductive approach that quantitative studies traditionally adopted or an inductive approach that qualitative studies did. Q uses factor analysis, a quantitative tool, which results in quick and deep analysis that otherwise might not be possible. Because of its use of factor analysis, some call Q a mixed method rather than a qualitative one.*

Keywords: Q methodology, q technique, fundamentals of Q, correlations among people, holistic approach, abduction

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## I. Domain of Q studies

Social science uses scientific methods to investigate societies, individuals, groups in societies, and social processes (Schutt, p. 10). During investigations, social science researchers can directly observe society, people, or phenomenon on their own. Or they can observe these entities through the eyes of other people by asking them questions about these entities.

Q researchers rely on the second approach to understand what research participants think about these entities, in other words, their subjectivities, such as people's feelings, opinions, beliefs, and evaluations.

The subjective world is complex and hard to measure in comparison with the outside world. In the early 20th century, behaviorists like Loeb, Watson, and Skinner, ignored studies on the human mind because "the human body is essentially a machine responding deterministically to stimuli in a way that is hugely more complex but not qualitatively different from the functioning of simple life forms" (Kemp, 2014, pp. 342-343) like Pavlov's dogs.

Watson (1924/1998), who firmly established the psychological school of behaviorism, wrote that the older psychology, called introspective psychology, which focused on consciousness as its subject matter, is unprovable and unapproachable. Thus, he argued that the behaviorist "dropped from his scientific vocabulary all subjective terms such as sensation, perception, image, desire, purpose, and even thinking and emotion as they were subjectively defined" (p. 6).

Following the behaviorists' tradition that ignores the human minds as a black box, Q inventor William Stephenson (1953) named his seminal book *The Study of Behavior*, even though it focused on human

subjectivities. While putting aside human consciousness, he argued that he could measure human subjectivity using Q methods, without violating any tenets of behaviorism. To Stephenson, "Dreaming is as much behavior as is jumping a stile or dashing a hundred yards. All is a matter of interacting with this or that situation. Inner experience and behavior are thus alike. Both are matters for objective, operational, definition and study" (p. 4).

## II. William Stephenson, the Inventor of Q Methodology

Stephenson earned a doctoral degree in physics from the University of Durham in England in 1926 and another one in psychology in 1929 from the University of London. Additionally, he served as the last assistant to Charles Spearman, the inventor of factor analysis (Brown, 1997) and his successor, Sir Cyril Burt. His physics and psychology background contributed to the formation of the two concepts he emphasized: complementarity and the centrality of self (Logan, 1991).

When *the Journal of Broadcasting & Electronic Media* celebrated its 50th anniversary in 2005, the publication honored William Stephenson as a research pioneer. Esrock (2005) summarized Stephenson's achievements for the journal. According to his article, Stephenson left Oxford in 1948 for the psychology department at the University of Chicago. There, he published *The Study of Behavior: Q-Technique and Its Methodology* (1953), his most important work. Stephenson moved to the business world in 1955 as director of advertising research for Nowland and Company. In 1958 he transitioned to the University of Missouri School of Journalism, where he wrote another book, *The Play Theory of Mass*

Communication. After retirement from Missouri in 1974, he accepted a visiting professorship at the University of Iowa where he served until 1977. Following retirement, he continued to write until he passed away in 1989 at the age of 87.

Stephenson (1935) first described Q methodology in 1935 when he sent a letter to *Nature* on June 30, 1935, suggesting the correlation of people instead of variables in factor analysis. He believed that he could study subjectivity under the behaviorism tradition. He did not negate the existence of consciousness in the human mind, but he thought it does not offer much for behavioral science. Instead of consciousness, he decided to explore subjectivity using Q methods (p. 347).

In the psychology area, behaviorism dominated the world until the mid-20th century. Behaviorists used classical and operant conditioning to explain how animals behave in a specific way. If animals respond unconsciously to a specific stimulus (for example, smell of food), they would respond in the same way to another stimulus (for example, sound of a bell) if they are made to associate the two stimuli through mental pairing. This classical conditioning involves unconditioned reflexive behavior. On the other hand, operant conditioning explains that animals' voluntary behavior (for example, pecking a disk) can be influenced by how their behavior is rewarded (food) or punished (an electric shock).

As a pigeon pecks a disk, Stephenson must have imagined, a person sorts statements on cards. When a person sorts them, Stephenson (1953) viewed that people's subjectivity will be emitted. Stephenson argued that human subjectivities, like dreaming, are not different from observable human behavior, and they can be captured as people's responses to external stimuli like statements on cards.

Watts and Stenner (2012) interpreted him in the same vein. They

wrote, "In using the qualifier *operant*<sup>1)</sup>, he is also making a very direct statement: subjectivity is not to be understood as a mental concept and hence as an aspect of mind of consciousness. It is not some isolated *mind-stuff* that exists inside us, or that is somehow separate from the real world of objects. On the contrary, subjectivity is a behavior or *activity* and it is an activity that is best understood relative to its impact upon the immediate environment" (pp. 25-26) - like statements on cards.

### III. Six Stages of Q methods

The objective of Q-methodology is to identify a wide range of ideas that are communicated within a society of research interest. These ideas are captured via six stages of Q methods: 1) collecting a population of statements, 2) constructing a sample of statements, 3) selecting a sample of research participants, 4) ranking sampled statements, 5) factor analysis, and 6) interpretation.

#### *Stage 1: Collecting a population of statements*

- For a Q study, Q researchers need to collect statements on a topic of their interest, whether it is an event, an issue, a person, or a phenomenon.
- Here statements refer to not only text, but also images, videos, or even smells.
- Researchers should collect self-referent statements, which sorters can use to express their own viewpoints by ranking each statement un-

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1) All italics in direct quotations here and thereafter were made by the authors of cited sources, not the current author.

der a researcher's sorting instruction.

- These statements should be subjective so that sorters can order them differently according to their standpoints. All factual statements, such as  $3 + 6 = 9$ , should be excluded.
- These statements consist of "the ordinary conversation, commentary, and discourse of everyday life - of the kind that proliferates" (Brown, 1993, p. 94). As Stephenson's concourse theory suggests, these ideas run together in thoughts of people whom researchers want to investigate (Brown, 1993).
- These ideas can come from journal articles, news articles, social media posts, comments on articles, or interviews with experts or ordinary people who have stakes in the topic. The objective is to gather as wide a gamut of thoughts as possible. The controversial or complex topic may collect more statements than simple issues. Usually it could be 200-300 statements at the end, which are called a concourse of statements. Watts and Stenner (2012, pp. 59-60) suggest starting the literature review to identify key themes and continue to collect statements from the mass media and formal and informal interviews.
- Researchers need to collect as many statements as possible. When researchers find newly collected statements repetitive, then they should stop the collection process, believing that a list of statements is nearly exhaustive. They don't have to collect all statements possible, an impossible task. Stephenson (1953) was satisfied with "a rough-and-ready universe of statements" (p. 78).
- A concourse of statements is processed and integrated into organized, classified, and refined ideas by Q studies. Its use was well described by Brown (1993):

"From concourse, new meanings arise, bright ideas are hatched, and discoveries are made: it is the wellspring of creativity and identity formation in individuals, groups, organizations, and nations, and it is Q methodology's task to reveal the inherent structure of a concourse - the vectors of thought that sustain it and which, in turn, are sustained by it." (p. 95)

### *Stage 2: Constructing a sample of statements*

To understand people's own viewpoints on themselves, other people, other entities, and phenomenon, researchers may ask people to portray their ideas by sorting a concourse of statements. This is ideal, but unrealistic or impractical for people to deal with hundreds of statements.

Thus, researchers must compose a sample from this population of statements, often called a concourse. Stephenson (1953) suggested an "artificial" selection based on Fisher's method of experimental design (p. 66) instead of an unstructured one.

The nature of statements, of course, should be of the same topic. They also should be clear, concise and representative of the concourse. (Stephenson, 1953, p. 76). Stephenson also emphasized "heterogeneity of assessment" in levels of factorial design, as well as "homogeneity of statements in a sample (p. 65). This kind of sample will "produce the kind of comprehensiveness that is desirable in the sample as a whole" (Brown, p. 189).

When a research involving human beings requires questions (variables) and people who will answer these questions. R scholars traditionally emphasize a large random sample of people, which enables a generalization of a result to a whole population from which the sample was derived. But they don't give much thought to a random sample of questions,

which reflect variables.

In the past, quantitative studies relied on an algebraic approach, focusing on one variable at a time, as exemplified by t-test and ANOVA (analysis of variance). On the other hand, Q has taken the holistic approach, looking at all possible variables at the same time. Stephenson (1953) criticized the R approach because it does not look at all effects and their interaction effects at the same time, which is normal in the reality. He wrote, "Concrete behavior is more likely to occur in a setting in which many effects and variables mediate *together*, if at all" (p. 192).

Due to computer development and advancements, R studies can simultaneously handle multiple variables as seen in structural equation modeling or path analysis. (Refer to *Figure 1*). For example, perceived child care burden depends directly or indirectly on many variables, such as neigcare (child care by neighbors), integrat (integration in neighborhood), cantalon (inability to be alone), relatives (relatives in area), relacare (child care by relatives) as shown in the figure below (Hox & Bechger, 1998, p. 11).

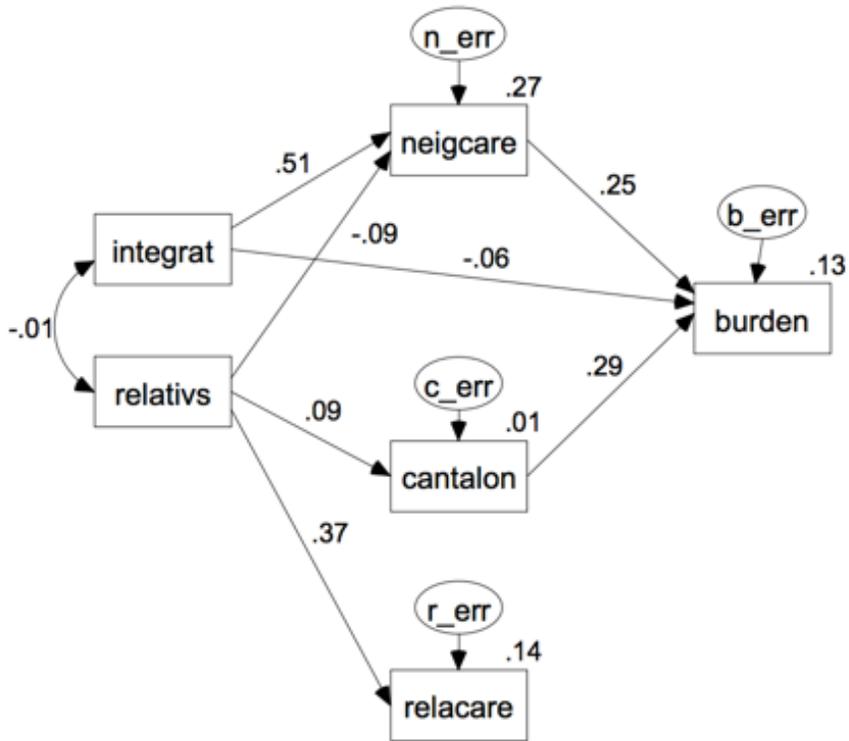


Figure 1. The direct relationship or indirect relationship among variables.

However, R studies still tend to tackle fewer variables than Q or qualitative studies.

A sample can be extracted with various designs.

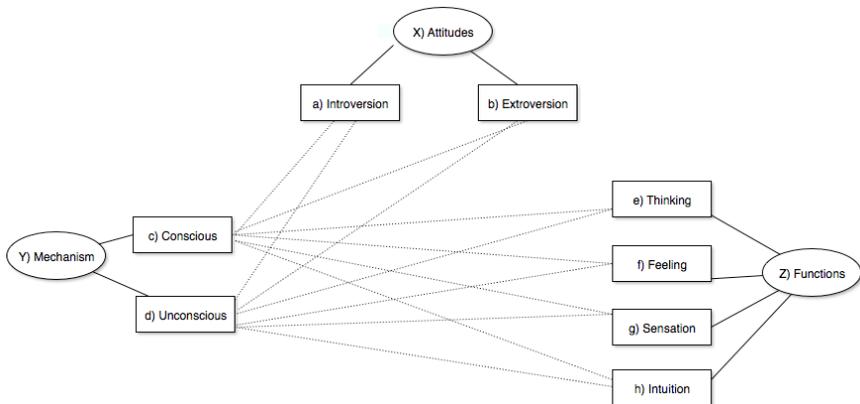
### A) Unstructured Design

The unstructured sample is "arguably more taxing in terms of your own knowledge and personal expertise" (Watts & Stenner, 2012, p. 60), but it can be used. For example, a study on doctoral students in counselor education sampled 47 statements in a Q sample based on the unstructured design (Baltrinic, Waugh, & Brown, 2013).

## B) Structured Design

### 1) full factorial design

Fisher's factorial design consists of factors or main effects, each with discrete values or levels. These elements can be fully crossed as Stephenson used for a study on Jung's type psychology (Stephenson, 1953, p. 69), as shown in *Figure 2*.



*Figure 2.* An example of a full factorial design

The diagram shows three effects of X) Attitudes, Y) Mechanism, and Z) Functions. Here X) Attitudes is composed of two levels of a) Introversion and b) Extroversion; Y) Mechanism of c) Conscious and d) Unconscious; and Z) Functions of e) Thinking, f) Feeling, g) Sensation, and h) Intuition. The structure has 16 full combinations as shown in *Figure 3*.

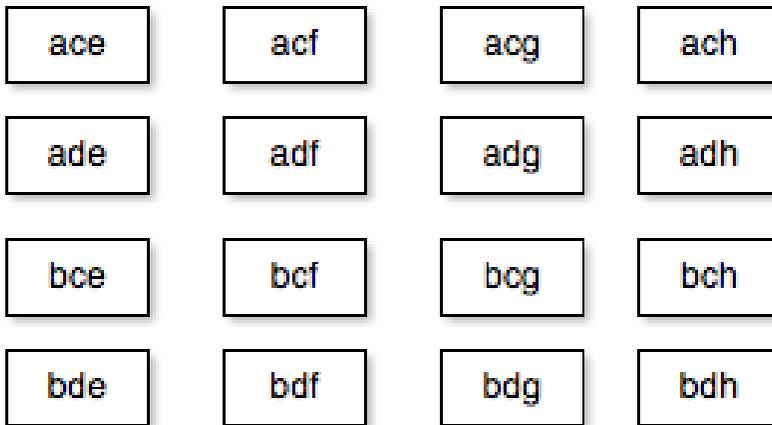


Figure 3. A full combination of three effects

Each combination reflects three effects. For example, the combination of "ace" is a statement reflecting three levels of a) Introversion, c) Conscious, and e) Thinking. Multiple statements are made for each of these combinations to measure the same concept multiple times. If three statements are collected for each combination, for example, a Q sample will contain 48 statements.

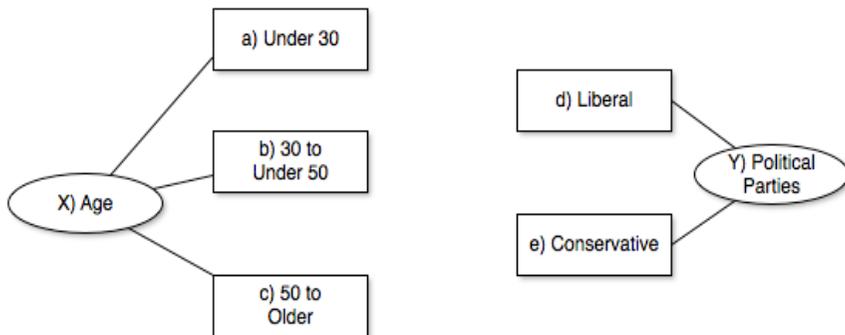
## 2) partial factorial design

Researchers may also take partial factorial designs that omit interaction among effects. One study in *Operant Subjectivity* even mixed two designs, selecting 10 statements each for three effects and 10 additional statements randomly from the remaining statements (Akanbang, Karko-Osei, & Atengdem, 2013).

*Stage 3: Selecting a Persons-set*

If you are interested in a psychological study on one person, the selection of the participant is obvious. When you conduct a study about people living in a society of your research interest, you generally can follow what R researchers have done. Research participants should be selected from a population of research interest.

Q studies choose participants based on stratified sampling rather than random sampling. Stephenson (1953) often created a p-sample based on the factorial design using socio-economic class, age, educational status, and the like, "instead of seeking to reproduce the fiction of a 'general population'" (p. 193). For example, when ages and political party affiliations are considered as in *Figure 4*, participants can be selected from the six combinations of ad, ae, bd, be, cd, and ce. Each combination can be duplicated, for example, 7 times to make a total of 42 participants.



*Figure 4.* Factorial design for a sample of participants

Q researchers do not select a random sample out of a human population. They are not interested in generalization of a research result to a population, but try to find a pattern of people's subjective thoughts in a concourse, believing that this pattern exists in the population that the sample is derived from.

Q does not suppose that the largest pattern or factor in a sample will be the largest in the population. It just assumes that this pattern simply exists in the population. Stephenson (1953, p. 5) wrote, when we find X's eyes are blue, we can argue some other persons may have blue eyes like X, not argue that all eyes of other people are blue. All the people or what percentage of people have blue eyes is the subject of R research, not Q.

Since Q is not interested in a specific size of relationship between variables like an R researcher, but a pattern of viewpoints, it would not require a big sample. Brown (1980) suggested that a set of 40 to 60 persons in a sample is more than adequate, and 4 to 5 persons defining each factor (p. 260).

If Q researchers can find factors that might be valuable for their research purpose, it would be enough. They do not have to find all factors existing in the world, like R researchers who do not have to extract factors that would explain all variations in data.

A large number of participants is not important for a Q study, and could be considered a waste of time and resources. Selecting from a wide range of people or a targeted group of people is far more important.

#### Stage 4: Ranking statements

Research participants are asked to rank statements based on the instruction of experiments. The resulting configuration of each person's sorted Q statements reveal that person's subjectivity. An individual's Q sort will reveal that person's viewpoints. A point of view is personal, never being right or wrong in any sense.

##### A) Deep thinking

Since Q adopts a holistic approach, participants must assign each statement a score to represent its significance while considering other statements, not independently of them. Ideally sorters may read all sample statements until they can understand the topic and then evaluate each statement relative to other statements. To save time, Q researchers ask people to divide statements in three piles, say, based on their agreement, disagreement or neutrality toward each statement, a process that will have them be familiar with all statements in this process. These three piles are further divided into a more number of piles that a researcher predetermines, for example, 7 to 11.

The subjective world is not a research domain that is monopolized by Q studies. Q studies only deal with human subjectivities, internal worlds, while other methods can deal with internal and external worlds. Large-scale survey methods can collect information about people's attitudes and other subjectivities (Baker, van Exel, Mason, & Stricklin, p. 40; Stephenson, 1953, Chap. IX). Thus, the differences between Q and R methodologies arise not in the topic, but in the nature and quality of data since the two methods collect data in a different manner. R re-

spondents are asked to think only about one question, one variable, at a time, while Q respondents are asked to simultaneously think about all relevant variables. Stephenson (1953) criticized R writing, "What a person may *actually* do in a situation may bear little relation to what he is *potentially* capable of doing under propitious, that is, rule of the single variable, conditions" (p. 192).

If our thoughts can be divided into three types: 1) fleeting thoughts we may not even clearly keep track of, 2) cursory thoughts off the top of our head, and 3) deep thoughts. R methods would collect type 2) thoughts, which people may keep because they recently have had on their own or after being exposed to external sources like mass media or conversations with other people. On the other hand, Q methods can tap into deep thoughts like type 3) because sorters must consider a variety of opinions, including others'. Q statements would induce sorters to recall even what they have forgotten or force them to consider what they have never thought about. That's why Q sorters often feel they have learned just from participating in a Q study.

A neuroscientist described how the brain works along this holistic approach of simultaneously considering many thoughts. Eagleman (2011) wrote that brain works cannot be divided into numerous processes that can be done by different subagents. Instead of "the division of labor model," he suggested the parliament model, in which different factions compete with each and come to a final vote in conflict situations, like whether you have to eat a chocolate cake. He wrote, "Part of you wants the cake and part of you tries to muster the fortitude to forgo it" (p. 107).

## B) The range of distribution

Sorting instructions, which is called the condition of instruction, can be ranking the order of statements from the most to the least. For example, Stephenson (1953) used the most pleasing color for a score of 10 to the least pleasing color for a score of 0 (p. 9); the most liked photograph for a score of 8 and the least like for a score of 0. (p. 17); In another study on description of oneself, the range of scores started from the highest score of 10, and down to the lowest score of 0 (p. 20).

However, most Q studies have chosen to sort statements from the most positive to a zero to the most negative. For example, one study about mindfulness asked people to sort the statements based on how sorters have experienced mindfulness practice and how it has influenced themselves on a scale of + 5 to -5 (Kvalsund, Baardsen, & Allgood, p. 39)

## C) Instructions for sorting

One person can sort statements under the various conditions of instruction or experiment, such as "Sort who you are most like," "Sort who your father thinks you are most like," "Sort who you would be most like in 10 years," "Sort who you were most like 10 years earlier," "Sort who you wish you would be most like," etc.

Or multiple people can sort statements under a single condition or multiple conditions (Stephenson, 1953, p. 19). Reporters, for example, may be asked to sort statements based on three conditions:

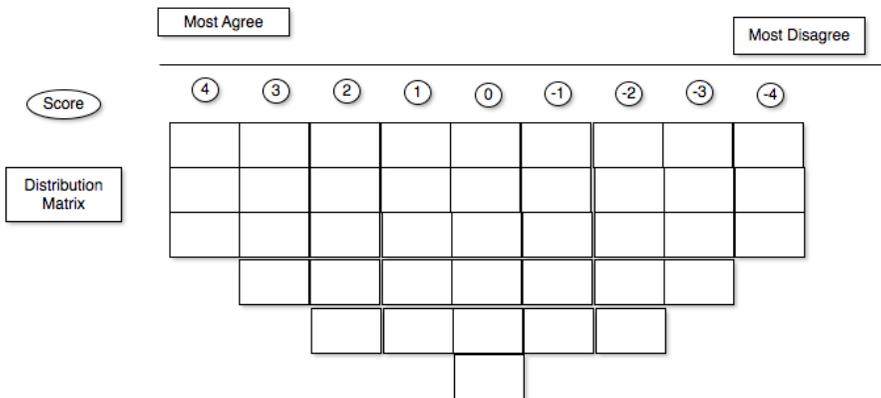
- "Sort statements of ideas that you think save the newspaper in-

- dustry,"
- "Sort statements that readers would think save the newspaper industry according to your opinion,"
  - "Sort statements that the owner of the newspaper would think save the newspaper industry according to your opinion."

In most of cases, multiple people sort statements under one condition.

D) Implementation of sorting: forced vs free distribution

After dividing statements in three piles of “agree,” “neutral,” and “disagree,” Q respondents are allowed either a fixed or free distribution matrix for further sorting. They can have a prearranged quasi-normal form of frequency distribution, as shown in *Figure 5* below. In this case, sorters are asked to choose from the "agree" pile only a specific number of cards and place them under the most agree column, in the case of *Figure 5*, 3 statements.



*Figure 5.* Scores in fixed distribution and its matrix

Next, they will fill out the next most agree columns. They continue to fill out the next most agree columns until the agreed cards are exhausted. After the agreed pile is exhausted, the disagreed pile will be used to fill up the disagreed side of columns, starting with the most disagreed column. After the disagreed statements are exhausted, the neutral cards will be used to fill up where the agreed cards left off. The neutral cards continue to be used until they are exhausted somewhere the disagreed cards were exhausted. At the end, all the cells under each column will be filled without any overlap.

In free distribution, sorters are asked to place statements under the positive pile anywhere under the columns without any restraint, followed by negative statements and neutral statements.

Q researchers traditionally have relied more on the fixed distribution than the free one since Stevenson and others used the former. Examples can be found in Stephenson's book, *The Study of Behavior* (Refer to pages. 9, 17, and 20), Brown's *Political Subjectivity* (Refer to pages 17, 21), and Watts and Stenner's *Doing Q Methodological Research* (Refer to page 86).

In Q studies, however, some researchers found that their research participants could not sort statements because a fixed distribution pattern distorted their viewpoints. For example, a statement that should be under column +2 could be categorized under column -2. Even though Q researchers compose a Q sample of statements with a balanced distribution in mind and pretest it with a few sorters to secure a balanced result, some sorters in a real Q study may prefer a skewed distribution to one side and other sorters to another side. Sorters may tacitly follow the researcher's instruction even though the distribution pattern may distort their viewpoints, so the distortion cannot be found unless they are asked.

When a researcher creates a structured Q sample, he or she finds categories or themes from a Q population and selects statements so that half of the statements will be positive and the other half negative. If these categories are what sorters use in their process, we can naturally expect a resulting symmetry. If sorters, however, use a different theme or category, then the sort could be skewed.

For example, statements on “being in love” can be divided based on the “romantic” and “realistic” line. But these statements can be differently divided by a psychoanalyst based on the “oral,” “anal,” and “genital” line (Brown, pp. 186-188). Different conceptualization requires a different Q sample structure, and a structure that a researcher adopted based on a wrong expectation will lead to an unbalanced sorting result.

#### E) Evaluation of forced distribution

The forced distribution is based on one of Q-technique postulates: "vi. Scores are approximately normally distributed with respect to the person-array" (Stephenson, 1953, p. 58). Regarding why it should take a quasi-normal distribution, Stevenson did not seem to clearly show any empirical evidence throughout his works. He just wrote, "A normal curve is not likely. For certain reasons, however, it should be symmetrical. Therefore, we follow the practice of using a much flattened symmetrical distribution of scores for all Q-sorts" (p. 59).

In the reality, some Q scholars mentioned their difficulties to deal with the sorters who refused to adapt their viewpoints to a forced distribution and gave up on their sorts in the middle saying that they could not sort statements according to a forced distribution. Many others might feel awkward, but they might tacitly follow the instructions rather than challenging a researcher.

Those who insist on the forced distribution argue that the ipsative (choosing the most suitable one on a forced choice scale after comparing multiple desirable options) nature of sorting in a forced distribution make sorters think more deeply because they are forced to choose the most suitable statement out of many for one column and continue to do so one after another. But in a free distribution, all statements of similar significance would have been dumped under one column.

A researcher in favor of forced distribution would argue that forced distribution may push people to think harder and make a judgement of one statement from another based on even small differences that might be ignored under free distribution. Brown (2016) used *Sophie's Choice* as an example. When a sadistic doctor in a novel, which became a movie of the same name later, asked Sophie to take only one child to a detention camp because that child will be allowed to live and the other should die, she chose a boy over a girl after an agonizing deliberation.

The question is how many Q-sorters would be willing to deliberately sort statements like Sophie? If not, they may just keep a few in the first category after cursory consideration and dump the rest in the next category. It might be better to have all in the same category rather than having them carelessly divided into two or more categories without much reasoning. Even in Sophie's case, she might have considered all the reasons to save her son instead of her daughter, or haphazardly chose one over another not to sacrifice both.

Unless we ask Sophie, we cannot know for sure. An empirical test should be done to see how Q sorters are behaving, for example, by measuring the time a sorter spent on each statement to see whether a sorter deliberated longer under a forced distribution than in a free distribution.

## F) Factor scores under the forced distribution

Those who favor forced distribution observed that the factor structure that will emerge is mostly decided by the order of items ranked rather than their exact positions or shapes, so either distribution will lead to a similar factor structure (Brown, 1971; Brown, 1980, pp. 288-289). Just because the two distribution matrices lead to the same factor structure, it does not mean they can use the resulting factor scores from the forced distribution without any justification.

While many Q papers have used forced distribution, they used information about the positions of statements in factor arrays for factor interpretation. As a result, what they interpreted as -2 could have been +2 in some cases. If Q scholars use forced distribution to determine factor types of people, it is not an issue. But if they use a forced distribution and use rank scores for statements based on factor scores, it could be problematic, especially in relation to those in the middle. Many cannot ignore statements near the middle, probably because of their holistic approach that look at the entire configuration including the middle zero (Watts & Stenner, 2012, pp. 154 -155). They advised not to overlook those in the middle because “on occasion, an item sitting right in the middle of the distribution can act as a fulcrum for the whole viewpoint being expressed” (p. 155).

## G) Why ranking statements on a scale

The purpose of Q studies is to find thinking patterns or frameworks of people from their own viewpoints. About any topic, we can assume a person's schema of thoughts on that topic. This schema cannot be ac-



ging them from one place and dropping them onto another.

Q researchers may ask research participants to build their own cognitive schema using Q statements. This will provide more rich information than sorting of statements because researchers can know how each statement relates to other statements.

One problem is that one participant's network of statements can be well portrayed, but it cannot be easily compared with other people's. This issue can be found in network analysis. Most of network analysis focuses on the nature of one network (Borgatti, 2013; Hansen, Schneiderman, & Smith, 2011). When comparing multiple networks, research may have to focus on aggregate network metrics like density and centralization coefficients. One study comparing the social structures of Asiatic asses/onagers used metrics like the number of connected components, vertex degree, cluster coefficient, and path length, since "qualitative assessments of network graphs can illustrate overall patterns. But only quantitative comparisons of metrics... can reveal details about structure" (Rubenstein, Sundaresan, Fischhoff, & Saltz, p. 166). Of course, the overall pattern can be compared only qualitatively.

Q statements may describe either nodes, edges, or both. A statement can be as simple as "I am ambitious," which describes a node for an ambitious person. A statement can be more complex like "Many friends around me make me happy," which describes two nodes ("many friends and me") and an edge ("make happy"). Rather than using Q statements as a Lego block to build their internal world, people are asked by Q researchers to rank order them. In this case, information on nodes are kept, but interconnecting edges can be lost unless embedded in related statements.

Ranking statements on the same measurement scale results in an array

of ranking scores. This same format of array enables researchers to compare research participants' scores through factor analysis, even though it requires sacrificing most of information on edges. To estimate the nature of edges, the relationships among nodes (or statements), researchers must rely on Q-sorts, post-sorting interviews, literature review, or even hunches.

In this process, the given information is not sufficient to come to an absolutely correct answer, like in  $x + y = 7$ . Rotating factor axes would be like suggesting one answer among many possible combination of different answers for  $x$  and  $y$ , such as (0, 7), (1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1), (7, 0), or many in between. Unless guided by a theory that will dictate a look at a specific combination, researchers must rely on an algorithm-based solution like a varimax rotation. If they want a judgmental rotation based on their expertise or strong hunches that will offer additional information beyond what the data suggests, they will seek out the most likely explanation among many possible ones. This abductive reasoning, unlike inductive and deductive reasoning, requires logical leaps for an "inference to the best explanation," which is like deciding one set of answers for  $x$  and  $y$  above as the best one among many potential combinations.

### *Stage 5: Factor analysis*

#### A) Correlations of persons instead of variables

Behavioral psychologists used correlations of variables for their analysis. They correlated variables to detect people's traits and abilities. Stephenson (1953) called this type of studies R-technique and his approach Q-technique (p. 10). His Q approach correlated people instead of

variables. Of course, correlating people instead of variables were used previously, but he thought its true meaning was not understood (p. 8). Correlating people instead of variables has much deeper implications than just rotating by 90 degrees a data matrix in which each row represents an individual and each column represents a variable.

Let's examine the difference between Q and R by making an analogy. One day the current author asked class students to raise their hands. Then he pointed at a hand that was the smallest and asked the students whether it was small. All the students said in unison it was small. The author asked why it was small, which was followed by puzzled looks from the class. Their reasoning was based on comparing this small hand with the other hands raised. This is R-approach. In Q-approach, this hand would be compared with other body parts of the selected student, like the person's face, arms, legs, etc. Then it could turn out to be normal, not small at all.

Here is another example. The university where the current author teaches is popular among its current students. If they are asked about how much they like the university, let's assume that most of them would give a 5 out of the total score of 5. In this case, the question about the university is of little value to R researchers because answers to this question lack variability. But this question would be valuable in Q research. One student's answer to this question would be compared with this same student's answers to other questions, so the answers would most likely have variability.

The students' fondness for the university is significant. Even though students gave the same ranking about their fondness of the university, its meaning can be different when it is seen in the context of answers to other questions. They may like the university for a variety of reasons: in-

expensive tuition in comparison with other private universities, small class sizes, supportive faculty and staff, beautiful campus, strong study abroad programs, high graduate rates within four years, a good chance of landing a job before or soon after graduation, etc. This question can be valuable to a Q researcher about students' attitudes toward their university, while a R research may regard it as worthless.

Let's revisit the rotation of a data matrix by 90 degrees. Researchers can't collect data for a R study and rotate it for a Q study. First, the R study does not include questions from a wide range of topics. Secondly, the questions were not answered in the Q way. Each question should have been answered in the context of the remaining questions.

## B) Different factor analysis algorithms

Among many factor analysis methods, centroid and principal component analysis (PCA) are mostly used in Q analysis to extract factors from the correlation matrix of all Q sorts and rotate the resulting factor axes.

Stephenson (1953) wrote, "Statisticians much prefer the method of principal axes, and psychologist the centroid method" (p. 33). As a psychologist, he also favored the centroid method due to uncertainties embedded in its manual rotations. Today many Q researchers rely on the centroid method or principal component analysis (PCA) instead of principal axes, followed by the manual or varimax rotation.

Traditionally, Q scholars have used centroid because it does not suggest any default factor rotations, which aligns with Q's abductive approach in which researchers must find the best explanation among many possibilities. Those who are familiar with PCA likely due to their quantitative experience or its easy availability tend to choose PCA over the centroid method. Those who use PCA usually choose the varimax rota-

tion rather than the manual rotation.

Brown and Robyn (2004) defended the manual judgmental rotation against “suspicion because of the subjectivity and unreliability thought to attend it” (p. 104). The two did not suggest rotating factor axes for the sake of using the manual rotation. Rotations should be guided by cues from data, their expertise, and detailed knowledge about participants that was obtained after one of the investigators interviewed them for hours.

Watts and Stenner (2012) supported judgmental rotations if the investigator is interested in particular individuals or groups or firmly know what he or she is hunting down (p. 123). But they also made a few reservations about manual rotations. They worried that an investigator’s “understanding of the reality” could be mistaken for “the reality” (p. 123). Additionally, larger data sets and data sets without “clear makers” would be problematic (p. 125).

Akhtar-Danesh (2017) suggested two different rotation approaches. He recommends a manual rotation as an appropriate choice to confirm or reject predetermined hypotheses or theories. In an exploratory study, on the other hand, he recommended mathematical factor rotations, such as varimax, quartimax, promax, etc. He thought manual rotations in an exploratory study could not be replicated by a different researcher (pp. 199-200).

If researchers test theories, have an expertise about a research topic, or have deep knowledge about Q sorters based on intensive interviews, it can be argued that they can take a confirmatory approach and use a manual rotation. They also can consider doing manual rotation when they are interested in a specific sorter, like a university president who has the strong influence in university policy making. The varimax rotation is a democratic method dealing with all sorters equally. By rotating

an axis toward a university president, they can understand the exact position of the president and others' in comparison with the president's. The same approach can be done with a specific group of people like minority groups, which must be marginalized under a varimax rotation unless they were recruited heavily with intention. Some of these circumstances were mentioned by Watts and Stenner (2012) as suitable cases for the manual rotation.

In a purely exploratory study, a researcher first may try a rotation that is dictated by PCA. Then the researcher may try a manual rotation for an "eureka" moment since the truth can reveal itself in the form of a small hint or cue, rather than the best fit of the actual data with the factor axes that is realized by the varimax rotation. A researcher may guess an existence of a cat by just looking at the tip of the cat's tail or figure out the law of gravitation based on an observation of a falling apple, as Newton did. But this kind of flimsy conclusion should be taken with a grain of salt or may be suggested as a research topic for future studies.

### *Stage 6 Interpretation*

Interpreting Q data can be done in a variety of ways like climbing a mountain to reach its peak. Brown (1980) wrote, "There is no set strategy for interpreting a factor structure; it depends foremost on what the investigator is trying to accomplish" (p. 247). But he suggested some general procedures. The investigator must obtain an array of factor scores—in the form of a z-scores or, more often, a factor rank scores—of all statements for each factor. The factor rank scores represent a Q sort array for each factor if an ideal human representative were to rank statements for each factor. To understand how each individual sorter contrib-

utes to each factor, the investigator must know the loading of each person to a specific factor. To understand factors better, differences and similarities among them also should be analyzed. In these processes, theories under investigation can be tested and new findings can turn into a new hypothesis (p. 262).

Watts and Stenner (2012) compared the aim of interpretation as writing an overall story based on statement rankings. The investigator must make sense of the wood, the whole viewpoint, which is based on “the nature and placement of its trees” (p. 156). They suggested investigating the entire configuration of statements in light of Q’s holistic nature and finding surprising facts based on an abductive inference while using many clues in factor arrays (pp. 148-150). They cautioned against restricting the investigator’s attention to only a small number of statements like the highest and lowest ranking items. They suggested the crib sheet system as a practical tool, in which statements that ranked highest, lowest, or higher in a factor than in other factors were selected for interpretation since they made “the most profound and important contributions *within* the related factor. They also emphasized not to overlook statements in the middle of distribution, which tend to be insignificant, but sometimes turnout to be pivotal” (pp. 155).

#### IV. Differences between Q and R

Q can be used as a tool for confirmatory and exploratory studies. Whichever way it is used, Q will reveal the thinking patterns of research participants, and the relationship among variables important for the research topic. It does not tell the exact size of relationships among the

variables, which R studies can.

In this sense, Q is a basically qualitative study, despite it is aided by a numerical tool, factor analysis that relies on correlations of Q sorts.

Another difference between R and Q is that the former focuses on small number of variables and emphasizes a big random sample to generalize the result to the population, while the latter aims at a holistic interpretation of a research topic by collecting a concourse of statements and comparing the ranking of statements within each research participant.

When Q is utilized for the confirmatory purpose, it can be used to test a theory. When Q is used for the exploratory purpose, more hunches and hypotheses can be generated for further studies through deductive and inductive studies later.

Questions about subjectivity is not monopolized by Q scholars because subjectivity like attitudinal information can be asked by R scholars. But the objectives of R and Q scholars are different. Q scholars are interested in a qualitative question to find "explanation of the points of view that exist around a topic" while R scholars are "required to address questions of prevalence and distribution" (Baker et al, p. 39).

With the introduction of computers, quantitative analysis often seeks causal relationships among multiple variables. The difference is that R studies put together the entire sample of respondents as a group to generate one pattern of thinking for all, while Q often divides respondents into multiple groups and a different thinking pattern for each individual group. R can, of course, divide a sample into multiple groups, like a male group and a female group. Even in this case, the same structural pattern of variables is set up, and only different coefficients among variables are estimated.

Validity is an important issue in research. R researchers should create questions that can represent the concepts embedded in a theory. Any bad operationalization of a concept leads research participants to interpret the question differently from what the original researchers intended—a validity problem. In Q, researchers employ a theoretical framework as a scaffold to compose a sample of statements. If a different framework or concepts emerge from Q sorts, this framework will be abandoned. Thus, the validity of a Q study comes from the appropriate interpretation of data, like in inductive qualitative studies.

## V. Advantages of Q

Q has advantages over other approaches. Good qualitative studies often require solid data from human participants, which is possible through their proper verbal or written skills. Q participants, however, do not have to have these language skills to clearly express their opinion because they are given statements representing a variety of ideas and are asked to just rank them under a different condition of instruction. It's like selecting from the computer menu bar, a command item rather than directly writing a command itself out of memory.

Human beings are a cognitive miser, a term Taylor (cited in Fiske and Taylor, 2013) coined “to explain the necessary stinginess with which attention and processing time are often allocated to stimuli in the real world” (p. 206). They tend to respond to survey questions without thinking deeply and tapping into thoughts they buried long ago in their subconscious. On the other hand, Q can obtain more deep ideas from people. Q statements may jog Q sorters' memory or enable them to an-

swer with statements that they haven't previously even thought of.

Q relies on a quantitative method of factor analysis instead of verbal analysis. Computer use dramatically shortens the time required for integration of people's ideas for analysis and revealing minute shades of differences among factor groups that otherwise might be overlooked.

Triangulation of data is possible with the Q method. A qualitative researcher gathers data from the reality, and interprets it as objectively as possible, even though critics might cast a doubt on the researcher's capability of putting aside one's predisposition or presumption in analyzing the data. A Q researcher, on the other hand, collects statements from the reality and organizes them based on a theory to test in a confirmatory study or emerging themes in an exploratory study. As a second step, the Q researcher offers research participants statements to see how their subjectivity is operating against these statements. The researcher can check whether the operant subjectivity is aligned with the original theory or whether new themes emerge or not. This confirmation process is bolstered by written comments Q sorters make on statements with the highest and lowest ranking scores or post-sort interviews. The triple evidence—organizing ideas of statements based on a theory or emerging themes, Q sorts, and post-sort comments and interviews—would ring more convincing than a single source of evidence.

## VI. Future developments

Q can go out of the ivory tower to solve real-world problems. To alleviate social tensions among diverse groups of stakeholders, scholars need to study how each group really perceives them. A Q study reveals

different thinking patterns for multiple groups, rather than forcing one model or theory for all groups together. Thus, a Q study has been favored by scholars when they deal with controversial issues, like climate change, environmental issues in relation to economic development, etc.

Researchers can deploy Q to find similarities among groups as a starting point for group negotiations and reconciliations. A clear demarcation of differences will let diverse groups look at the issues holistically and clearly understand other groups' positions rather than guessing other groups' positions based on a few conspicuous points they can observe easily.

This advantage has been utilized in academia to encourage discussion of diverse ideas and views in the classroom (Q-perspectives, n.d.; Walker, Lin, & Li, 2017 ). Students can sort statements on an issue before coming to class or in real time. They will be paired with an "opponent" for discussion. Understanding an opponent's position by looking at a configuration of statements could lead to a deeper discussion because they can cut out the time to figure out each other's positions.

R scholars use a vertical approach, going directly to specific variables of importance for research and continuing to pursue in the same direction. This can sometimes be problematic like continuing to mine the same area. When oil or gas is extracted from a field, a developer may want to dig deeper and deeper for new sources of gas and oil. Sometimes a field might be exhausted, and a developer should move to another field for fruitful production. But R researchers might stick to the old mine field and try different devices (different research methods) or dig deeper (adding new variables or new samples of people) for a bonanza in vain.

When society changes quickly, people's lifestyles and their thoughts

about life shift quickly. All theories that were developed and maintained in old circumstances can become obsolete in a new society. In these new circumstances, a researcher may need to quickly figure out whether old theories are still valid or new theories should be generated, rather than trying to extract the last drop of juice out of an already squeezed orange. Testing existing theories and generating new hypotheses quickly are Q's forte.

Of course, Q reveals research participants' general patterns of thinking. This horizontal approach covering a wide area of variables cannot be applied to a big sample of people. Thus, some scholars (Baker et al., 2010; Talbott, 2010; Kim, 2008) have tried to extend Q into the R turf, as medical researchers (Kim, Farmer, & Porter, 2014; Ooms, van Damme, Baker, Zeitz, & Schrecker, 2008) have done under the name of the "diagonal" approach, which tried to bridge the vertical and horizontal approach.

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## 큐 방법론의 기초

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### 논문요약

이 논문은 윌리엄 스티븐슨 박사가 1935년에 고안하고 그 이후 발전시킨 Q-방법론의 기본을 독자에게 소개하는 것을 목적으로 한다. 이 방법론은 철학적인 또한 방법론적인 면과 큐 기법이라는 두 부분으로 구성된다. Q-방법론은 객관적인 사실이 아닌 감정, 의견, 신념 또는 평가와 같은 주관적인 견해를 발견하는 것을 목표로 한다. 한 사람의 견해나 다수의 견해가 연구 대상이 될 수 있다. Q 학자는 연구 참가자의 주관성을 발견하기 위하여 종이 카드 또는 컴퓨터 화면에 연구 주제에 관련된 문항을 보여주고 순위를 표시하도록 한다. 이 문항의 표본은 인터뷰, 대중 매체 및 문헌 검토를 통해 수집된 다양한 문항에서 발췌한다. Q는 연구 참여자를 무작위로 선정하지 않고 오히려 연구 문항을 무작위로 선정하는데 더 관심을 가진다. 질적 방법과 마찬가지로, Q는 연구 주제에 대한 사람들의 사고 구조 방식(schema), 어떤 것이 사람들에게 중요한지, 또는 사람들의 생각 패턴에 초점을 맞추고 있다. 또한, Q는 연구 결과를 표본이 추출된 모집단으로 일반화 하는 데는 관심이 없다. 연구 참여자를 뽑을 때 계층화된 샘플링을 함으로써 연구 주제에 대하여 가능한 한 많은 관점을 얻으려고 한다. Q는 변수들의 상호 작용이 종종 무시되는 대수적 접근보다는 다양한 스펙트럼으로부터 문항을 수집하는 전체론적, 계슈탈트 방식을 취한다. Q는 요인 분석이라는 계량적 방법을 사용하지만 근본적으로는 질적 방법에 속한다. Q는 소수의 연구 참여자를 사용하여 이론을 테스트하거나 가설을 세울 수 있다. 정량적인 연구가 전통적으로 채택한 연역적 접근이나 질적 연구가 사용한 귀납적 접근보다는 Q는 가장 합당한 설명을 찾기 위해 가설적 추론법을 채택한다. Q는 정량 분석 도구인 요인 분석을 사용함으로써 빠르고 깊은 분석을 가능하게 한다. 요인 분석을 사용하기 때문에 일부 학자들은 큐를 순수한 질적 방법이 아닌 양적 방법과 질적 방법이 혼합된 것으로 간주하기도 한다.

주제어 : 큐 방법론, 큐 테그닉, 큐 기초, 사람들과의 상관관계, 전체적 접근, 가설적 추론법

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