

Toward the Development of an Instrument for Measuring a Christian Creationist Worldview

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Abstract

The research reported in this article addresses the fundamental issue of measurement of the construct worldview. Specifically the issue of how to measure a person's worldview as related to the creation/evolution controversy is considered. Data were collected via a LIKERT-scale instrument constructed for the specific purpose of measuring a "Young Earth Christian Creationist Worldview." The analysis of data revealed some weaknesses in the design and individual questions. Reliability and validity of the instrument was explored. The preliminary investigation reveals that the construct under consideration most likely can be measured successfully.

Keywords

measurement, worldview, worldview development, validity, reliability, scientific creationism, biblical creationism, evolutionary tenets, creationist tenets

INTRODUCTION

Christians are involved in a war against a well-thought out comprehensive worldview, commonly called evolutionary Darwinism. To win this war, the "Young Earth Christian Creationist Worldview" must also be well thought out. This particular worldview should be presented in a manner which is usable and understandable for secondary level science teachers and their students. One step in the process of making the creationist worldview usable for the secondary level would be the development of an instrument (test) that would measure the basic elements of a creationist worldview. To our knowledge, this task has not been attempted. This paper describes an ongoing attempt to define and measure a creationist worldview.

REVIEW OF LITERATURE

The purpose of the review of literature is fourfold. First, literature related to development of a worldview in general and more specifically a creationist worldview is explored. Second, literature related to measurement of complex psychological constructs such as a worldview is reviewed. Third, a synthesis of the reviewed literature serves to present the need for developing the instrument. Fourth, the process of instrument development is explored.

SCIENCE AND WORLDVIEW FORMATION

When exploring the sciences and their relationship to worldview formation, one finds two basic alternatives. For example, D.M.S. Watson (1), a Christian and creationist, stated that:

...the theory of evolution itself, a theory universally accepted not because it can be proven by logically coherent evidence to be true, but because the only alternative, special creation, is clearly incredible (p.233).

Douglas Futyma (2), an evolutionary biologist echoes a similar view:

Creation and evolution, between them, exhaust the possible explanations for the origin of living things. Organisms either appeared on the earth fully developed or they did not. If they did not they must have developed from preexisting species by some process of modification. If they did appear in fully formed state, they must have been created by some omnipotent intelligence... (p. 197).

Futyma and Watson bring the issue into clear focus; it is one of belief, either in evolution (as Futyma advocates) or in special creation. The evolutionary view is based on a false reality and false conclusions which attempt to reduce any dependence on an objective reality. This type of reasoning is due to a shift in worldviews. Purves and Orians (3) show the connection:

Biology (and all other major disciplines of Western thought) began a major change in paradigm a little over a century ago with the general acceptance of Darwin's theory of evolution by natural selection. The change over has taken a long time because it required abandoning many components of a different worldview. The pre-Darwinian world was thought to be a young one in which living organisms had been created in essentially their current forms. The Darwinian world is viewed as an ancient one ... in which he would not recognize former living organisms of the future if we were transported forward in time, nor organisms of the past if we were transported back in time. Acceptance of this paradigm involves not only the acceptance of the process of natural selection, it also involves accepting the view that the living world is constantly evolving, but without any future "goals" (p. 19).

Purves, Orians, and Futyma, are openly stating that the decision to accept the evolutionary worldview is based on a choice. By rejecting the creationist view of God as Creator, they accept natural processes, time, and chance (evolution) as "god." By advocating this blanket acceptance of evolutionary theory, the boundaries and capabilities of science in explanatory terms are extended to a new realm and new view of not only science, but also the knowledge which comprises the science. Science has and is still moving away from objectivity and into the realms of metaphysics and belief. The reason for such a leap of faith is based solely on the rejection of the "incredible" alternative view known as creationism.

WORLDVIEW DEVELOPMENT AND EPISTEMOLOGICAL CONSIDERATIONS

A fundamental problem in most secondary science classrooms is that the teaching is aimed at the acquisition of knowledge at the memorization level. Very little is done in the realm of interpreting the data and development of thinking skills. This is a serious problem because science is not a set of facts to be memorized, but rather a dynamic volume of concepts and principles begging to be interpreted and integrated into one's worldview. Because of this malleable state of scientific knowledge, students should be exposed to the fact that the knowledge in science is in three basic forms. Certain knowledge is tentative, certain knowledge is unchanging, and certain knowledge is yet to be discovered (4, p. 37). With this view and understanding of scientific knowledge, it becomes easier for one to understand why the measurement of a student's worldview is imperative.

A student's beliefs (worldview) affect his or her understanding about scientific knowledge and thus about how science works. At a more fundamental level, the student's belief system affects his or her interest in science. Because these and other factors are present within the student before entering the science classroom, it is

important for the teacher to be able to discern the student's worldview (creationism/evolutionism). Thus, the need for being able to measure a student's worldview as it relates to creation/evolution is established.

EDUCATIONAL AND CULTURAL FACTORS AND FORCES CONTRIBUTING TO WORLDVIEW DEVELOPMENT

Forces and factors which affect the development of a personal worldview are many and varied. Particularly in secondary science where textbooks, teachers, and curricular materials play a role in worldview presentation and development. For example, Yager (5) reported that "over 90% of all science teachers use a textbook 95% of the time; hence the textbooks become the course outline, the framework, the parameters for the students' experience, testing, and a worldview of science" (p. 578). Cobern (6) connects the teacher and textbook to worldview development by stating "beliefs about nature are interesting because the natural world is the domain in which science operates. Science teachers expect that through their instructional efforts student beliefs about nature will be informed by the concepts and processes of science. Moreover, they tacitly assume that student beliefs about nature conform to the implicit assumptions of both textbook and teacher" (p. 935).

Interestingly, Cobern reports science has little influence on the student's beliefs, yet he continues to emphasize the "concepts and processes of science" and teacher instructional efforts as the driving forces for student beliefs. This line of reasoning may lead one to ask, "Does science possess the capabilities of assisting an individual in developing a useful and truthful worldview?" This question was addressed by deKard (7), who asserted that formation of a modern worldview necessitates more than just knowledge and understanding of the scientific method (science in general) and that a source of knowledge outside of science must be considered. Even though Darwinian evolution is the prevailing worldview, our basic presupposition is that only a "Christian Creationist" framework will lead to the formation of a truthful, and therefore fruitful, worldview (p. 257).

DIMENSIONALITY OF THE CONSTRUCT WORLDVIEW

Luker (8) and Emerson (9) reported that the construct worldview is a multidimensional one of considerable complexity and that use of single-measure variables are highly prone to reliability errors. Tourangeau et. al, (10) suggested that such concepts are best operationalized using scales. The preliminary hypothesis was that the construct under consideration was two-dimensional. The two dimensions were believed to be the scientific creationism aspects (based on the tenets of scientific creationism) and the Biblical creationism aspects (based on the tenets of Biblical creationism). Although this is not a major consideration of this paper, there is an ongoing attempt to understand these two dimensions.

RELATED INSTRUMENTS

To our knowledge the PEERS Test from the Nehemiah Institute (11) and the Religious World Views Scale RWV (12) are the only instruments available for measuring the general construct known as worldview. The stated purpose of the PEERS Test is to measure the degree to which a person has or holds a biblical Christian worldview in the areas of politics, economics, education, religion, and social issues. The publisher of the test provides the disclaimer, however, that the PEERS Test ". . . is neither perfect nor a final measurement of Christian education," and says it is not the final authority on biblical truth (p. 4). In essence, then, the PEERS Test deals with values, attitudes, and beliefs. The opposing worldviews which are contrasted are liberal versus conservative. The test consists of seventy items. Fourteen items are presented for each of the five categories which are considered to make up the construct worldview. These categories are Politics, Economics, Education, Religion, and Social issues (PEERS). A review of the test shows it does not address key issues related to the opposing worldviews of creation and evolution.

McLean (12) developed a scale for measuring religious world views. The scale (RWV) was developed with the intent of distinguishing between a continuum of views ranging from naturalistic to Christian Orthodoxy. McLean provided a method for scoring along with a twenty-five item scale. No evidence of validity or reliability was given. Jennings (13) studied 364 junior college students using several scales. One was the Religious World View Scale RWV. He found a split-half reliability of .87 and Spearman Brown of .93. He calculated a correlation for each of the twenty-five items on the scale. These ranged from .09 to .78 with all but two of the items having item correlation of .40 or higher.

REVIEW OF LITERATURE SUMMARY

Modern day science presents an evolutionary based perspective and worldview regarding issues related to origins. This perspective must be replaced if a creationist worldview is to be credible. It should be understood that an unbiased appraisal of origins issues deals with various issues which are beyond the scope of scientific investigation. In an effort to combat the credibility and scope problem, the creationist should understand and present a unified creationist worldview. Although many are hard at work, the creationist community in general has not presented such a unified view. One step in the process of moving toward this unified view is the development of an instrument for measuring the construct of a creationist worldview. The review of literature also assists in laying an appropriate developmental and methodological framework. These aspects are discussed in more detail in appropriate sections of this paper.

METHODOLOGY

Definitions

The reader will find definitions of key terms in this section. Some operational definitions are used here. An operational definition ascribes meaning to a construct by specifying the operations that must be performed in order to measure or manipulate the construct. These are italicized.

Construct - An abstraction at a higher level than a concept used to explain, interpret, and summarize observations and to form part of a conceptual content of a theory.

The Tenets of Creationism - For the purposes of this study the **ICR tenets of Biblical and Scientific Creationism** are considered to represent and encompass the basics necessary for understanding scientific and biblical creationism (14). If this assumption is correct, the tenets are a reasonable benchmark for the construction of an operational definition of a "Young Earth Christian Creationist Worldview" and may serve as the contextual base for developing an instrument for measuring this worldview.

Field Testing Stage - For this paper, the field testing stage is defined as the two years of testing for determining the dimensionality, validity, and reliability of the instrument.

Worldview - A worldview is an internal belief system about the real world - what it is, why it is, and how it operates. Within a person's mind, it defines the limits of what is possible and impossible (15, p. 596).

Instrument - Our instrument is a LIKERT-scale questionnaire. A LIKERT-scale is a measurement scale consisting of a series of statements followed by five response categories, typically ranging from strongly agree to strongly disagree. An evaluation of the total score is used in determining an individual's possession of a creationist or an evolutionary worldview.

Designing the Likert Scale

A stepwise procedure was used to develop the LIKERT-scale for measuring the construct Creationist Worldview. The steps are outlined below.

Step 1-- Define the construct under consideration and develop test items. Potential test items were developed based on the ICR tenets of biblical and scientific creationism. These tenets are considered to represent the domain of the construct "Young Earth Christian Creationist Worldview." Multiple items were constructed from the tenets. An attempt was made to represent all eighteen tenets. Each tenet was represented in both a positive and a negative sense to make the questions fit the LIKERT-scale format. The questions were written using the Strongly Agree to Strongly Disagree format of the LIKERT-scale.

After the first set of statements were constructed, a review process was conducted. Five professionals at ICR with training and knowledge of the creation/evolution. controversy reviewed the statements for accuracy and clarity. Their suggestions were considered, and changes were made as deemed appropriate. On August 16, 1995, seven people completed the instrument in a preliminary field test. Results from this preliminary field test were reviewed, and appropriate changes were made. Some items were found to be confusing and were dropped from the pool of statements.

Step 2 -- Verify the Dimensionality of the test - During the next two year phase of the research the dimensionality of the test was under consideration. The preliminary hypothesis was that the construct under consideration was two-dimensional. The two dimensions were believed to be the scientific creationism aspects (based on the tenets of scientific creationism) and the Biblical creationism aspects (based on the tenets of Biblical creationism).

Description of the Field Test Population and Student Discovery Days Program

The field test population consisted of home schooled students and their parents or guardians and a group of 6th through 12th grade students from a local Christian school. The students were junior high through secondary school age. These groups (two each month) came to ICR for a program in basic creationism during 1995-96, starting in September of 1995 and ending in May of 1996. This population consisted of two groups. One group came to ICR on the second Tuesday of the month and the other came on the second Thursday of the month. The starting N for the Tuesday group was 36. The starting number for the Thursday group was 38. The ending numbers for the two groups were 44 (22 in each). The reason for the drop off in numbers from the beginning to the end of the program was twofold. First, the group from the Christian school dropped out partway through the year. Second there were some who drove a considerable distance and were unable to attend the last session when the posttest was administered. The second-year started in September of 1996 and ended in May of 1997. Both groups were pre tested using the instrument and post tested with the same instrument. The second-year data were coded in an effort to be able to link individual tests and conduct different statistical procedures than were done on the first-year of data. The second-year data was not considered because of publication deadlines.

The program, Student Discovery Days, consists of eight monthly three hour presentations. Among the teaching methods used were hands-on experiments, demonstrations, skits, lecture, presentations, and videos. The purpose of the program is to introduce the students to the basics regarding creation and evolution issues. The presentations emphasize an ICR young Earth Creationist perspective. Each of the monthly presentations are named and are termed modules. These modules are being field tested for the purposes of development of a curriculum. The titles for the modules are: 1) Developing a Christian, Creationist Worldview, 2) The Origin of the Universe and the Age of the Earth, 3) First and Second Laws of Thermodynamics, 4) The Origin of Life, 5) Dinosaur Data Book: Truth Only Please!, 6) The Genesis Flood, 7) The Fossil Record, 8) A Creationist Based Field Trip.

The students participate in the eighth module after taking the posttest and it is not considered at this time as part of the document being prepared for the curriculum. deckard (16) outlines much of the content purpose for module number eight.

Mortality is an issue for the first-year data. This issue limited the use of the results from the first-year. Another limitation is the affect of pre testing. The pre testing effect is concerned with the issue that subjects may have learned from the pretest. Also, with a test measuring beliefs, taking the pretest may prompt subjects to subsequently think about the questions and issues raised in the pretest and to give different responses on the posttest.

A third issue regarding the first-year data was that the tests were not coded in a manner that allowed an individual pretest to be matched with an individual posttest. This limitation resulted in the first-year data being lumped into two categories (pretest and posttest). This limitation was corrected in the design for the second-year of testing. A fourth concern is one of maturation. Beliefs can change with passage of time and are also influenced by developmental cognitive and social aspects (17).

An important issue for the first-year data analysis was the makeup of the population. There was very little variation within the sample in regards to several key variables. For example the population was mostly white middle class conservative Christians, therefore it is assumed that most would have a basic understanding of the ICR position. This assumption is based on the fact that the population came to ICR on their own volition with a prior knowledge of the ICR teachings.

STATISTICAL STUDY OF EXPERIMENTAL DATA AND RELIABILITY ANALYSIS OF THE INSTRUMENT

The main objective of the study is to develop a reliable instrument for measuring a Christian Creationist Worldview. This goal presumes that a Christian Creationist Worldview and a competing doctrine, known as evolutionary Darwinism, have a certain spread in a population. Each of the constructs, "Creationism" and "Evolutionism," is believed to have a manifestation in a variety of related items. These items can be treated as **observable (indicator)** variables as opposed to the worldview constructs which are typically **latent (unobservable)** variables (e.g., racial prejudice, or being liberal or conservative). An adequate statistical model useful in this study can be identified as one of so called latent class models or latent structure models. The latent class analysis, or more general, latent structure analysis, is a powerful branch of statistical modeling methodology for social and behavioral sciences (17, 18, 19, 20, 21, 22, 23, 24).

According to Clogg (22), latent structure models may be represented in many ways. A major consideration is the choice of an appropriate scale for observed variables Y_1, \dots, Y_m and for the latent variable X . To design a questionnaire type instrument, we are especially interested in the categorical-ordinal scale for observed variables. One example of such a scale is a LIKERT-scale with five scale values (strongly agree, agree, neutral, disagree, strongly disagree).

Validity and Reliability of the Instrument

This statistical study is intended, particularly, to answer the following questions: what is the validity of the instrument and how reliable is it. The valid instrument must measure precisely what it is intended to measure. The **reliable** instrument must be stable (rather than sensitive) to possible modifications in the content of observed variables; it behaves similarly under a variety of circumstances. To analyze the overall quality of our instrument, we need to study several aspects of its design as listed: 1) What is the validity of the scoring procedure presumed for the Instrument?, and 2) What is the quality of observed variables in the instrument from a statistical point of view?

DISCUSSION OF OBTAINED RESULTS

Numerical calculations and graphing outputs for this statistical study were performed on a professional version of MATLAB 4.2 for Windows (The MathWorks, Inc.) based on script files (computer programs) created by the author, and statistical software SPSS/PC+ and StatMost for Windows.

Analysis of Individual Scores: Validity.

The validity was studied by analyzing individual score descriptive statistics for each observation in the two samples (Pretest and Posttest). The overall statistics for individual score analysis shows that there is no significant difference between the Pre- and Posttest results. This lack of change may reflect the fact that these two samples were taken from the same (homogeneous) population of people belonging to a Creationist Worldview group. Validity of the instrument may be finally established if we make sampling from a broader population. Then it will be possible to estimate probability distributions of X given H_0 or H_1 and formulate a criterion of classification, that is a rule of decision making in testing hypothesis H_0 ("Creation "Creationist" against H_1 ("Evolutionist").

Reliability of the scale based on individual scores.

To evaluate reliability of the instrument based on individual scores, we apply one of the most commonly used reliability coefficients, Cronbach's alpha (20). The analysis of individual items is presented in Table one. This shows how different items affect the reliability of the scale. This analysis can be performed by removing each of the items from the scale and calculating Cronbach's alpha (20) on the rest of items. We can see that elimination of any of items from the scale causes little change, which means that all items are approximately equally valuable.

Table 1. RELIABILITY ANALYSIS - SCALE (ALPHA)					
PRE - TEST 95-96			POST TEST 95-96		
<u>Item - Total Statistics</u>					
	Alpha if Item Deleted	Alpha if Item Deleted		Alpha if Item Deleted	Alpha if Item Deleted
VAR1	.9086	.8907	VAR26	.9024	.8847
VAR2	.9022	.8881	VAR27	.9009	.8882
VAR3	.9030	.8883	VAR28	.9029	.8837
VAR4	.9013	.8890	VAR29	.8993	.8877
VAR5	.9008	.8870	VAR30	.9049	.8880
VAR6	.9014	.8830	VAR31	.9002	.8841

VAR7	.8988	.8878	VAR32	.9003	.8856
VAR8	.8984	.8862	VAR33	.9109	.8884
VAR9	.8990	.8928	VAR34	.9009	.8800
VAR10	.9019	.8893	VAR35	.9108	.8882
VAR11	.8985	.8852	VAR36	.9030	.8836
VAR12	.8996	.8871	VAR37	.9082	.8890
VAR13	.9007	.8875	VAR38	.8999	.8885
VAR14	.8982	.8869	VAR39	.8995	.8872
VAR15	.9005	.8858	VAR40	.8994	.8896
VAR16	.8994	.8898	VAR41	.8988	.8890
VAR17	.9010	.8896	VAR42	.9001	.8837
VAR18	.9005	.8850	VAR43	.9002	.8840
VAR19	.9016	.8881	VAR44	.9030	.8847
VAR20	.9021	.8849	VAR45	.9021	.8861
VAR21	.9005	.8880	VAR46	.8986	.8886
VAR22	.8993	.8874	VAR47	.9076	.8879
VAR23	.8990	.8879	VAR48	.9067	.8866
VAR24	.8992	.8883	VAR49	.9015	.8814
VAR25	.8996	.8878			
Reliability Coefficients 49 items					
Alpha = 0.9035			Alpha = 0.8903		
Standardized item alpha = 0.9133			Standardized item alpha = 0.9165		

Analysis of Items

For comparative study purposes items with similar themes from our instrument were compared to items with similar themes on the RWV scale. Below are items which were judged to have similar themes. Our item(s) is listed first and in bold type. The RWV items are listed second. Inter-item correlation values are given for the RWV items (13). The items are numbered according to the number assigned to them in the original scales.

2. An eternal Creator supernaturally made the physical universe.

21. I believe in God the Father Almighty, maker of heaven and earth. (.74)

Both items have a similar theme "God as Creator". Our scale has a specific focus on creationism thus our choice of the word "creator" is appropriate and makes our item more specific to the task. The r value for the RWV item is high thus providing some sense of the quality of the item.

12. The competent Creator made the universe for an ultimate purpose.

9. The chief end of man is to glorify God and enjoy Him forever (.77).

Both items are aimed at measuring belief regarding purpose. Our item appears to be appropriately worded because of the emphasis on creationism. The r value for the RWV items is high and an indicator of discriminatory value of the item.

22. Genesis chapters one through eleven lack historical truth.

4. The biblical story of creation is probably based on one of the early Babylonian myths. (.66)

The theme is related to the historicity of scripture. Our item seems to be more direct and to the point. The RWV item uses the term "story" which carries to many possible meanings. The r value is reasonably high.

25. There is not a real place of permanent suffering which is known as hell.

26. Those who refuse to put their trust in Jesus Christ will spend eternity in hell.

1. I believe Hell is a form of existence in a future life (.61).

The theme deals with the issue of existence of a place called hell and the issue of the purpose of this place (item 26). Our items seem to be more precisely written and the use of the two items seems important in the attempt to distinguish between the two themes. These are the existence of the physical place hell and the fact that the creator is the final arbitrator regarding the occupants of hell. The RWV items only presumes the existence of hell.

This brief analysis gives the author some confidence that the construction of the compared items was completed with some level of competence. Further study is needed to validate this conclusion.

Correlation Analysis

When an individual item average score is correlated with the total mean score using Spearman rho on the pretest and posttest data, the item should correlate at .25 or above with the total scale score (20, p. 236). Items that have very low correlation or negative correlation with the total score should be eliminated because they are not measuring the same thing as the total scale and hence are not contributing to the measurement of the attitude." From the statistical analysis and the process of inspection, the following items were identified as potential problems: 1, 9, 16, 30, 34, 35, 37, 47, and 48. A brief discussion regarding some of these items follows.

Item: 1. Space, time, matter, and energy have always existed.

Analysis: This item may be a problem for the younger students (for this particular study the 7th and 8th grade

population) because it contains a list of four formal operational concepts (25). The introduction of multiple concepts within a single item may not be appropriate. This item needs further study in an attempt to establish the possibility of cognitive mismatch of the item with the sample population.

Item: 9. Sedimentary rock layers and fossils were deposited by a worldwide flood.

Analysis: This item is conceptually a problem because it may be that all sedimentary rocks and all fossils are not flood deposits. The item as written may back the respondent into a corner. Use of the phrase "great quantities of" at the beginning of the item might improve its discrimination ability. We also have the issue of the item being double-barrelled, bringing up the question of what it is testing?

Item: 16. A triune God--Father, Son, and Holy Spirit--all participated in the work of creation.

Analysis: There appear to be several issues with this item. One is that this item maybe measuring more of a theological attitude or issue rather than a creationist one. Second, this item may be too difficult for the younger respondents (7th grader?)s because of its complexity (34). It is also possible that this question could be viewed as conflicting with item 49. Further study is needed.

Item: 37. Matter and energy cannot be created or destroyed.

Analysis: This item is poorly constructed and is ambiguous, and both creationists and evolutionists should strongly agree.

Item: 47. For a geological event to occur in the past, it must be observable in the present.

Analysis: This item is not user-friendly and is not well worded.

Item: 48. In Geology the present is the key to the past.

Analysis: The item is not clearly written. What is meant by the "present"? More explanation may help respondents. This item has a poor and negative correlation on the pretest ($r = -0.1347$) and the posttest ($r = -0.1265$).

The above analysis of items indicates that these questions must either be rewritten or eliminated. Further study of the data will be required for deciding the fate of these items.

RECOMMENDATIONS AND CONCLUSIONS

It is recommended that a more diverse population be tested. This key step in the process of the instrument development is being explored. Populations from a Christian-school setting and a public-school setting are under consideration. It is recommended that the test be compared to the PEERS test for validity purposes. The validity of the instrument needs to be established. Comparison to the PEERS test will serve as a part of the validation process.

It is recommended that individual differences regarding the construct worldview be studied. An individual's worldview may be dependent upon factors which are yet to be identified. Much exploration in this area lies ahead and should provide much ground work for fruitful research endeavors.

It is recommended that other methods for measuring the construct worldview be considered and developed for comparative purposes. The great importance of the construct known as a Young Earth Creationist Worldview demands more attention from the Christian academic community.

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