METHODS OF BELIEF: A Q STUDY OF R STUDIES OF ELECTORAL CHOICE*

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ABSTRACT: Peirce's four methods of establishing belief (tenacity, authority, reason, science) are examined in the context of students' R-methodological studies of voting behavior. Employing a Q sample composed of propositions concerning electoral choice, participants provided five Q sorts to represent the hypotheses they were testing using survey data, their own views about how voters decide, their views of the textbook author's standpoint, their views of the class instructor's standpoint, and a summary of their term papers' results, to which were added the personal Q sorts by the textbook author and class instructor. The resulting factor structures, supplemented by commentary in the students' term papers, provided evidence of Peirce's four methods by which doubt is resolved. Conclusions are reached about the need for cooperation and collaboration between potential scientists and their teachers.

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In "The Fixation of Belief," originally published in 1877, Peirce (1966) identified four methods of resolving doubt and fixing belief. In the method of *tenacity*, "we cling tenaciously, not merely to believing, but to believing just what we do believe" (p. 99). In the method of *authority*, human beings are almost totally dependent on external sources for their beliefs. "If it is their highest impulse to be intellectual slaves," stated Peirce, "then slaves they ought to remain" (pp. 104-105). In the method of *reason*, logic determines "what proposition it is which is to be believed," especially when the premise of the belief is "agreeable to reason" (p. 106). And, in the method of *science*, inquiry results in beliefs that are consistent with facts; inconsistent beliefs are given up "once science has proved them false" (Thompson, 1953: 75).

In the spring of 1987, students in my introductory political behavior course participated in a study of Peirce's methods of belief. They were required to write a term paper in which an electoral-choice hypothesis was tested with R data from the 1984 presidential election. These novice social scientists also performed several Q sorts with a Q sample designed to represent different models of electoral choice. This paper reports my analysis of the Q sorts and term papers for those students who seemed to achieve their results with one of Peirce's four methods

The Term Paper Project

Since 1975, social scientists who wished to teach the method of objective science could adopt a SETUPS (Supplementary Empirical Teaching Units in Political Science) distributed by the American Political Science Association and the Inter-university Consortium for Political and Social Research (ICPSR). *Voting Behavior: The 1984 Election* (Prysby & Scavo, 1986), is the first SETUPS released in mainframe and microcomputer versions (Scavo & Prysby, 1986). Included in the microcomputer package are data from the 1984 presidential election and a simplified version of ABC, a statistical analysis software package, developed by ICPSR, that runs on an IBM or IBM-compatible personal computer. It was this pack-

age which was adopted for the aforementioned course on political behavior.

The students who enrolled in this course were required to write a term paper in which an electoral-choice hypothesis was tested. As this requirement was described in the syllabus:

> The hypothesis...should answer the following basic question: "How did voters decide for whom to vote in the 1984 presidential election?" There are many theories or models of electoral choice from which you may derive a "testable" research hypothesis. Your assignment is to [test]...at least one theory of electoral choice with the [software and] data set distributed with *Voting Behavior: The 1984 Election*.

Two kinds of instruction--formal, in-class instruction and informal, out-of-class instruction--were provided. The formal instruction, offered immediately following examinations, included a review of various "models" of electoral choice, an introduction to the ABC software package and its use on a microcomputer, and a discussion of the principles and techniques of hypothesis testing. The informal instruction, provided students who sought additional assistance, included tips on relevant studies to review and assistance with data analysis and interpretation.

This term paper project created an opportunity to study two related topics: (1) how these students achieved their results, and (2) whether they achieved their results with the method of science. Whether it was possible to study these topics was the methodological problem solved with Q methodology.

A Q Study

How citizens decide for whom to vote has been the subject of empirical study for more than 50 years, during which the social scientific community has developed, tested, and debated numerous models of electoral choice. Constructing a Q sample to represent those models was the first task of the research design. The design in Figure 1 was used to select from the academic literature statements that would

represent different aspects of several models of electoral choice.

Three voting models constitute the levels of the first main effect of the design (Hinkley, 1981). In *general-choice* models, voters require only a limited amount of low-cost information which they can obtain without much effort to make their decision. Group voting, party voting, and retrospective voting are, by this definition, general-choice models (Campbell, Gurin, & Miller, 1954; Lazarsfeld, Berelson, & Gaudet, 1944; Key, 1966). In *specific-choice* models, such as issue voting and image voting, voters require more detailed, high-cost information, secured through concerted and sustained efforts, to make their decision (Nie, Verba, & Petrocik, 1979: 157-158; Nimmo & Savage, 1976). A *mixed-choice* model is any model in which voters employ both general and specific criteria to make a decision. The Kelley-Mirer rule (Kelley & Mirer, 1974) and the *American Voter* model (Campbell, Converse, Miller, & Stokes, 1960) are two examples of mixed-choice models.

Three distinct aspects of voting models constitute the levels of the second main effect (Kelley & Mirer, 1974). *Assumptions* include the basic premises of the model. For example, the Kelley-Mirer rule assumes that "all considerations which enter into a voting decision are weighed equally" (*cd* in Figure 1). *Considerations* are simply what voters take into account. In the Kelley-Mirer rule, "attitudes toward candidates and parties and issues of policy are the principal considerations that figure in voting decision" (*ce*). A *decision rule*, such as the Kelley-Mirer rule, provides a description of how voters use considerations to make decision: "People simply weigh their preferences for the two candidates and reach their decision; or, if no candidate is preferred, they follow their party affiliation" (*cf*).

The $AB=(3)(3)=9$ combinations in Figure 1 were replicated $m=6$ times, resulting in a 54-item Q sample. Statements were taken directly from the academic literature, not from "actual" voters, because the students were asked to "derive a testable research hypothesis" from the literature. Six statements were selected to represent assumptions of general-choice models (*ad*), six statements to represent consider-

Main Effects	Levels
A. Voting Model (choice)	(a) general (b) specific (c) mixed
B. Model Aspect	(d) assumption (e) consideration (f) decision rule

Figure 1. Design of Q sample.

ations of general-choice models (*ae*), and so on, until 54 statements had been selected.[1]

The students each performed five Q sorts: (1) a sort representing the hypothesis to be tested, (2) a sort depicting how they personally make electoral choices, (3) a sort of their perception of the textbook author's approach (Nimmo, 1978), (4) a sort of their perception of the instructor's approach, and (5) a sort summarizing their papers' results. Two other Q sorts, one by Dan Nimmo and one by myself, were also included. Professor Nimmo based his sort on the framework presented in his 1978 textbook. Included in the analysis was my own Q sort of "how voters make their decision," which was, in my own mind, closer to Kelley and Mirer (1974) than to Nimmo (1978). These two sorts provided a way to check the accuracy of student perceptions, as well as an opportunity to explore the effects of these authorities.

The five sorts from each student and the two authority sorts were correlated and centroid factors were extracted.[2] Because the method by which results were achieved was the principal subject of this inquiry, the factor structure was focused judgmentally on each student's Results sort. The factor structures and the term papers were then analyzed to determine whether the results of these R studies

[1]The Q sample is available upon request.

[2]The study data were coded, correlated, and factor analyzed with P.C.Q., a microcomputer program developed by Michael Stricklin (1987).

of voting had been achieved with one of Peirce's four methods.[3]

Results

The Method of Tenacity

In the method of tenacity, "we cling tenaciously, not merely to believing, but to believing just what we do believe" (Peirce, 1966: 99). This kind of inquiry begins with a fixed belief, not doubt, and its purpose is to confirm that belief. Someone who practices this method is obviously unwilling to question a fixed belief in a serious way. If someone's hypothesis represents a fixed belief, then results could be achieved "by taking as answer to a question any we may fancy, and constantly reiterating it to ourselves, dwelling on all [evidence] which may [support] that belief, and learning to turn...from anything that might disturb it" (p. 101).

The factor structures for John Hicks and John Thomas, presented in Table 1, suggest that their results were achieved with the method of tenacity.[4] In each factor structure, only the Hypothesis sort and the Self sort load on factor A, the Results factor created by judgmental rotation. These patterns suggest that hypotheses were derived from self conceptions. If so, finding supportive evidence could have been a necessary ego-defensive function for these students.

The *sine qua non* of objective social science is control of rival hypotheses. "If we are to have any faith in the accuracy of any one hypothesis," assert Manheim and Rich (1981: 29), "we must attempt to test the major rival hypotheses to be sure that we are not being misled by our observations." Even though this subject was introduced in class, neither student followed the recommended procedure of comparing the results of simple and partial tables.

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[3]Methods not identified by Peirce are discussed in Wattier (1987).

[4]The names of students have been changed to insure confidentiality.

Table 1
Factor Structure for Method of Tenacity
(significant Q sorts shown)

John Hicks	John Thomas
Factor A	*Factor A*
Self	Self
Hypothesis	Hypothesis
Results	Results
Factor B	*Factor B*
"Nimmo"	"Wattier"
"Wattier"	Wattier
	Nimmo
Factor C	
Nimmo	*Undefined*
Wattier	"Nimmo"

"Nimmo" and "Wattier" are student perceptions.

"The economic policy of the two [candidates]," Hicks argued, "was the biggest factor in the election." Whether Hicks derived this hypothesis from the literature is not clear because no studies, either of voting behavior in general or of the 1984 election in particular, were mentioned in his paper. Although certainly a plausible hypothesis, it seems to flow from his own opinion, not from a well developed theoretical model of electoral choice. He tested his hypothesis by cross-tabulating the vote with several economic variables: Reagan's handling of the economy, the current and the future state of the economy, the present and the future financial condition of the respondent, and whether the economic condition of blacks, of the middle class, and of the elderly had changed. After reporting gammas ranging from .35 to .88, Hicks stated, "It [was] an economic election.... It is clear that economics did have a profound effect on the [election].... The main reason...Ronald Reagan defeated Walter Mondale is because he [led] the nation out of [an] economic

depression." Since no other reasons were considered, we may say that Hicks reached those conclusions by the method of tenacity.

Although Thomas's sorts and the introductory paragraphs of his paper suggest a focus on issue voting, he selected for analysis two variables, Reagan's handling of the economy and of the national budget, that are more appropriate for testing a retrospective model (Key, 1966). Unlike Hicks, Thomas did consider a rival hypothesis, personal images of Reagan as an inspiring and strong leader; however, no partial tables were analyzed. Instead, four simple two-variable tables were presented. The reported gammas for Reagan's handling of the economy and the budget (.88 and .80, respectively) were really no different than the reported gammas for inspiring and strong leadership (.76 and .80, respectively). Yet, Thomas concludes, "The reason...more people voted for Reagan in the election was that they approved of his position on certain issues and disapproved of Mondale's position on the same issues." By the method of tenacity, Thomas concludes there is evidence to support an hypothesis he really did not test.

Hicks did not control for any rival hypothesis; Thomas tried, but he did not follow the recommended procedure. Since neither student received any informal instruction, perhaps they did not know how to control rival hypotheses. Their hypotheses seemed to be fixed beliefs, not tentative hunches. Hicks ignored all non-economic variables in the data set, and Thomas ignored contradictory results reported in his own paper. Although there was instruction in the method of science, these two students followed their own paths to results.

The Method of Authority

In Peirce's second method, human beings depend on external sources for their beliefs. Having little, if any, ability for independent thought, human inquiry involves seeking as well as following the guidance of authority figures. "If it is their highest impulse to be intellectual slaves," states Peirce (1966: 104-105), "then slaves they ought to remain." Resolving doubt and fixing belief can become an ab-

solute power of state authorities, especially if an institution is created "which shall have for its object to keep correct doctrines before the attention of the people, to reiterate them perpetually, and to teach them to the young; having at the same time power to prevent contrary doctrines from being taught, advocated, or expressed" (p. 103).

Peirce's description of state authority can be applied to academia because, in that environment, authority figures--namely, textbook authors and professors--teach all kinds of "doctrines" that may be enforced through a professor's grading of the spoken and unspoken, the written and unwritten words of his students.

Table 2
Factor Structure for Method of Authority
(significant Q sorts shown)

Ann Turner	Christine Mason
Factor A	*Factor A*
Nimmo	Hypothesis
Wattier	"Nimmo"
Hypothesis	"Wattier"*
"Nimmo"	Results
"Wattier"	
Results	*Factor B*
	Nimmo
Undefined	Wattier
Self	Self
	"Wattier"(-)*

"Nimmo" and "Wattier" are student perceptions.
*Mixed loadings
(-) indicates negative significance

The factor structures for Ann Turner and Christine Mason, presented in Table 2, suggest that their results were achieved with the method of authority. In each factor structure, the Self sort does not load on the Results factor. However, in Turner's factor structure, the sorts by Nimmo and myself and

the two sorts in which she modeled her perceptions of our perspectives load on the same factor. In Mason's factor structure, on the other hand, the authority sorts load on one factor and the perceived-authority sorts on the other, indicating that her perceptions were inaccurate. These patterns suggest that hypotheses were derived from authorities or from inaccurate perceptions of those authorities, not from self conceptions. If so, these students could have sought evidence to confirm hypotheses derived from someone else's "pet" theory.

"My purpose in this paper," states Turner, "is to develop a candidate image model and determine from this model how strongly candidate image influenced the voters in 1984." Her image-voting hypothesis, which she derived from Nimmo and Savage (1976), was that "the voter formulates images of the candidates...then votes [for] the candidate with the more favorable image." She developed, on my recommendation and with my assistance, a relative candidate image index from separate measures (i.e., feeling thermometers) of the "affective" dimension of voters' images of Mondale and Reagan. Turner observed a gamma of .80 between this index and the vote, which means "there [was] a strong possibility that image voting had something to do with the [voters'] decisions in 1984."

Unlike Hicks and Thomas, Turner received a great deal of assistance with ABC's PARTITION subroutine. She was therefore able to follow the recommended procedure for controlling her rival hypothesis, party voting. However, she was unable to grasp the significance of split results in the partial tables. When describing the partial gamma of .30 observed among "strong Democrats," Turner concluded that "candidate image was not significant because voters in this partition voted on the basis of their strong...identification with the Democratic Party." The other reported partial gammas were not significantly different from the simple gamma (.80); however, the other partial table in which a "split result" could have emerged (the partial table for "strong Republicans") was not reported.

Despite a clear warning sign--a split result among the partial tables--Turner concluded, "The results show the voters in this study based their votes more

on candidate image rather than party identification in the 1984 election." When split results are observed, Babbie (1973: 292) advises the researcher to specify "the particular conditions under which the original relationship holds." In other words, Turner should have concluded, "Under certain conditions (e.g., weak partisanship), voters base their decisions more on candidate image; under other conditions (e.g., strong partisanship), they base their decisions more on party identification." Her unqualified conclusion of image voting suggests that Turner realized that inference by the method of authority.

The primary hypothesis of Mason's study was retrospective voting, a focus she attributed to Key (1966) and Fiorina (1981). These scholars relate electoral choices to voters' perceptions of the incumbent's performance in office, and Mason's selection of Reagan's job approval as her independent variable is entirely consistent with this approach. However, the following candidate-image statements define Mason's factor A:

> 24. The images people construct of the contenders is a major factor in the electorate's choice. (*be*)
>
> 47. Voters choose between candidates on the basis of how close each campaigner measures up to the voters' images of ideal officeholders. (*bf*)

This pattern suggests a subjective focus on Reagan's leadership image instead of his performance in office.[5]

Mason's factor structure reveals inaccurate perceptions of authority figures in the classroom, but her reported gamma of .94 between "Reagan's leadership image" and the vote probably convinced her to follow the "guidance" provided by Key (1966) and

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[5]While Hicks and Thomas selected economic performance variables to measure issue voting, it seems that Mason selected the presidential popularity question, a performance variable in the retrospective framework, to measure image voting.

Fiorina (1981), two authorities in the literature. As she concluded, "My work simply reinforces the basic concept of Key's work."

What defines Mason's method as a method of authority is her selection of sex as a control or test variable. She did follow the recommended procedure, without any assistance outside class, for controlling a rival hypothesis, but the sex variable (whether the respondent is male or female) is theoretically meaningless. By using this variable instead of a measure of party or issue voting, Mason failed to subject "the basic concept of Key's work" to serious challenge.

The Method of Reason

The method of reason relies on logic "to decide what proposition it is which is to be believed." If the "action of natural preferences" is left "unimpeded," contends Peirce (1966):

> ...men, conversing together and regarding matters in different lights, gradually develop beliefs in harmony with natural causes.... The most perfect example of it is to be found in the history of metaphysical philosophy. Systems of this sort have not usually rested upon any observed facts, at least not in any great degree. They have been chiefly adopted because their fundamental propositions seemed "agreeable to reason." (pp. 105-106)

Mark Rogers's interpretation of Reagan's success at the polls seems "agreeable to reason." His factor structure, displayed in Table 3, does not suggest use of either the method of tenacity (since the factor B loadings of his Results and Hypothesis sorts have opposite signs) or the method of authority (since no authority sorts load on the Results factor). Although his hypothesis was well reasoned, his major conclusions do not appear, "at least not in any great degree," to rest "upon facts" selected from *Voting Behavior: The 1984 Election*.

Rogers, a journalism major, wrote a two-part paper. In the first part he gave a brief biographical sketch that focused on Reagan's transition from Hollywood actor to political actor. He relied exclu-

Table 3
Factor Structure for Method of Reason
(significant Q sorts shown)

Mark Rogers	
Factor A	*Factor B*
Nimmo	Hypothesis
Wattier	Results(-)
Self(-)	
Undefined: "Nimmo" "Wattier"	

"Nimmo" and "Wattier" are student perceptions.
(-) indicates negative significance

sively on other journalists (e.g., Lou Cannon) for this information. The candidate's background in the dramatic arts, according to Rogers, made him "an effective communicator," which is why "people who voted for Ronald Reagan in the 1984 election perceived him as a strong leader." This "Great Communicator/Strong Leader" thesis, which news reporters have emphasized for several years, seems "agreeable to reason."

Data were analyzed in the second part of the paper, but that analysis revealed how little Rogers actually knew about the method of objective social science. His strong-leader hypothesis was derived, not from an explicit model of electoral choice, but from the rationale previously stated. However, no "simple," bivariate table, which showed the relationship between voters' perceptions of "Reagan as a strong leader" and the vote, was reported. Instead, this hypothesized relationship was presented for only one category of the region variable (Northeast) and for only one category of the age variable (65 and over). Rogers offered no interpretation of chi square and gamma values for either table. In short, Rogers gave a reasonable explanation for Reagan's election victory in Part 1 of his paper, but

his explanation was not subjected to a reasonable test in Part 2.

The Method of Science

According to Peirce (1966), "there is no reason...the results of [the first three] methods should" cause someone's "opinions to coincide with the" facts (p. 111); therefore, "it is necessary that a method should be found by which our beliefs may be caused by...something upon which our thinking has no effect" (p. 107). By the method of science, opinions could be made to coincide with the facts, and, if the same facts were observed, "the ultimate conclusion of every man [would] be the same" (p. 107). The fundamental hypothesis of this objective method is as follows:

> There are real things, whose characters are entirely independent of our opinions about them; those realities affect our senses according to regular laws, and, though our sensations are as different as our relations to the objects, yet, by taking advantage of the laws of perception, we can ascertain by reasoning how things really are, and any man, if he have sufficient experience and reason enough about it, will be led to the one true conclusion. (pp. 107-108)

Two tests suggest whether anyone has followed the method of science. The first test "is not an immediate appeal to [his] feelings and purposes, but, on the contrary, itself involves the application of the method" (p. 109). The second test is whether hypotheses are given up "once science has proved them false" (Thompson, 1953: 75).

Satisfying the second test appears to be more difficult because "the force of habit will sometimes cause a man to hold on to old beliefs, after he is in a condition to see that they have no sound basis" (Peirce, 1966: 111). Therefore, "an individual who is to make [scientific] inferences must be always ready to sacrifice his personal interests, to give up his old beliefs, as inquiry dictates" (Thompson, 1953: 75).

Table 4
Factor Structure for Method of Science
(significant Q sorts shown)

Mike Patterson	Blake Andrus
Factor A	*Factor A*
Self	Self
Nimmo	Nimmo
Wattier	Wattier
"Wattier"	"Wattier"
"Nimmo"	Hypothesis
Factor B	*Factor B*
Results	Results
Hypothesis(-)	"Nimmo"

"Nimmo" and "Wattier" are student perceptions.
(-) indicates negative significance

In their term papers, Mike Patterson and Blake Andrus followed the recommended procedure for controlling rival hypotheses.[6] Patterson tested an issue-voting hypothesis, Andrus a group-voting hypothesis, and both students controlled for party identification. Their factor structures, presented in Table 4, suggest their hypotheses ("old beliefs") were revised, if not abandoned entirely, during their inquiries. Patterson's Hypothesis sort has a significant negative loading, and his Results sort a significant positive loading on factor B. Andrus's Hypothesis and Results sorts load positively on different factors.

Unlike the other students, Patterson carefully developed the rationale both for his issue-voting hypothesis, which he attributed to Asher (1980), and

[6]Patterson, a political science major, sought and received the most outside assistance, due in part to the fact that I had served as his faculty advisor for more than a year.

for his test variable, party identification. "In order to study the importance of issue voting," argued Patterson,

> ...one must examine the candidate's views toward a specific issue with the views of the electorate. It is through comparing the closeness between the candidate's position on an issue and the voter's position that a conclusion can be reached as to how important an issue is in determining the vote of the individual citizen.

Patterson, with my assistance, constructed an issue-proximity index from three variables: respondents' self-placement, their perception of Mondale's position, and their perception of Reagan's position on a guaranteed jobs scale. Patterson observed a gamma of .40 between this index and the vote.

"In my study," remarked Patterson, "I...control for party identification to determine whether the vote was according to party identification or issues." Patterson attributed his rival hypothesis to Kessel (1972), whom he quoted:

> So far as a voting choice is concerned, it implies a difference between a first-order calculation, in which the vote is largely determined by party identification, and a second-order calculation used when party identification does not provide a guide (as with independents who do not lean toward either party) or when the net effect of satellite attitudes leads one to depart from his voting habits. (p. 465)

"Issue voting is not as [important] a factor in determining how the electorate as a whole decides as I originally perceived," concluded Patterson. Because of split results in the partial tables, he speculated, "Perhaps Kessel's first-order calculation is still a dominant means for reaching a voting decision." In his conclusion, Patterson suggested party was more important for strong partisans and issues were more important for weak partisans and independents.

In Andrus's Hypothesis sort, statement 11, an unambiguous issue-voting statement, was among the three most highly ranked statements. These "most characteristic" (+4) statements were:

> 11. When there is an issue and two positions on the issue, voters who prefer one of the two positions will vote for the candidate who holds that same position. (*bf*)
>
> 40. Many people vote and otherwise support their candidate without any admitted sense of strong attachment to either party. (*ae*)
>
> 38. The average voter will not vote for the man nor will he vote his party, except as the man or the party represents governmental policies which he himself wishes to see enacted or protected. (*bd*)

The focus of his term paper, entitled "Socio-Economic Status in the 1984 Presidential Vote," was not issue voting (statements 11 and 38). Instead, he argued, "The socio-economic status of the electorate...influenced the outcome tremendously." On my recommendation and with my assistance, he developed an index of socio-economic status by combining the education, income, and occupation variables. Andrus reported a gamma of .29 between this index and the vote. After reporting the split results of the partial tables, he concluded, "It is fairly clear that the results do not support the hypothesis. It appears that party identification is the dominant factor in determining the vote." Since statement 40 was ranked highly in Andrus's Hypothesis sort, his party-voting conclusion must have been an unexpected finding. Thus, from Q sort to data analysis and the interpretation of results, Andrus "gave up" several hypotheses, which suggests a willingness to let his opinions coincide with the facts.

Conclusions

Although I had taught this course several times, this was the first time I had required a data-based research paper. Not only would I teach "what we know"

about political behavior, but I would also try to teach these students something about "how we know what we know." Besides the opportunity for pedagogical research which it created, the term paper provided a way to introduce research methods (R method through the term paper, Q method through my study) and computer literacy to these students. They had received little, if any, instruction in behavioral methods, microcomputers, and statistics prior to this course. Completing their voting studies was, therefore, a major accomplishment.

Although they were encouraged, even exhorted, to approach this task from a social-scientific perspective, the evidence suggests that several students reached their conclusions by some other means. There was, however, evidence that two students learned a great deal about the method of objective social science. The most striking difference between these students and their peers was the extent to which they took advantage of the informal instruction. For instance, Patterson sought my assistance at each stage of his research project; he therefore received more assistance than any other student in the course. Andrus also received a great deal of outside assistance, though not as much as Patterson. Finally, unlike their peers, they both followed the recommended procedure for controlling rival hypotheses.

Social scientific methods can be taught undergraduate students, particularly when an effective "apprenticeship" system is developed. When this kind of relationship is not established between student and teacher, for whatever reasons, beliefs may be fixed, even in an institution of higher education, by other methods--tenacity, authority, and reason. It was Peirce's assumption that the method of science provided the principal means by which beliefs could be tested against facts and, through a program of continuous and rigorous testing, corrected--hence, the presumption that science could be, at least in principle, self correcting. If, for this reason, we wish to advance the teaching of scientific approaches, we will have to develop more opportunities and incentives for cooperation and collaboration between "potential" scientists, like Mike Patterson, and their teachers.

References

Asher, H. (1980) *Presidential elections and American politics*. Homewood, IL: Dorsey.

Babbie, E.R. (1973) *Survey research methods*. Belmont, CA: Wadsworth.

Campbell, A., P.E. Converse, W.E. Miller & D.E. Stokes (1960) *The American voter*. New York: Wiley.

Campbell, A., G. Gurin & W.E. Miller (1954) *The voter decides*. Evanston, IL: Row, Peterson.

Fiorina, M.P. (1981) *Retrospective voting in American national elections*. New Haven, CT: Yale University Press.

Hinkley, B. (1981) *Congressional elections*. Washington, DC: Congressional Quarterly Press.

Kelley, S., Jr. & T.W. Mirer (1974) The simple act of voting. *American Political Science Review, 68,* 572-591.

Kessel, J. (1972) The issues in issue voting. *American Political Science Review, 66,* 459-465.

Key, V.O., Jr. (1966) *The responsible electorate*. New York: Vintage.

Lazarsfeld, P.F., B. Berelson & H. Gaudet (1944) *The people's choice* (3rd ed.). New York: Columbia University Press.

Manheim, J.B. & R.C. Rich (1981) *Empirical political analysis*. Englewood Cliffs, NJ: Prentice-Hall.

Nie, N.H., S. Verba & J.R. Petrocik (1979) *The changing American voter* (enl. ed.). Cambridge, MA: Harvard University Press.

Nimmo, D.D. (1978) *Political communication and public opinion in America*. Santa Monica, CA: Goodyear.

Nimmo, D. & R.L. Savage (1976) *Candidates and their images*. Pacific Palisades, CA: Goodyear.

Peirce, C.S. (1966) The fixation of belief. In *Selected writings (Values in a universe of chance)* (Ed. P.P. Wiener). New York: Dover. (Original work published 1877)

Prysby, C. & C. Scavo (1986) *Voting behavior: The 1984 election*. Washington, DC: American Political Science Association.

Scavo, C. & C. Prysby (1986) Adapting SETUPS for microcomputer use. *Social Science Microcomputer Review, 4,* 365-367.

Stricklin, M. (1987) Some thoughts on completing computer programs for Q technique. *Operant Subjectivity, 10,* 136-139.

Thompson, M. (1953) *The pragmatic philosophy of C.S. Peirce.* Chicago: University of Chicago Press.

Wattier, M.J. (1987, November) *Method of belief: A Q study of R studies of electoral choice.* Institute for the Scientific Study of Subjectivity, University of Missouri-Columbia.