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Maria Karimova

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First Advisor

Dennis Delprato

Second Advisor

Natalie Dove

Third Advisor

Carol Freedman

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Q METHODOLOGICAL STUDY OF SUBJECTIVITY AND OBJECTIVITY

By

Maria Karimova

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Dennis Delprato
Supervising Inst

Natalie Dove
Honors Advisor

Carol Freedman
Department Head

Rebecca Sipe
Honors Director

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Abstract

Research has shown not only that subjectivity and objectivity are two very important concepts when it comes to scientific studies, but also that human tendencies towards duality have reinforced the opposition of these concepts. It is evident that objectivity and subjectivity differ, but this study was designed to evaluate how much the concepts really differ and how they are defined in the thinking of people. The study uses a Q methodological approach to measure the viewpoints of the faculty in the College of Arts and Sciences at Eastern Michigan University by having them sort a list of potential viewpoints on subjectivity and objectivity onto a matrix ranging from agree to disagree. Q methodology allows for a scientific measurement of subjective viewpoints, resulting in data that can be evaluated using factor analysis software. The purpose of this study is to evaluate the results of the Q sort to determine the factors of subjectivity and objectivity and how the viewpoints of the faculty of various departments relate and differ on the topic.

Introduction

Dualistic thinking (e.g., black and white, good and bad, right and wrong, Democrat and Republican) seems to be a common tendency among humans. People tend to place things into categories and opposites are easiest to distinguish. This thinking simplifies the differences in things that life presents. One example of such a dichotomy is the scientific debate of objectivity versus subjectivity, setting in opposition two approaches towards knowledge. One might have said "two *different* approaches towards knowledge" but that would encourage the duality.

Many definitions of objectivity and subjectivity exist, but among most of them, the opposition between the two terms is prominent. Boyne (2007) described subjectivity as an inner state, involving thoughts, feelings, emotions, and beliefs. It is implied that objectivity is the opposite of this, outside and without thoughts, feelings, emotions, or beliefs. Bornstein's (1999) definition described objectivity as a mental state, uninfluenced by feelings, biases, or prejudices relying exclusively on facts and subjectivity as a mental state where thought reflects the personal perspectives of an individual rather than a universal fact. The opposition is clear among these definitions, facts versus personal thoughts, but both subjectivity and objectivity are defined as mental states. If both objectivity and subjectivity come from within a person's mind, their differences are undermined, and the lines get blurry. Stephenson (as cited in Watts, 2011) proposed that "objective" can be defined as something observed by others, which becomes a problem when mental things can only be observed by the person whose mind is being observed, which is an inner experience that is found often in definitions of subjectivity, further blurring and confusing the concepts (Watts, 2011)

Greiffenhagen and Sharrock (2008) introduced objectivity as relating to words such as "structure," "totality," "determinism," and "macro," while subjectivity is associated with words

like "agency," "individual," "spontaneity," and "macro." They presented work by Hays (as cited in Greiffenhagen & Sharrock, 2008) that explains how these words create further implications, such as the association of structure with being systematic and patterned and consistent while agency is random and free.

Subjectivity has gained common acceptance as referring to non-testable, biased, unreliable, inaccurate operations (Watts, 2011). As seen from aforementioned definitions, it doesn't necessarily have to be any of those things, especially in pursuit of a subjective science via methods such as Q methodology. Shapin (2011) discussed how objectivity is seen as an ideal for science, while subjectivity is treated as a problem, with its potential being ignored, but that to balance this ideal with reality, subjectivity needs to be included in science to make things more realistic. This is ironic since with this kind of thinking, it is asserted that subjectivity be employed to add objectivity to studying humans realistically. He explained that while subjectivity is presented as a pollutant to objective knowledge, all knowledge is known by humans and therefore contains subjectivity, because everything known and interpreted by humans, or subjects, contains the subjectivity that comes from that interpretation. Shapin further argued that subjectivity is accepted as the polar opposite to objectivity, as an evil twin, but doesn't get as much attention or get studied as thoroughly as its counterpart. This poses a problem for society because humans spend much more of their life discussing subjective things such as feelings and opinions than objective things, so subjectivity cannot be exiled from science, especially social science that studies humans. The title of Shapin's article was "The science of subjectivity" with the implication that subjectivity is necessary for science and should not be cast aside (Shapin, 2011).

While subjectivity is commonly accepted as a problem, objectivity is accepted as an ideal, and science is easily accepted to be objective without question. When someone does choose to question it, the questions pour out. Phillips (1990) pointed out that objectivity is very commonly used in quotation marks, or scare-marks, because while it is accepted as an ideal for science, it is a very abstract and unreachable goal. An "objective" truth, just as an absolute truth, is an ideal that can never truly be achieved. All knowledge is partial or subjective in some way because no knowledge can be completely certain and everything in the world is observed by and reported by humans, who carry with them an unavoidable level of human error. Since nothing can be certain, and everything is interpreted differently by all individuals, no one viewpoint can be entirely objective. This inserts subjectivity into all objectivity. Hager (1982) shared a similar view, focusing on objectivity in journalism but pointing out that journalists and scientists were alike in that they are both human and hold judgments, preferences, opinions, and biases which remove absolute objectivity as a possibility and introduce subjectivity into everything that claims to be objective. He based this conclusion on the fact that even scientists, who claim to be fully objective, disagree on theories and facts all of the time, and this disagreement deteriorates the objectivity of the facts and creates a doubt that true objectivity can exist at all. Abbott (2004) also highlighted that any human involvement in anything, no matter how scientific the process, introduces human subjectivity into it. Mulaik (1995) defined this issue in terms of the "subject/object schema" which explains that any object is interpreted by a subject and both the actual reality of what the object is and what humans perceive the object as are important to defining the nature of the object. In this case, the object can be an actual object, such as a chair, or an idea or concept. Both what it is and what is thought of it are important in defining it.

Social Sciences and Natural Sciences

When speaking of science and of being scientific, the word objectivity is thrown around as a goal, a standard, and a requirement. Subjectivity is spoken as if it were a disease that threatens to infect science. It is treated as a problem, a threat to the very nature and existence of a scientific method. Psychology is often grouped into the social sciences, while disciplines like biology and astronomy are part of the natural sciences. Often, social sciences are referred to as "soft sciences," as opposed to the nicknaming of natural sciences as "hard sciences." To many, the term social science sounds like an oxymoron, as if studying society and the mind of the people in it cannot possibly be done in a scientific way. Psychology has fought since its beginnings to demonstrate that the discipline should be considered as much a science as anything else, but the challenge is large because subjectivity is humanity, and humanity is exactly what social sciences study. This subjectivity causes trouble for social scientists when they are trying to prove themselves within the scientific community.

Natural and social sciences differ in the aspects of humanity that they study and which aspects they treat as observable. Stephenson (as cited in Watts, 2011) acknowledged that the sciences held constant disagreements on dualisms like body versus mind, subjective versus objective, and fact versus opinion, and chose to avoid such dualisms in his own studies, but arguably failed to do so by putting much emphasis on subjectivity. Regardless of this issue, he argued that people's viewpoints could be reliable enough to be observed and measured scientifically and that social sciences should embrace the technique in order to approach the scientific objectivity that is demanded and expected of anything claiming to be a science. Stephenson showed how scientists can embrace subjectivity as an operant that can be observed rather than abandoning it on the journey towards objectivity and absolute truth (Watts, 2011).

For social sciences that require acknowledgement of subjectivity, an objective and scientific knowledge is still required for the science to be accepted as such. Valid theories, exploration, inference, and intervention are needed as per the scientific process that defines science as a whole. The drive to reach objectivity and "genuine knowledge" is standard and present in all sciences (Westen, 2002).

Observers often imply that psychology is the study of the human mind, which contains in it an assumption of subjectivity and is deemed difficult to measure. Klempe (2012) pointed out that psychology depends on the opposition of subjectivity and objectivity because so many of its concepts are abstract and lie within the unobservable mind. Psychology wishes to prove itself as an objective and "real" science but requires a subjective perspective, both by the observer and the observed. Subjectivity typically refers to something particular, a viewpoint on a certain topic, for example, whereas objectivity refers to something general, like a theory, but psychology incorporates both concepts by studying particular individuals but attempting to create general scientific theories. Klempe argued that subjectivity and objectivity must be accepted as opposites and the tension between them acknowledged in order for psychology to exist, but that both objectivity and subjectivity must together be a part of psychology, instead of hiding and repressing subjectivity like much of science strives adamantly to do. Since observation has been accepted as fundamental to a scientific approach, observing human action, as well as human viewpoints, can lead to a scientific study of subjects and their subjective expressions. Klempe summarized Kant's views of subjectivity and objectivity, explaining that Kant believed all objective knowledge to come from subjectivity initially and that subjectivity needs to be embraced as a stepping stone towards the ultimate goal of absolute and true knowledge. The main point from Kant is that whether or not subjectivity and objectivity are truly opposites, an

incorporation of both is necessary in science, even if the end goal is scientific objectivity. This is especially important for psychology because of its subject matter. Gough and Madill (2012) further asserted the need to accept and embrace subjectivity in psychology even though the ultimate goal is objectivity. They discussed the need to move subjectivity from the "problem" category and into the "prospect" category because the tendency for objectivity to minimize the subjectivity of both the participants and the researchers in a study is an approach ill-suited of a science that wishes to study human beings and their minds. They summarized the approaches of science and objectivity, such as double-blind studies, limited-answer surveys, and random selection of participants and pointed out that such are not usually in the best interest for psychological studies. They explained that with techniques such as questionnaires or surveys with limited answers, subjects have no opportunity to explain their responses, and that while that quantification makes for easy measuring, it doesn't allow the insight into the mind that a qualitative response would. Qualitative research appears to be beneficial for psychological advancement, but the distaste for subjectivity and viewpoints in the scientific community undermines this necessity and limits psychology and the knowledge it can acquire. Gough and Madill criticized the tendency for science to assume that data speaks for itself, when it really does not. Relying only on measurable data and ignoring participant explanations and viewpoints causes an objectification of humans, undermining their humanity, which is what psychology exists to study.

One area of psychology that relies heavily subjectivity is psychotherapy. This division of psychology is based on introspection, interpretations, and meanings, all of which are terms that are commonly found in definitions of subjectivity. Erwin (2000) discussed the difference between facts and meanings and the difficulties of objectively studying meanings in

psychotherapy, and questioned whether science and psychotherapy could ever coincide. He referred to Jerome Frank's discussion of how ill-suited exact science is to something like psychotherapy. Different things have different meaning to everyone, but the viewpoints can, nonetheless, be studied scientifically if one knows how to approach them in a way that embraces subjectivity but still follows scientific methods.

Over the years, the goals, approaches, and the subject matter of science have evolved. Greek science embraced subjectivity and individual intellect and rationality, whereas modern science strives for impersonality and objectivity, taking itself outside of the mind and into the observable world. Plato and Aristotle embraced the humanistic approach to naturalism. Over time, though, humanity has faded out of science (Gillispie, 1960).

Social sciences and natural sciences appear to differ not only in their subject matter but in their approaches to and attitudes about science in general. Objectivity is seen as the ultimate goal in science, but deemphasizing subjectivity to reach that goal is not always practical for social sciences that want to embrace subjectivity and human viewpoints.

Q Methodology

In search of a science of subjectivity, Stephenson (as cited in Watts, 2011) introduced a term called "operant subjectivity" to refer to almost the opposite of what most people view subjectivity to be. He referred to it as a method of studying something scientifically and objectively, but from a first person perspective rather than third. Stephenson dissociated subjectivity from mentality, mind, and consciousness, which most people had learned to pair it with. Instead, he explained that operant subjectivity is a behavior of a person expressing their viewpoint on a given subject or situation. This behavior is expressed outwardly, not hidden inside of the individual, and can therefore be measured objectively (Watts, 2011). By presenting

the term operant subjectivity, Stephenson was attempting to bridge the gap between objectivity and subjectivity by explaining that subjectivity is an observable behavior that can be measured objectively, and that "subjective" and "objective" only differ in the perspective, one being first person and one being third person. In society, however, subjectivity and objectivity continue to lie on opposite ends of a spectrum.

In an attempt to embrace subjectivity rather than fearing and avoiding it, Stephenson (as cited in Watts, 2011) developed Q methodology to take subjective viewpoints of individuals and processing them objectively and empirically. Viewpoints, therefore, would not be considered as mental entities, but as rational and observable behaviors by the sorters. He initially wanted the word subjectivity removed entirely from conversations about Q methodology because he believed it would create doubt in people's minds as to the validity of the research, since "subjectivity" carried such a negative stigma, but knew this was not realistic so he discussed operant subjectivity to give subjectivity a more behavioral, observable, and scientific appeal (Watts, 2011).

There exists an organization called The International Society for the Scientific Study of Subjectivity, ISSSS, which has created a website, www.qmethod.org, explaining the methods on a web page titled Q Methodology. It describes Q methodology, founded by Stephenson, as a method of research that studies people's viewpoints. It is said to be useful for both clinical practice and research in psychology, since both clinical and research aspects of psychology involve humans, and humans have viewpoints. The website exists to introduce and promote the use of Q method, as well as links to manuals, tools, and education necessary to properly implement the method in psychological studies (International Society for the Scientific Study of Subjectivity, 2011).

Typically, Q method requires a subject to rank a set of stimuli such as subjective phrases or feelings, according to given instructions. The ranking scale usually ranges from agree to disagree, with different levels of agreement and disagreement, or from "most agree" to "least agree" (Brown, 1977). Other variations include descriptive sentences that a subject can rate from "least like me" to "most like me". The subject is asked to look at a list of items, containing any amount of potential viewpoints. This list of items, called a Q-sample, is chosen by the researcher. The researcher can choose the items from literature and interviews, attempting to gather a complete set of ideas around the subject at hand. It is, of course, impossible to state every possible thought one could have on a topic, but it is possible to get a sufficient list with research. Steve Brown, a prominent name in the practice of Q methodology, mentioned that a Q-sample can also be non-word items such as paintings and photographs, but that is far less common. The q-sample, containing the items/viewpoints, is the main focus of Q method, rather than the people sorting them. Furthermore, the items, though gathered and developed by the researcher, have different meanings to different people and therefore still allow the participant to express his or hers viewpoints accurately via agreement and disagreement. (Brown, 1993)

Brown commended Q methodology on its unique way of quantifying subjective data that is normally only viewed as qualitative (Brown, 1993). The subject is the one actively and subjectively sorting the phrases on the scale based on what they are thinking or feeling about the topic, instead of the observer measuring the subject in some objective way. It allows the person to provide measurements for their internal viewpoints rather than allowing someone else to measure them from the outside. This operant subjectivity is an important aspect of Q. The method treats humans as humans, allowing them to express what they think and feel. Thinking and feeling is what defines humanity. Q method allows this humanity to be expressed and

embraces viewpoints in a controlled matter, allowing subjects to be subjects rather than objects (Stephenson, 1977).

Brown (1997) has provided a vast amount of information on the history of Q method, as well as providing lectures and tutorials on the subject. He created a Q methodology primer in which he explained the steps in Q method and the statistics behind them. He began this primer by explaining that Q method measures viewpoints and viewpoints cannot be right or wrong. This relates to the aforementioned issue of human tendency to think in duality. These viewpoints are subjective, but they are produced by an observable behavior, which is then put through an objective and scientific statistical analysis.

Brown presented a quote from Psychiatrist Bernard Glueck, who praised Q as being a "long-awaited stable and dependable frame of reference [for addressing the] universality of uniqueness". Brown also mentioned that Q method gives a statistical sophistication, referring to things otherwise undermined for being unscientific. While R studies, conventional correlational research methodology, measure things about people objectively, in studies where the person is passive and treated like an object, Q studies both objective and subjective aspects of a person, in studies where the person actively participates in some way, but their participation can be measured and analyzed statistically. He further explained that the difference is not just in how the studies are done, but in what they are measuring. Q studies humans in a way where they are treated as human subjects, not objects. It opens up new doors for scientific study of humans because it allows researchers to study how certain subjective statements, feelings, and reactions occur "within" an individual, and then compares those patterns across individuals, using two separate data matrices, rather than only studying patterns across individuals (Brown, 1997).

Stephenson (as cited in Watts, 2011) suggested that Q methodology approaches a science of subjectivity because it takes people's viewpoints as they are expressed in the environment of the items available for sorting and measures them through the observable behavior of the process of sorting the items into piles on a scale. There is no introspection necessary, since the subject acts out their viewpoints and the action can be measured scientifically. Because of this, Stephenson believed that Q methodology didn't just express subjectivity, but actually is their subjectivity, expressed outwardly with the sorting behavior. Q method catches subjectivity as it is acting as an operant. Furthermore, Q method allows people's viewpoints to be not only identified, but also compared to others, thereby discovering factors of the subject at hand (Watts, 2011).

Current Study

The current study uses Q methodology to study viewpoints on subjectivity and objectivity. College faculty in the College of Arts and Sciences at Eastern Michigan University were asked to sort items containing various viewpoints on subjectivity and objectivity into a matrix on a scale ranging from "agree" to "disagree." The results were recorded and software was used to analyze the sorts. The purpose of the study was to identify factors, or groups of people sharing certain viewpoints, on the topic of objectivity and subjectivity by identifying which viewpoints people share in common. The study aimed at discovering similarities and differences, if any, in the viewpoints of members of different departments.

The definitions of objectivity and subjectivity vary throughout the literature and whether or not subjectivity and objectivity belong on opposite ends of a spectrum is controversial and highly debated in science. Culture has sorted things into objective and subjective for the greater part of the existence of science. This study attempts to gather viewpoints of subjects in a stable

and scientific manner in order to better understand subjectivity and objectivity by quantifying people's points of view on the subjects.

Brown (1980) wrote a chapter on the technique and method of Q methodology in which he outlines the 8 steps of Q method as 1) Statement collection 2) Q samples 3) P sets 4) Conditions of instruction 5) Statistical analysis 6) Factor rotation 7) Factor scores and 8) Interpretation. Following the guidance of Steven Brown, the current study was prepared, administered, and analyzed. The following sections will describe all of the parts of the Q method study in detail.

Method

Participants

Q methodology requires a very small sample, as opposed to the more common R method. Another difference between Q methodological studies and R methodological ones is that Q method doesn't require a random sample, but rather the researcher chooses the participant sample theoretically, based on which people would be relevant to the subject of the study. A large amount of subjects is not needed because the focus of the study is on the viewpoints of the subjects, not the subjects themselves, and therefore the study only requires there be enough people presenting their viewpoints for these viewpoints to create factors, or families of viewpoints. It was recommended in the literature to have between 20 and 50 people for a Q study. Participants are selected by the researcher based on their likelihood to actually have viewpoints, not just knowledge, of the subject matter. The participants make up what is referred to in Q methodology as the P-set (Brown, 1980).

As this study explored viewpoints on subjectivity and objectivity, mainly as it applies to sciences and academics, the relevant P-set in such a study would logically consist of professors

and lecturers who are qualified and knowledgeable enough to adequately understand the potential viewpoints being presented. A random sample would not insure that everybody would be knowledgeable about subjectivity and objectivity, and therefore the study would be unable to present usable findings because people without a comprehensive knowledge of the topic would produce sorts based on guesswork or random number placement just for the sake of completion.

After approval of the human subjects study by the Human Subjects Committee at Eastern Michigan University, participants were recruited via email. The recruitment email included an attachment of a consent form and a data collection sheet on which they would complete the procedure, called a Q-sort (See Appendix A). The recruitment email, consent form, and data sheet all had instructions on them. The data sheet had the most precise instructions, explaining how the actual sorting process should be done. Participants were asked to print the documents and fill them out, then scan them and send them back, or send them to the Psychology department via campus mail.

Participants included 22 professors and lecturers from the College of Arts and Sciences at Eastern Michigan University. This P-set consisted of 3 participants from the Psychology Department, 3 from Communication, Media, and Theater Arts, 1 from English, 1 from History, 2 from Political Science, 3 from Sociology/Anthropology/Criminology, 2 from Chemistry, 3 from Biology, 3 from Math, and 1 from the Music Department. Aside from department and specific concentration within the department, no other demographic data was solicited, as they were deemed unimportant to the goals of the study. The professors were recruited via email solicitation, using emails provided on the departments homepages within the College of Arts and Sciences webpage. Everyone with a listed email who belonged to the College of Arts and

Sciences as a lecturer or professor received an email. Approximately 400 lecturers and professors were solicited.

Informed Consent

The aforementioned participants who were recruited via email signed a consent form that explained the purpose of the study, the procedures, the risks (which were nil), benefits of their participation, confidentiality, and their ability to withdraw at any time. They were also given contact information and informed that they would be able to see the study at the Undergraduate Symposium and online on EMU's digital commons.

Data Collection

The recruitment email contained at attachment of the data collection form (Appendix A) that willing participants would fill out after signing the consent for.

The data collection sheet included a number of important things. The top of the page asks for the Department and concentration within the department, and is the only demographic information collected in the study.

The conditions of instruction followed. Brown (1980) referred to the directions given to participants explaining how to fill out the data collection form as conditions of instruction and stated that they could be as simple as "express your viewpoints", but following the guidance of the Q methodological study presented in the Psy103 course at Eastern Michigan University (The lab portion of Introduction to Psychology), more specific instructions were given:

> Refer to the list of numbered statements below. Pick the two statements with which you least agree and place their numbers in the two boxes on the column furthest to the left, under the -4. Then pick the two statements with which you most agree and place their numbers in the two boxes in the column furthest to the right, under the +4. Next, of the

remaining statements find the three statements that you least agree with and place them under the -3. Of the statements that remain now, find the three that you most agree with and place them under the column marked +3. Do this again, with the remaining statements, with four statements you least agree with being placed under -2 and four statements you most agree with under +2, and once again, with five statements you most agree with under -1 and the five you most agree with under+1. Place the five remaining items in the column labeled 0. Please check to make sure you have not used any of the numbers more than once, that you have used all of the statements and that each box is filled in.

After that, there was a 33-box matrix (see Appendix A) ranging from -4 to +4, with -4 being "least agree" and +4 being "most agree." Participants had been asked in the instructions to perform a Q-sort by sorting the items based on the level of agreement they had with those items, starting with the most extreme agreement and disagreement and ending with the neutral items in the middle. Following the matrix was the list of statements, known as the q-sample.

The Q-sample was comprised of potential viewpoints on subjectivity and objectivity. As Brown explains, a Q-sample is created by the researcher from a concourse, or a universe of potential viewpoints. It is the researcher's duty to gather enough potential viewpoints on a subject that it can be considered complete. Any one subject can have an infinite number of statements made about it, and it is unimportant to try to write them all down. The Q-sample should include enough statements that, with the participants' ability to agree or disagree, it presents a full range of viewpoints on the topic. Q method is often criticized for the bias and subjectivity that comes from the researcher creating the sample of statements, and it is true that the researcher has the power to organize the statements as he or she sees logical, but this does not

necessarily negatively affect the study. This is because, while the researcher imposes this Q-sample and in a way, represents some of his or her own viewpoints, the participant chooses what they agree or disagree with, and the extent of that agreement or disagreement. Furthermore, each participant gives their own meaning to each statement, and has their own unique reaction to the statement. This renders the researcher's bias irrelevant. Whatever understanding and opinion of the viewpoints the researcher may have holds no importance. The participants determine the meaning and significance of each statement by themselves. The way the researcher writes the statements does not matter as much as the meaning they have to the participant matters, rendering validity an insignificant concept in Q methodology. The statements don't matter as much as what is done with them does (Brown, 1980).

For this study, the Q-sample consisted of 33 items/statements (see Appendix A). This Q-sample was equal parts phrases about subjectivity, phrases about objectivity, and phrases about subjectivity and objectivity together, with 11 in each of the three categories. This was done to create a balance among the item set, and to cover a wide range of viewpoints. To avoid this pattern affecting the sort process, Microsoft Excel was used to randomize the list of items. Furthermore, Brown (1980) pointed out that the original categorization of the statements by the researcher does not affect the results of the sorts because the participants may categorize the items differently, but this categorization was done for the purposes of creating a balanced q-sample.

Based on the instructions on the data collection sheet, the participants were asked to sort the items into the "least agree"/"most agree" matrix. The matrix is arranged so that there is a neutral column marked zero in the middle for the placement of items that the participant feels neutral about. Boxes to the right of the column are for statements the participant most agrees

with, and the boxes to the left are for the statements the participant least agrees with. This is a modified version of a rank-order procedure in which items are ranked in order of significance. Unlike a traditional rating scale, there is no right or wrong answer in Q method. This matrix allows for the subjectivity to be freely expressed rather than limited or avoided. Participants are expected to rank items based on the psychological importance that item has to them, whether it be a feeling of agreement, disagreement, or neutrality (Brown 1980).

At first glance, such a matrix may seem limiting, almost as if it forces the participant to conform their answers to a forced distribution, but since the participants decide where to place items, they are fully in control of expressing their viewpoints in their own unique way. They are guided by the matrix rather than constrained or forced by it. So when concerns arise about the constraints of the forced distribution, it is important to note that Q methodology is designed in a way that gives plenty of room for unique and individual responses. Brown (1980) used the same number of items as this study, 33, in his explanations of the technique of Q method, and demonstrates that with 33 items, there are "11,000 times more different ways to sort the statements, even in the forced distribution, than there are people in the world" (Brown, 1980, p. 201).

Procedure

The participants were recruited via email based on the email addresses found on Eastern Michigan University's website, with the professors and lecturers of the College of Arts and Sciences being asked to participate. The email included a request for participation, with a brief explanation of the study and the data collection sheet and consent form attached. The participants who agreed to participate opened the files and completed them by either electronically filling out the data collection sheet and signing the consent form, or printing both and filling them out in

print. They followed the conditions of instruction and completed the Q sorting process as instructed, filling in their responses in the matrix on the data collection sheet. The participants then returned the completed documents to the researcher either by sending them via campus mail to the Psychology Department or by scanning in and sending it via email.

Data Analysis

When all of the sorts were collected, the data were put into software called PQMethod (Schmolck, 2013). The software, developed and updated by Peter Schmolck can be found and downloaded on http://schmolck.userweb.mwn.de/qmethod/downpqwin.htm. This software and its add-on, PQrot (for rotation of factors) can be downloaded for free and is a simple dos program. More user friendly software can be purchased elsewhere. The software does a great amount of the work that once had to be done by hand to perform factor analysis on the data, but all of the data and statements have to be entered into the program first.

Results

Once the statement set was imported and each Q sort entered into the PQMethod software, the program calculated the correlation matrix, which showed how each sorter correlated with every other sorter. In Q method, the correlation matrix is not important as anything more than a bridge to get from the data to the factor analysis (Brown, 1980). Less attention is paid to the correlation matrix in Q method than in R because while the correlations between sorters/sorts are important in leading up to the factor analysis, the items themselves and their representation in sorts and factors are more important than seeing the direct correlation between each sorter. The correlation matrix for the 22 sorters in this study is shown in Table 1.

Table 1

Correlation Matrix Between Sorts

SORTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 psy1	100	-26	41	41	44	20	42	29	45	-21	36	56	14	-11	-7	41	-9	37	53	12	43	56
2 psy2	-26	100	34	-12	14	5	4	27	17	28	9	-14	6	48	13	-16	-17	-21	-21	-3	12	-15
3 psy3	41	34	100	36	59	26	21	51	37	13	49	37	19	15	2	34	-21	22	33	-2	30	40
4 com1	41	-12	36	100	46	42	36	51	46	9	55	62	46	-36	26	66	-42	47	73	36	2	69
5 com2	44	14	59	46	100	41	50	40	27	18	7	54	32	-14	9	19	-18	54	38	6	16	57
6 com3	20	5	26	42	41	100	36	32	15	32	25	48	19	-34	-12	34	-22	51	47	47	24	51
7 engi	42	4	21	74	50	36	100	41	48	2	37	57	32	-24	16	39	-20	50	48	43	9	66
8 hist1	29	27	51	51	40	32	41	100	44	38	45	42	40	-2	25	50	-14	22	52	49	22	39
9 poli1	45	17	37	46	27	15	48	44	100	22	40	39	31	9	26	57	-16	29	38	17	31	52
10 poli2	-21	28	13	9	18	32	2	38	22	100	-6	10	-9	-17	22	15	-5	29	26	6	15	14
11 soc1	36	9	49	55	7	25	37	42	40	-6	100	34	16	-1	17	59	-17	4	44	28	46	34
12 soc2	56	-14	37	62	54	46	57	42	39	10	34	100	41	-39	9	51	-8	65	59	47	14	77
13 soc3	14	6	19	46	32	19	32	40	31	-9	16	41	100	-3	45	24	-10	23	36	47	-9	31
14 chem1	-11	48	15	-36	-14	-34	-24	-3	9	-17	-1	-39	-3	100	17	-19	8	-47	-46	-21	19	-39
15 chem2	-7	13	2	26	9	-12	16	25	26	22	17	9	45	17	100	11	17	-14	12	13	23	7
16 bio1	41	-15	34	66	19	34	39	50	57	15	59	51	24	-19	11	100	-28	35	54	48	14	54
17 bio2	-9	-17	-31	-62	-13	-22	-20	-14	-16	-5	-17	-9	-10	8	17	-35	100	-18	-38	-13	14	-20
18 bio3	37	-21	22	47	54	51	50	22	29	29	4	65	23	-47	-14	35	-13	100	55	32	-14	64
19 math1	53	-21	36	73	38	47	48	52	38	26	44	59	36	-46	12	64	-32	55	100	47	19	71
20 math2	12	-3	-2	36	6	47	43	45	17	6	28	47	47	-21	13	48	-13	32	47	100	12	37
21 math3	43	12	30	3	16	24	9	22	31	15	46	14	-9	19	23	14	14	-14	19	12	100	12
22 music1	56	-15	40	69	57	51	66	39	52	14	34	77	31	-39	7	54	-20	64	71	37	12	100

In Q method, the variables that are classified via factor analysis are the sorts (Brown, 1980). Some sorts will naturally fall into factors, which are families of sorts/sorters. If sorts are similar to each other significantly, they will likely be grouped in the same factor family. Factor analysis statistically places sorts into factors instead of the researcher deciding the factors him or herself. Since it is done statistically, this maintains the objectivity and scientific nature of the factor analysis. Brown further explains that such a process is a great starting point of a science of human behavior because it shows that when people operationally express their viewpoints through the behavior of sorting, and their sorts are compared with each other and sorted statistically into factors, it shows a scientific method of study.

The PQMethod software allows for the choice of Centroid and Principal Components methods for factor analysis, and manual and varimax methods for rotation. This study used the principal components method of factor analysis.

The program extracted 8 factors via principal components factor analysis. Table 2 shows the 8 unrotated factors that were formed by the data and how each of the 22 sorters correlates with (loads on) each factor. The correlation between each sorter and each factor is represented by

a value from -1 to +1, the correlation coefficients as in R methodology, and shows how strong or weak the relationship is between that sorter and a factor, or family, extracted by the factor analysis. Brown (1980) explained that in order to determine which correlations can be considered significant, one must use the same technique in Q methodology as in R and depend on the *z*-scores. He emphasized using $p < 0.01$, which was used for this entire study, and the *z*-score 2.58 to calculate the correlation coefficient at which significance would begin. The equation for determining above and below which values a correlation is considered significant is as follows:

$$2.58(1/\text{sqrt}N)$$

The N refers to the number of items for sorting, rather than the number of participants, as with R methodology. This study had 33 items, which would make the equation equal 0.45. This means that any number equal to or above +0.45 and equal to or below -0.45 was statistically significant to this study.

Table 2

c:\pqmethod\pqrot.exe

	1	2	3	4	5	6	7	8
1 psy1	0.61	-0.01	-0.58	-0.33	0.14	0.05	0.03	0.02
2 psy2	-0.04	0.69	0.50	-0.17	-0.03	-0.23	0.16	0.21
3 psy3	0.53	0.47	-0.01	-0.47	0.03	-0.20	0.02	-0.37
4 com1	0.85	-0.07	-0.04	0.20	-0.02	-0.23	-0.18	-0.00
5 com2	0.62	0.05	0.21	-0.46	0.45	-0.06	0.09	-0.11
6 com3	0.80	-0.17	0.32	-0.19	-0.31	0.16	0.36	0.08
7 engl	0.73	-0.06	-0.00	0.07	0.20	-0.13	0.05	0.48
8 hist1	0.66	0.37	0.21	0.12	-0.09	0.03	0.11	-0.24
9 poli1	0.61	0.39	-0.10	0.05	0.11	0.05	-0.39	0.29
10 poli2	0.22	0.13	0.69	-0.12	-0.22	0.46	-0.36	-0.03
11 sac1	0.56	0.38	-0.38	0.08	-0.40	-0.04	0.03	-0.05
12 sac2	0.81	-0.20	-0.04	-0.06	0.20	0.10	0.14	-0.01
13 sac3	0.49	0.12	0.12	0.52	0.40	-0.21	0.22	-0.23
14 chem1	-0.36	0.73	-0.10	-0.05	0.14	-0.19	0.14	0.12
15 chem2	0.19	0.47	0.09	0.54	0.36	0.30	-0.25	-0.02
16 bio1	0.73	0.04	-0.19	0.24	-0.30	-0.05	-0.19	-0.13
17 bio2	-0.31	0.02	-0.17	0.06	0.41	0.67	0.19	-0.12
18 bio3	0.66	-0.47	0.24	-0.22	0.17	0.07	-0.03	0.06
19 math1	0.83	-0.17	-0.03	0.07	-0.19	0.08	-0.12	-0.18
20 math2	0.55	-0.09	0.13	0.49	-0.22	0.09	0.51	0.12
21 math3	0.25	0.51	-0.32	-0.23	-0.20	0.54	0.17	0.13
22 music1	0.85	-0.19	-0.04	-0.13	0.13	0.02	-0.08	0.13

The first 2 to 3 factors are typically the most important in Q because they, together, account for the most variance, which refers to how the data are spread out. At this point, the majority of the high loadings are in Factor 1, with many of them being above 0.8, which is a very high correlation. In order to gain a new perspective, factor rotation needs to be performed. Rotation of factors refers to taking two of the factors and placing them as the X and Y axes on a graph to gain a new perspective on the clusters of sorters.

The program allows for either a varimax rotation, or a manual rotation. The varimax rotation does the rotation automatically, using statistics to move the sorters around on the graph and place them into new, more defined and strong factors. The problem with using statistics to automatically rotate the factors is that the math and the program are unaware of the particular study at hand. They have no understanding of the topic on which the viewpoints were given, and no idea of the hypotheses and goal of exploration of the researcher. Brown (1980, 1993) emphasized the need in Q methodology for hand rotation rather than varimax or other statistical rotations. The researcher, unlike mathematics alone, knows more information about each sorter and about that sorter's viewpoints, allowing for a better understanding of the similarities and differences between sorters, making for stronger factor separation via manual rotation. Further rotating factors manually, or doing so entirely in place of varimax, is beneficial. Brown (1980) pointed out that a big criticism of Q method is the manual rotation and the bias it may impose, but he countered this attack by explaining that manually rotating factors does not create new factors based on the biases and desires of the researcher, it only allows for a new perspective, a look from a slightly different direction, at the data presented. The sorters are placed on the X and Y graph based on their correlation to each factor. The points on the graph can then be rotated, all at once, to make factor definitions more clear. While the rotation may make new factor families,

points that belong together will always stay together. The sorter responses never change. The sorts that are similar will cluster together and end up in the same factor, and the sorts that are very different will be in different factors. The rotation allows the researcher to do what Brown (1980) refers to as almost a brand new experiment, discovering the 2 or 3 strongest factors in the study by rotating points on the graph around until 2 or 3 factors distinguish themselves as strongest. The varimax rotation was attempted, but the results were unsatisfactory. Manual rotation was performed, rotating first factors 1 and 2, then factors 3 and 4. It was discovered that only factors 1 and 2 were necessary to show important results of the study, and that factor 3, containing only one significant loading, and factor 4, containing only 3 significant loadings, did not give this study any important information that could not be derived from factors 1 and 2 alone.

Figure 1 shows Factor 1 and Factor 2, unrotated, on the graph, and Figure 2 shows the factors rotated. Each point on the graph is a number, which refers to a sorter, corresponding with the numbers assigned to the sorters by the program. Refer to Table 2 to see the factor loadings for the unrotated factors in Figure 1 in numerical form. The numerical representation of the factor loadings on the rotated factors in Figure 2 are presented in Table 3. The purpose of the rotation was to move the points on the X axis to bring more definition to Factor 2, while still maintaining a good definition for Factor 1

Figure 1

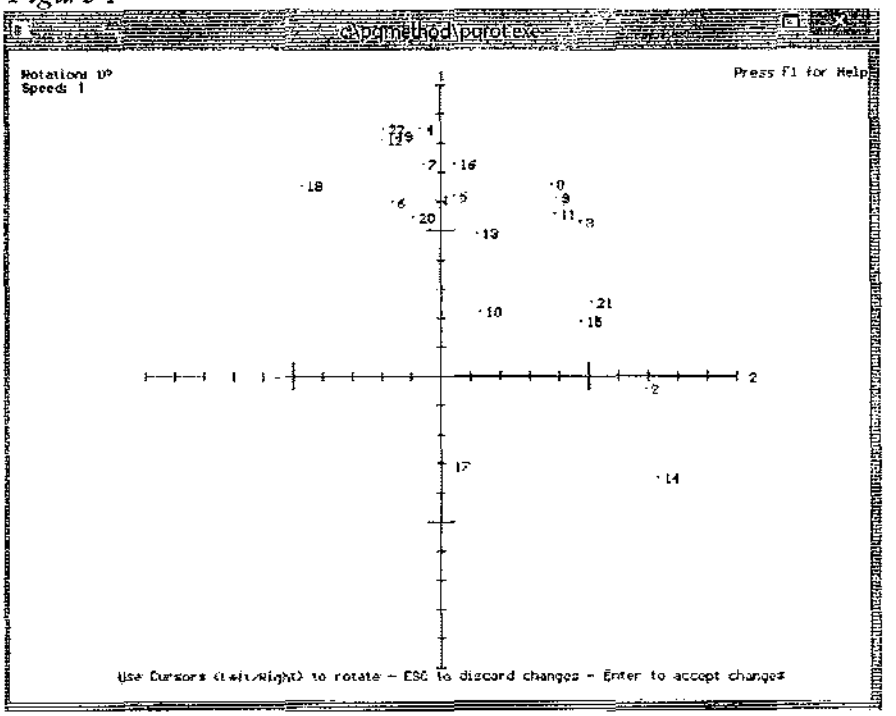
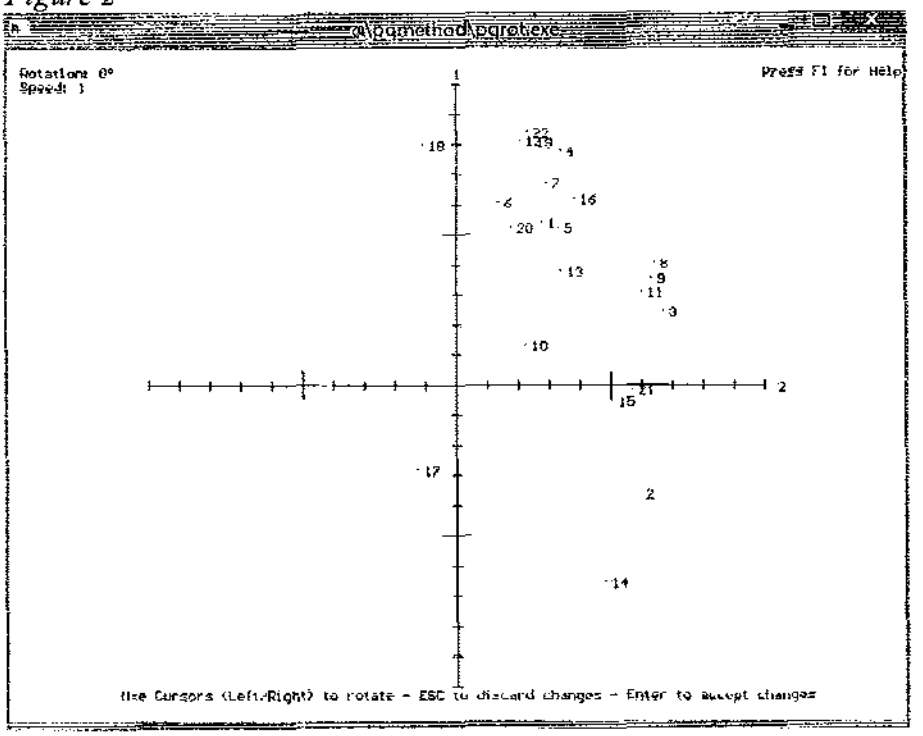


Figure 2



Extracted Factors After Rotation

Table 3 shows Factors 1 and 2 after rotation and how each sorter is correlated with each of the 2 factors. The Xs next to some of the correlation coefficients represent statistically significant correlations that had to be flagged as such for the program to run analysis on the results. Factors 1 and 2 accounted for 47 percent of the variance, with Factor one accounting for 30 and Factor 2 for 17.

Table 3

		1	2
1	psy1	0.55X	0.28
2	psy2	-0.36	0.59X
3	psy3	0.25	0.67X
4	com1	0.78X	0.34
5	com2	0.52X	0.33
6	com3	0.61X	0.14
7	eng1	0.67X	0.29
8	hist1	0.41	0.64X
9	poli1	0.36	0.63X
10	poli2	0.14	0.22
11	sac1	0.31	0.60X
12	sac2	0.81X	0.21
13	sac3	0.38	0.34
14	chem1	-0.48	0.48X
15	chem2	-0.06	0.51X
16	bio1	0.62X	0.38
17	bio2	-0.28	-0.13
18	bio3	0.80X	-0.11
19	math1	0.81X	0.24
20	math2	0.53X	0.18
21	math3	-0.01	0.57X
22	music1	0.84X	0.23

Table 4 shows the correlation between the two extracted factors in this study.

Table 4

Correlations Between Factors

Factor	1	2
1	1	0.4
2	0.4	1

Table 5, below, shows the amount of sorters from each department who loaded on Factor 1, Factor 2, and the total number of sorters from each department. Of the 22 participants, 3 did not load on either Factor 1 or 2.

Table 5

Department Affiliations of Sorters

Department	Factor 1	Factor 2	Total Sorters From Department
Psychology	1	2	3
Communications/Media	3	0	3
English	1	0	1
History	0	1	1
Political Science	0	1	2
Sociology/Anthropology/Criminology	1	1	3
Chemistry	0	2	2
Biology	2	0	3
Mathematics	2	1	3
Music	1	0	1

Factor 1: Skeptical of Objectivity and Optimistic Regarding Subjectivity

Eleven sorters defined Factor 1. The department representations for Factor 1 can be found in Table 5. No sorters from History, Political Science, or Chemistry loaded on (or defined) Factor 1. Ten of the 33 statements defined Factor 1. The defining statements for Factor 1 are shown in Table 6 and Table 7, with asterisks marking the statements that significantly distinguish Factor 1 from Factor 2 at $p < 0.01$. There were 4 such statements.

Table 6

Factor 1: Statements Most Agreed With

Statement #	Statement	Rank	Z Score
33	A scientific observation by a person will unavoidably contain at least some bias and subjectivity.	4	2.15
28	How an object is perceiveed is just as important as what it actually is.	4	1.76
30	There cannot be a complete science without embracing both objectivity and subjectivity	3	1.44
31*	Subjectivity and objectivity cannot exist without each other.	3	1.39
15*	Since scientific facts are constantly argued about, they can't be considered fully objective.	3	1.07

Table 7

Factor 1: Statements Least Agreed With

Statement #	Statement	Rank	Z Score
11	Subjectivity is a threat to science.	-3	-1.14
12	Objective knowledge is irrefutable.	-3	-1.31
1*	Insuring full objectivity is the only way to have a reliable science.	-3	-1.43
13*	Objectivity provides the one and only correct view of reality.	-4	-1.76
10	Objective knowledge is absolute knowledge.	-4	-1.9

Factor 1 distinguished itself by placing emphasis on rejecting the absolute objective standard that science claims to have by highly agreeing with the statement "Since scientific facts are constantly argued about, they can't be considered fully objective" (15) and disagreeing strongly with the statement "Objective knowledge is absolute knowledge" (10). Further criticism of the exaggerated trust and reliance society appears to place on objectivity was implied by the disagreement sorters loading on Factor 1 expressed towards the statements "Objective knowledge is irrefutable" (12) and "Objectivity provides the one and only correct view of reality" (13). They demonstrated disagreement with the implied irrefutability of science, and expressed that reliable science can occur without full objectivity. Besides their skepticism on placing trust in objectivity, Factor 1 also encourages paying attention to subjectivity by agreeing with the statement "Subjectivity and objectivity cannot exist without each other" (31) and disagreeing with the statement "Insuring full objectivity is the only way to have a reliable science" (1). The general direction that the viewpoints of Factor 1 took is towards embracing subjectivity within the sciences and other aspects of studying and understanding reality, and towards minimizing the dependence placed on objectivity, seeming to believe that objectivity and absolutism of knowledge that comes from it is exaggerated.

Factor 2: Dedicated to Objectivity but Accepting of the Inevitability of Subjectivity

Factor 2 was defined by 8 sorters, the department affiliation of whom can be found on Table 5. Sorters from Communications/Media, English, Biology, and Music did not load on (define) Factor 2. 10 of the 33 statements defined Factor 2. The defining statements for Factor 1 are shown in Table 8 and Table 9, with asterisks marking the 5 statements that significantly distinguish Factor 2 from Factor 1 at $p < 0.01$.

Table 8

Factor 2: Statements Most Agreed With

Statement #	Statement	Rank	Z Score
24*	Science must be objective.	4	1.8
33	A scientific observation by a person will unavoidably contain at least some bias and subjectivity.	4	1.61
30	There cannot be a complete science without embracing both objectivity and subjectivity	3	1.59
27*	Science must be completely impartial.	3	1.59
1*	Insuring full objectivity is the only way to have a reliable science.	3	1.54

Table 9

Factor 2: Statements Least Agreed With

Statement #	Statement	Rank	Z Score
3*	Subjectivity can't be supported or refuted scientifically.	-3	-1.05
10	Objective knowledge is absolute knowledge.	-3	-1.06
12	Objective knowledge is irrefutable.	-3	-1.07
29*	Objectivity can only be absolute if it is completely independent of the mind.	-4	-1.42
18*	Feelings and opinions have no place in science.	-4	-1.85

Factor 2 showed a different emphasis from Factor 1. The sorters loading on Factor 2 seemed insistent that science must always be objective and impartial, and showed this through agreement with the statements "Science must be objective"(24), "Science must be completely impartial" (27), and "Insuring full objectivity is the only way to have a reliable science" (1). While their emphasis on the need for objectivity and impartiality in science differed from Factor 1, the items sorters loading on Factor 2 disagreed with did not entirely denounce subjectivity, as one might expect. Their disagreement with the statement "Objectivity can only be absolute if it is completely independent of the mind" (29) can be interpreted to mean that they believe that subjective viewpoints could still be observed objectively, which would show optimism towards incorporating subjectivity into scientific studies, but it could also be taken to mean that they have faith in objective knowledge even though it may come from a person, as all knowledge must. Either way, combined with the strong disagreement that "Feelings and opinions have no place in science" (18) and the strong agreement that "There cannot be a complete science without embracing both objectivity and subjectivity" (30), it is evident that while the proponents of Factor 2 appear adamant in keeping objectivity and impartialness in science for the purposes of

reliable knowledge, their viewpoints allow for the possibility of letting subjective data enter science, so long as it is measured and analyzed objectively and impartially.

Consensus Statements

Twenty-three of the 33 statements did not significantly distinguish Factor 1 from Factor 2 and 17 of these statements were considered consensus statements, and can be found in Table 10. These statements were similarly ranked by the participants loading on both factors. Some of them more strongly defined one factor than the other, but not so much as to be considered distinguishing.

Table 10

Consensus Statements

Statement #	Statement	F1 Rank	F1 Score	F2 Rank	F2 Score
33	A scientific observation by a person will unavoidably contain at least some bias and subjectivity.	4	2.15	4	1.61
30	There cannot be a complete science without embracing both objectivity and subjectivity.	4	1.76	3	1.58
10	Objective knowledge is absolute knowledge.	-4	-1.9	-3	-1.06
12	Objective knowledge is irrefutable.	-3	-1.31	-3	-1.07
11	Subjectivity is a threat to science.	-3	-1.14	-1	-0.8
28	How an object is perceived is just as important as what it actually is.	3	1.44	2	1.05
17	Subjective science is an oxymoron.	-2	-0.56	-2	-0.85
26	Subjectivity refers to opinions and perceptions derived from immediate sensory experiences.	2	1.01	2	0.63
16	Subjective knowledge is unreliable.	-2	-0.6	-1	-0.57
9	Subjectivity can refer to observable behavior rather than the mind.	2	0.83	1	0.52
20	Subjective science allows the subject to be active rather than passive.	2	0.67	1	0.25
21	Hard sciences cannot incorporate subjectivity without becoming soft sciences.	-1	-0.48	-1	-0.54
25	Subjective data cannot be measured accurately.	-1	-0.51	-1	-0.57
7	Objectivity relies on theory alone.	0	0.13	-1	-0.71
8	Objectivity is reality while subjectivity is the interpretation of that reality.	1	0.57	0	0.07
19	Subjectivity and objectivity exist on opposite ends of a spectrum.	1	0.24	0	0.03
23	Subjectivity by definition refers to the lack of objectivity, and vice versa	0	-0.23	0	-0.34

Proponents of both factors strongly agreed with Statement 33, which stated that "A scientific observation by a person will unavoidably contain some bias and subjectivity" and the statement that "There cannot be a complete science without embracing both objectivity and subjectivity" (30). They also strongly disagreed with the statement that "Objective knowledge is absolute knowledge" (10) and the statement that "Objective knowledge is irrefutable" (12). Statements 7, 8, 19, 20, 21, 23, and 25 were essentially irrelevant for both factors with a factor score at or near zero. The remaining items were ranked similarly across both factors.

Discussion

This study produced a large amount of consensus items. 17 items, more than half of the 33 items in the study, were similarly ranked by both factors. Since the two factors represent 19 out of the 22 sorters in this study, it can be said that on average, most of the participants ranked the consensus items similarly. This study was administered to participants representing 10 different departments, including Psychology, Communication/Media/Theater, English, History, Political Science, Sociology/Anthropology/Criminology, Chemistry, Biology, Math, and Music. One would assume that the natural sciences (Chemistry and Biology) would have very differing viewpoints on subjectivity and objectivity from the social sciences (Psychology, Sociology/Anthropology/Criminology, Political Science) and that the sciences would have a further differing view of the topic than the non-science departments such as Communication, English, Math, and Music. This study has shown that the faculty from the different departments are intermixed in their viewpoints and that the factors each contain a variety of science and non-science sorters.

Another strong implication of the consensus items is that a great variety of the potential viewpoints that were thought by the researcher, upon exploring the literature on the subject, to be important in distinguishing between subjectivity and objectivity, and to be especially important to the science departments, were shown to be irrelevant to the sorters, as seen by the factor scores being at or near 0. These items did not show to be psychologically stimulating or significant to the sorters loading on the two factors and produced no strong agreement or disagreement. The vast amount of items that literature and experience deemed important to the topic being ranked neutrally by most sorters represents a blurring of the line between objectivity

and subjectivity and demonstrates the idea that subjectivity and objectivity may not be the polar opposites that literature and tradition has said them to be.

The individual factors also demonstrated the blurring of the line between objectivity and subjectivity and emphasized the potential that subjectivity has for being incorporated into science. Sorters within Factor 1 argued against the assumption that science is capable of being absolute and objective and disagreed that objectivity is the only way to have a correct view of reality while expressing the opinion that subjectivity and objectivity are both equally necessary for a complete science to exist. Sorters within Factor 2, in contrast, insisted strongly on the necessity for science to be both objective and impartial. These differences aside, both factors expressed the understanding that nothing can be fully objective because of human involvement, which produces bias and subjectivity, whether it is intentional or not. Both factors demonstrated acceptance that even if science needs to be completely impartial and objective, as sorters defining Factor 2 strongly encouraged, this is not a realistic or possible thing. Sorters in both Factor 1 and Factor 2 strongly expressed that scientific knowledge is not completely absolute, nor is it impossible to refute.

Sorters loading on Factor 1 primarily focused their ranks to express the doubts they have about objectivity and to show optimism in the inclusion of subjectivity in science. Proponents of Factor 2 focused on insisting that science must be objective and impartial, but nonetheless, still showed some support for subjectivity, and in a similar way to the sorters that loaded on Factor 1, admitted that scientific knowledge is not absolute and inevitably has weaknesses.

Future Research

It is important to note that Q methodology and R methodology are viewed by many as opposing or competing methodologies, but they are actually just separate tools used to collect

and analyze data, and the factor analysis in both is roughly the same. Both methodologies allow for the use of a variety of factor analysis methods, and it is up to the researcher to decide which method is best for the data at hand. The statistics in both methodologies are the same, but Q and R differ in the kind of data they are practical for, allowing for an ease of data collection and analysis by selecting one over the other (Brown 1980). Q methodology was not just practical for this study, but the basis of the entire study. It allowed for the proper handling of subjective viewpoints and transformation of those viewpoints into measurable numerical data so that scientific and statistical factor analysis could be performed.

Q methodology is in its early stages. After its development, it took time to be accepted as a method for scientific study, as it applies too much emphasis on subjectivity, a concept often avoided by scientists. Any internet search or library search would provide the conclusion that the information available on Q methodology is as scarce as the studies using it, especially in comparison to studies using the common statistical analysis approach using R. This study was an undergraduate student's exploration into Q methodology and the subjectivity-objectivity debate, with time constraints and limitations, but this is a study that would benefit from repetition on a larger scale, with in-person interviews rather than remote data collection and a stronger encouragement for more professors to participate.

This study originally intended to study subjectivity and objectivity separate from science, but the term because unavoidably incorporated into the study. Subjectivity and objectivity are concepts that exist separate from science, but both the use of academic participants and the realization that the topic more often than not relates to some aspect or area of science brought science into the discussion of the topic. Furthermore, just as it was unavoidable that the term "science" would be incorporated into the study, it was inevitable that dualities/dichotomies,

which were discussed and denounced in the introduction, would find their way into the discussion of the study. Distinguishing between "objective" and "subjective" was at times unavoidable in this study, as was reference to the quantitative data vs. qualitative data distinction. Dualities are strongly emphasized within society and the scientific community is no exception. Even a study questioning whether subjectivity and objectivity are truly opposites can fall victim to the use of them as such.

As long as there is science and people practicing that science, there will be a discussion about subjectivity and objectivity. People will always have viewpoints, and these viewpoints will be considered subjective, or coming from the subject. Science will always strive for truth, ultimately for absolute truth, something towards which the idea of objectivity attempts to lead scientists. But as long as scientists are human, there can hardly be a total removal of subjectivity, viewpoints, and biases. The debate, as with many controversial issues, will be around for a while, and duality and bipolarity are easier to accept than murky boundaries and blurry lines. Nevertheless, researchers with an understanding of the necessity to allow people to be people, to be subjects rather than objects when studied, will push for a subjective science, and Q methodology is the developing and available tool for such an endeavor.

The future of Q methodology is filled with potential. It is a much less common methodology than R, and working with subjectivity is generally minimized in scientific study, but the uses and benefits of Q methodology cannot be ignored. Brown explained of Q methodology that the Q sort that the subject produces belongs to that subject; that it comes from the actions of the subject rather than some kind of measurement that treats the subject more like an object (Brown, 1980). Brown further stated that Q method allows for a lot of subjectivity but "nevertheless, it is numerical, hence it permits the investigator to be quantitative and humane at

the same time" (Brown, 1980, p. 263"). The idea of the "behavioral scientist" is also mentioned in the conclusions Brown (1980) drew about Q methodology, particularly that the term rarely applies to studying behavior, and deals more with knowledge of statistical analysis. Q methodology allows for the operant behavior of expressing subjective viewpoints to be measured statistically incorporating both behavior and statistics into an objective study of human subjectivity, something that will bring vast amounts of benefits to science if given a fair chance.

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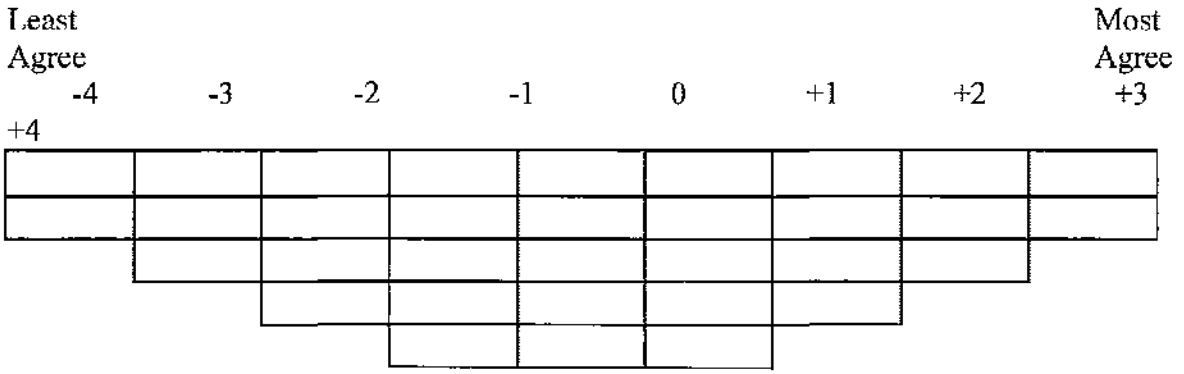
APPENDIX A

Data Collection Sheet – Page 1

Department_____
Concentration Within Department_____

Refer to the list of numbered statements below. Pick the two statements with which you least agree and place their numbers in the two boxes on the column furthest to the left, under the -4. Then pick the two statements with which you most agree and place their numbers in the two boxes in the column furthest to the right, under the +4. Next, of the remaining statements find the three statements that you least agree with and place them under the -3. Of the statements that remain now, find the three that you most agree with and place them under the column marked +3. Do this again, with the remaining statements, with four statements you least agree with being placed under -2 and four statements you most agree with under +2, and once again, with five statements you most agree with under -1 and the five you most agree with under+1. Place the five remaining items in the column labeled 0.

Please check to make sure you have not used any of the numbers more than once, that you have used all of the statements and that each box is filled in.



Data Collection Sheet – Page 2

1. Insuring full objectivity is the only way to have a reliable science.

2. Subjectivity is synonymous with personal bias.
3. Subjectivity can't be supported or refuted scientifically.
4. Objectivity avoids all influence of personal feelings.
5. Subjectivity and objectivity both originate within the mind of an individual.
6. Objectivity is synonymous with impartialness.
7. Objectivity relies on theory alone.
8. Objectivity is reality while subjectivity is the interpretation of that reality.
9. Subjectivity can refer to observable behavior rather than the mind.
10. Objective knowledge is absolute knowledge.
11. Subjectivity is a threat to science.
12. Objective knowledge is irrefutable.
13. Objectivity provides the one and only correct view of reality.
14. Objective science has the subject in a passive role.
15. Since scientific facts are constantly argued about, they can't be considered fully objective. .
16. Subjective knowledge is unreliable.
17. Subjective science is an oxymoron.
18. Feelings and opinions have no place in science.
19. Subjectivity and objectivity exist on opposite ends of a spectrum.
20. Subjective science allows the subject to be active rather than passive.
21. Hard sciences cannot incorporate subjectivity without becoming soft sciences.
22. Subjectivity creates abstract interpretations, not concrete facts.
23. Subjectivity by definition refers to the lack of objectivity, and vice versa.
24. Science must be objective.
25. Subjective data cannot be measured accurately.
26. Subjectivity refers to opinions and perceptions derived from immediate sensory experiences.
27. Science must be completely impartial.
28. How an object is perceived is just as important as what it actually is.
29. Objectivity can only be absolute if it is completely independent of the mind.
30. There cannot be a complete science without embracing both objectivity and subjectivity.
31. Subjectivity and objectivity cannot exist without each other.
32. Subjective things are privately within the mind while objective ones are public and visible.
33. A scientific observation by a person will unavoidably contain at least some bias and subjectivity.