The Image of the Scientist Through the Eyes of Navajo Children

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The study describes data collected from the Draw-a-Scientist Test (DAST) that was administered to 94 Navajo elementary students in grades 4-6 to determine their perceptions toward science and scientists. The DAST is a useful assessment instrument for teachers interested in addressing stereotypes students may hold related to science. A commonly used checklist (DAST-C) was used to score student drawings. In looking only at the numerical scores, it would appear that Navajo students generally have a much less stereotypical view of scientists than other populations reported from previous studies. However, a low score on the checklist may actually indicate that a student has no conception whatsoever of what a scientist is. Interviews with individual students were also conducted to clarify items depicted in the drawings. The Navajo student drawings provided additional information unique to this sample that offers valuable insight into students' perceptions, beliefs, and values. This information may be useful to science educators who are interested in developing a culturally relevant science curriculum for Navajo students.

The unique perspectives and different ways of knowing held by marginalized groups have the potential to greatly enhance science for everyone, yet these ideas still remain outside the mainstream of science. Until the participation of underrepresented groups in science increases, these voices will continue to remain unheard. The lack of minority participation in science and science related careers is a continuing and growing concern within the science education community.

Although the number of minorities entering the fields of industry and business has increased greatly over the past thirty years, gains in the fields of science and technology continue to remain small (Barba, 1998). As the minority population of the nation increases, minority participation in science seems to fall farther behind despite the removal of barriers that previously prevented these students from aspiring to and achieving careers in science (Barba, 1998). The National Science Education Standards emphasize that science is for all students.

Unfortunately, there remains much work to be done in achieving this goal for minority students in general, and even more so for American Indians/Alaska Natives in particular.

Of all minority populations, American Indians/Alaska Natives are least likely to enter scientific careers (Indian Nations at Risk Task Force, 1991) and are underrepresented in careers that require high-level scientific knowledge (Lawrenz & McCreath, 1988; National Science Foundation, 1996; Nelson-Barber & Estrin, 1995). Many causal factors have been suggested to explain the lack of American Indian/Alaska Native participation in science careers. An emerging body of research seems to suggest that perhaps the way science is portrayed in schools is an additional hindrance to Native students' success in science (Allen, 1995; Cahape & Howley, 1992; Schik, Arewa, Thomson, & White, 1995). A study by Haukoos and LeBeau (1992) suggests that teachers of American Indian students should use student-centered, inquiry-based methods of teaching science and include the integration of science and culture as a necessary part of instruction. It is believed that the development of a school curriculum that reflects students' cultural values and addresses real world concerns will make science more relevant to American Indian/Alaska Native students.

In seeking to encourage participation in science from all populations, of interest to science educators for many years have been the perceptions that students hold toward science and scientists. The Draw-a-Scientist Test (DAST) attributed to Chambers (1983) is a commonly used method to assess students' images of scientists and has been used with people of all ages, from elementary school students to adults. The purpose of the test is to score students' drawings for stereotypical images that may influence students' perceptions of science in a negative way (MacCorquodale, 1984; Rosenthal, 1993; Ross, 1993). The DAST is especially useful with elementary children who may not be able to respond to written instruments.

In the early versions of the test, students were simply asked to draw a scientist. More recent versions of the test add an additional component to the directions in order to get a clearer picture of students' perceptions: students are asked to draw a scientist *at work*. Follow-up interviews in which students are asked to tell about their drawings reveal more detailed information regarding what the students were intending to portray in their drawings.

The test is not only simple to administer but also easy to score. A scoring checklist, the DAST-C, developed by Finson, Beaver, and Crammond (1995) improves the objectivity of scoring and the interrater reliability of certain stereotypical characteristics (Appendix). The DAST-C consists of 14 common stereotypes that have been identified from previous research. When one of the items is present in a drawing, the scorer simply checks that item. The total numbers of checks are summed to provide an overall score. The lower the total score, the less stereotypical view a student holds toward scientists. While a student's total score on the test is of some interest, it is the individual items that can provide useful information for educators who are interested in improving

science instruction. For example, one of the items relates to gender. If the majority of students only portray scientists as male, this suggests to the teacher that he or she should emphasize that females as well as males can be and are scientists. Other common stereotypes that appear could be similarly addressed by the teacher in ways that expand student perceptions about who can be a scientist and what scientists do.

Although the exact impact of students' stereotypical perceptions of scientists in shaping career aspirations is not known, it is believed that those students who have negative perceptions of science and scientists are less likely to choose science as a future career (Mason, Kahle, & Gardner, 1989). It is especially disturbing that despite efforts within science education for several decades to present science in a much more inclusive way, change in student attitudes has been very slow in coming. Even though current science textbooks make a concerted effort to depict scientists as females and ethnic minorities, students most often depict scientists as white males. Previous studies have reported that most students share common stereotypes regarding scientists (Finson, Beaver & Crammond, 1995; Fort & Varney, 1989; Huber & Burton, 1995; Krause, 1997; Schibeci & Sorenson, 1983).

Barman (1999) reported one of the most recent studies of the DAST with students in grades K-8 in which 154 classroom teachers collected data from 1,504 students. The sample represented equal numbers of male and female students and represented seven states in the eastern United States, two western states, three southwestern states, and nine midwestern states. The study did not report results according to ethnicity. Results from this most recent study reveal many of the common stereotypes present in student drawings as reported in earlier studies. Most students drew scientists who were Caucasian, male, and working indoors in a traditional lab setting.

Much data have been collected and reported on the DAST but little data have been collected from American Indian/Alaska Native students. Of interest in this study are questions regarding the stereotypical perceptions of scientists among a specific group of American Indian elementary school students. Specifically, do these students who comprise the least represented group in science careers have stereotypical views of scientists similar to other elementary students? Or, do they hold differing perceptions that might shed some light on their lack of participation in science?

Method

Participants

The DAST was administered to 94 Navajo elementary school students in grades 4-6, all of whom attended a public school in southern Utah. This particular school was selected because of its large Navajo population (99%). Some students live in the small community near the school, but many live in remote areas and travel long distances to school. Although isolated geographically, these students, like most children their age across the United States, are exposed to images of

scientists through the popular media (Gerbner, 1987). Almost all students watch television regularly and enjoy talking about the latest VCR movies they have seen. Because this area of Utah is quite remote, students' exposure to some kinds of science enrichment activities is limited when compared to students who live near urban areas. The nearest city with a science museum or a planetarium is hours away. While other schools often bring in science specialists to work with students, the school's remote location also limits these contacts. On the other hand, these students have a distinct advantage when it comes to opportunities to explore their natural surroundings. They can see the stars at night, unhindered by light pollution experienced in urban areas; animals and plants can be studied in their natural habitats; and the area is a geologist's paradise.

The fourth, fifth, and sixth graders in this study had different teachers for each of the core subjects and moved to a different class every 50 minutes. The same teacher, an Anglo male with over 15 years of teaching experience, was the only science teacher in the school and was responsible for teaching science to all students in grades 4-6. In grades K-3, students are in self-contained classes, and like many elementary schools across the country, literacy instruction often takes precedence over instruction in science. Student exposure to formal science instruction is limited until it is addressed in grade 4. Before this time, students' ideas about science and scientists are mainly shaped by factors other than what they experience in school. An elementary school setting was selected because it is at this level that attitudes toward science and scientists are first formed, even though it is not until high school and college that the outcomes of these attitudes become most evident (Barba, 1998).

Procedure

The DAST was administered in a group format by the primary investigator who had visited the classroom three weeks previously as a limited participant observer—not in any type of instructional role. On the day the DAST was to be administered, the classroom teacher was ill and the researcher was asked to serve as the substitute teacher. Because of the remoteness of the site, it is difficult to get substitute teachers on short notice. Since the DAST was already scheduled to be administered, this seemed like a reasonable solution to the principal.

Students were each given a piece of white paper and provided with crayons, colored pencils, and markers in a variety of colors that could be used to depict different skin colors if the students chose to do so. In standardized fashion, children were instructed, "Draw a picture of a scientist at work." Each student spent the entire 50-minute class period carefully completing his or her drawing. Some students inquired as to what they should draw; and they were assured that whatever they drew in response to this assignment would be fine. Based on previous experience with administering this test in other school settings, this was a common question.

Over the following weeks students were interviewed and asked to describe the details of their picture of the scientist. Student comments were recorded on

paper to use later in scoring the drawings. Interviews began by simply asking students to tell about their pictures. The DAST-C was used as a guide during the interviews, and items that would not be automatically evident to the scorer just by looking at the drawings were asked about specifically during the interviews. For example, a common ambiguous feature of the drawings was the age of the scientist. To clarify this item, students were asked if the scientist was as old as they were, as old as their parents were, or as old as their grandparents or other elders that they knew. This seemed to make it easier for students to explain their intentions in this particular category.

Using the DAST-C (Finson et al., 1995) the drawings were scored initially by the primary investigator and then by a Navajo woman who was a member of the school staff. Notes collected from the interviews with students resulted in 100% agreement in the scoring of the drawings using the checklist indicators.

Results

In discussing the findings of this study, data from the Navajo student DAST drawings were compared to data on the DAST compiled by Barman (1999). Barman's data were collected in actual classroom settings by elementary school teachers in 23 states and the District of Columbia and represented students from varying school settings (Table 1). This study was selected for comparison for several reasons: (a) It is one of the most recently published DAST studies involving elementary students; (b) it is national in scope; and (c) while findings are very similar to previous studies, students in Barman's study had somewhat more positive views of science and scientists than previous DAST studies (Finson et al., 1995; Fort & Varney, 1989; Huber & Burton, 1995; Krause, 1997; Schibeci & Sorenson, 1983).

Considerations When Using the DAST-C

In using the DAST-C to score a student's drawing, the fewer items presented, the less stereotypical the student's view of a scientist. In simply comparing the percentages from Navajo students' drawings to the national sample, it would appear that Navajo students generally have a much less stereotypical view of scientists than the comparison group. In all categories except one (indication of danger), Navajo students scored lower than the comparison group. In looking carefully at the results it was found that in some cases, the absence of a particular stereotype could be somewhat deceiving. When students had no conception whatsoever of a scientist, their drawings contained fewer stereotypical indicators on the checklist. For example, one fourth grade girl had no idea of what a scientist was or looked like. After being assured that whatever she drew would be fine, she drew a teddy bear. In talking with her about her drawing, it became evident that the term *scientist* was an unfamiliar one to her. In fact, seven of the 94 students had no conception of scientists at all. All of these students were fluent English speakers, so language did not seem to be a factor. Conversely, ten other students drew pictures that indicated a science theme, but the actual scientist

Table 1

Comparison of Navajo Student Responses on DAST-C To Those of Barman (1969)

Theme	Sample Responses		
	Navajo Students Grades 4-6	Barman's National Study (1999)	
Common stereotypes	(*N* = 94)	Grades 3-5 (*N* = 649)	Grades 6-8 (*N* = 620)
	Percent of Total Responses		
Lab coat	6	41	52
Eyeglasses	3	28	46
Facial hair	2	9	26
Symbols of research	29	94	84
Symbols of knowledge	9	35	37
Technology	11	15	20
Relevant captions	5	13	19
Male gender	47	73	75
Caucasian	66	80	74
Indications of danger	31	18	22
Mythic stereotypes	6	11	13
Indications of secrecy	1	3	11
Scientist working indoors	18	88	71
Middle-aged or elderly	1	32	38

was either not visible (inside a spacecraft for example) or not anywhere in the picture. In interviewing these students, it was evident that they did have a conception of science, but the DAST-C did not give an accurate picture of their ideas. These cases point out limitations of the checklist and emphasize the importance of talking with students about their drawings to accurately determine their perceptions regarding science and scientists. Interviews seem to be an essential component of this test in order to understand exactly what students where thinking.

Gender of Scientists

In previous studies using the DAST, the category related to gender equity has been of particular interest to science educators because drawings of females as scientists appear less frequently than those drawings portraying scientists as males. These depictions seem to mirror the underrepresentation of females in science careers in our society. Chambers (1983) found in his early study that only 28 of 4,807 drawings by students in grades K-5 depicted female scientists. A later study of 1,600 students in grades 2-12 by Fort and Varney (1989) found although 60% of the respondents were female, only 135 drawings depicted female scientists. Only 6 of the 135 drawings showing female scientists were drawn by males. Flick (1990) and Mason, Kahle, and Gardner (1991) echoed this trend in studies that represented male scientists greatly outnumbering female scientists. In more recent studies, the number of females scientists that appear on the DAST is slowly beginning to increase (Barman, 1997; Finson, Beaver, & Crammond,

1995) Again, this seems to parallel the increasing numbers of females in science careers. The sample in this study, however, indicated an even greater percentage of scientists as females. In fact, the Navajo student drawings represented slightly *more* females than males in the drawings. This is certainly an interesting finding when comparing this study to DAST results from other populations.

Reasons for the depiction of more female scientists by students in this particular sample could have several possible explanations. One possible explanation could be the way in which the researcher was introduced to students by the principal on the day that the DAST was to be administered. Before this time, students had seen the researcher sitting in the back of the classroom but had never been introduced to her. The principal, in his introduction, referred to her as "a scientist." Those students who had little previous experience with the concept of "scientist" could have been influenced by the fact that the person they were meeting was identified as an example of what they were supposed to draw. Since she was a female, perhaps students used this information in depicting their scientist. Could the researcher, even though she was an Anglo woman, have served as somewhat of a role model for female students? It is possible that seeing a woman in this role could have influenced female students in their responses. Another explanation could be cultural in nature. Traditional Navajo society is matriarchal, and women are generally viewed in roles of power. The majority of female students in the class portrayed their scientists as female while almost all the male students portrayed their scientists as male. Did the Navajo female students in this study feel less limited in their career choices than female students in other studies? The answers to these questions are not provided by this study but may certainly be questions of interest to future researchers.

Identification of Scientists by Race

Navajo students portrayed their scientists as mainly Caucasian (66%). This category is of concern in previous studies as well and has shown little improvement during years of testing with various populations. Of the remaining 34%, only one student drew a person he identified as a Navajo scientist—a medicine man. Other students in this group depicted scientists predominately as Asian, with a small percentage as Hispanic. Students sometimes had difficulty describing the race or ethnicity of their scientist and in these cases the researcher would offer possibilities to the students. Navajo was always included as one of the possibilities, but students never selected that choice. Four female students drew pictures specifically of the Anglo researcher. While three of the pictures portrayed blond women, one drew an identical picture with dark hair. When the student who added dark hair to her drawing was asked who the picture was intended to represent, she shyly looked down and smiled. She then replied that the picture was meant to represent the researcher. When it was pointed out to her that the hair of the woman in the drawing was the color of *her* hair, not of the researcher, she continued to smile and nod. However, when it was suggested to the student that the picture looked more like her than the researcher and she was

asked if she might be a scientist someday, her demeanor changed instantly. She looked the researcher clearly in the eye and said incredulously, "No! *I* could never be a scientist!" Her tone and the look on her face indicated that the thought of being a scientist was simply an impossibility in her mind. This comment along with the lack of American Indians depicted in the drawings seemed to give a rather clear indication that this group of students did not view themselves as future scientists.

Indoor vs. Outdoor Settings

One of the most interesting findings dealt with the category of a scientist working indoors. There was a striking difference in the national sample and the results from Navajo students. Only 18% of Navajo students portrayed scientists as working indoors. Students often had scientists in labs outdoors under the open sky or under a tent. Computers were often part of these outdoor scenes. Other studies have overwhelmingly shown that students of all ages portray scientists doing work indoors in traditional lab settings. This is in sharp contrast to the students in this study. The Navajo elementary school students in this study exhibited strong place attachment and found it important to include their place in the drawings. This group of students spent a great deal of time outdoors in the natural environment and observations of them during field experiences indicated that they felt very comfortable outside. This came through clearly in their drawings.

Additional Categories

In scoring the student drawings, it soon became evident that there were other common responses on the Navajo students' drawings that were not on the checklist. Because these responses appeared often, it became obvious that they offered some valuable insight into what students were thinking. These are summarized in Table 2.

Table 2
Additional Categories from Navajo Student DAST

Theme Category	**Percent of total responses (*N* = 94)**
Sun and clouds	40.0
Local geologic features	36.8
Volcanoes	29.5
More than one person present	28.4
Tents	13.7
Hogans	11.6
Picture of the earth from space	11.6
Science theme but no person present	10.5
Picture not related to science theme	7.4
Gang symbols	6.3
Dinosaur bones	5.3
Animals	4.2
Medicine man	1.0

Many students included clearly identifiable local geologic features in their drawings. These landforms played a major role in the drawings and made it quite easy to recognize the particular place that was being depicted. Many students also drew active volcanoes in their drawings. In southern Utah and northern Arizona, there is a great deal of visible evidence of ancient volcanic activity. In the Four Corners area there are numerous volcanic plugs or necks as they are often called that stand out distinctively among the surrounding red sedimentary rocks (Stokes, 1969). Shiprock can be seen 100 miles away and is one of the landmarks with which the students are familiar. There are many others perhaps less well known to the general public that the students see on a daily basis. Initially, it might appear that the presence of volcanoes in student drawings could be likened to the presence of ancient volcanic evidence all around them. After talking with the students, it was determined this was not the case. The week before completing their drawings, all students watched a National Geographic video in their science classes about volcanoes. The impact of this video on student perceptions was quite evident in the drawings and in conversations with the students. The students who drew volcanoes pointed out additional details that were linked directly to the video.

There were other references to the earth and students sometimes drew the earth holistically, as it would appear from space. Clouds and the sun were repeatedly seen in the drawings. In many cases, the drawings were very personal depictions of each student's world. Horses were common in the pictures just as it was common to see the students riding their own horses after school. Hogans, tents, and shade houses often appeared in the drawings, common structures in the world of these students. One student made it a point to indicate that he had drawn his favorite plant, a yucca, in his picture. When asked why this plant was his favorite, he said that he liked it because his grandmother used it to wash her hair.

Another interesting feature of the Navajo students drawings were the number of people that were portrayed. Students were instructed to draw a scientist at work, yet 28% of the students drew pictures that showed more than one person engaged in a task and working together. The students described these examples of group interactions as cooperation. Unfortunately, there was also another kind of group that appeared as well. This feature of the drawings by some of the younger male students was the inclusion of gang symbols and gang members. This was not something they wished to discuss but unfortunately was a part of the world in which they lived.

Discussion and Implications for Teaching

The results of this study offer several considerations for educators. While providing valuable data for teachers and researchers, simply looking at a student's total score on the DAST-C may not give an accurate picture of a student's view of scientists. A low total score on this assessment instrument generally indicates that the person taking the test has a less stereotypical view of scientists. According

to this study, a low score may indicate that the person taking the test has no perception of scientists. Numerical scores alone may not always give a clear understanding of student perceptions. Looking at individual items on the checklist seems to be more informative, and follow-up interviews seem to be an essential component of test administration in order to get valid results. When teachers are aware of the inaccurate or limited view that students may have toward science, they can take steps to include examples that broaden student views.

Distinct differences were present in this sample and the national study reported by Barman. The fact that the Navajo students represented almost equal numbers of males and females as scientists is a positive finding. Even though many females were pictured, the young girl who could not imagine herself as a scientist provides evidence that certainly there is still a long way to go in this area. In mainstream society, recent emphasis has been on encouraging females in science because they have traditionally been an underrepresented group. While certainly Navajo females should be encouraged to participate in science and science careers, the male students should not be overlooked. It would seem that classroom teachers would need to make sure that encouragement was also given to male students where science and science careers are concerned. They may need even more encouragement to channel their energies away from less desirable options like gang influences that appeared in some of the young males' drawings. While certainly not every child will want to become a scientist, that option should be a possibility for all students. Apart from career aspirations, science should be viewed by students as a part of everyday life, related to the world in which they live.

Role models are important in encouraging all students in science.. Only one student in this sample represented an American Indian as a scientist. The message sent here is a clear one—students do not see science as a career option for themselves. While discouraging, it is not a surprising finding. In a previous study, Odell, Hewitt, Bowman, and Boone (1993) found that most minority students portrayed scientists as Caucasians. When minority students cannot envision themselves in a career, it is unlikely that they will pursue that career in the future (National Science Teachers Association, 1993; Smith & Erb, 1986). Implications for the education of all minority groups, including the students in this study, suggest that students could benefit from role models in science that seem more like themselves. Anglo children have difficulty relating to the "famous" scientists that are portrayed in textbooks. These people seem quite removed from their world and the same is true for Native students when they are exposed only to Anglo scientists. Science is an extensive discipline and many Native people are currently participating in many different fields of science from animal science to food science to natural resource management to earth science to computer science. This list goes on and is a long one. Many fields of science are often overlooked when science is viewed as being practiced only in the laboratory by a white man in a lab coat. When students see other Native people engaged in science and science careers, they are more likely to view this as a possibility for themselves as well.

Perhaps the most important data collected in this study deals with the importance of place to this group of students. The concept of place attachment refers to the bonding of people to places (Low & Altman, 1992). Student drawings indicated a strong attachment to their place through the inclusion of local geologic features, and native plants, animals, and structures. Especially interesting was the fact that such a large percentage of students portrayed their scientists as working outdoors. No other study has reported similar results, and the "Scientist working indoors" item has changed very little despite efforts to modify this perception (Finson, Beaver, & Crammond, 1995). Yet, only 18% of the Navajo students drew a scientist indoors. There are several possible reasons for this.

Cajete (2000) describes the human body as a metaphor for landscapes in Native cultures. The earth and sky that many children drew represents the uniting of Mother Earth with Father Sky in the creation myths of many Native cultures. Traditional Navajo knowledge describes the Sky system and the Earth system as responsible for everything that happens. The interaction between Earth and Sky systems maintains a state of balance in the surface environment (Semken & Morgan, 1997). The essence of the Navajo worldview is balance. It includes everything that a Navajo thinks is good as opposed to evil (Levy, 1998) and is a condition that implies wholeness, harmony, beauty, perfection and well-being. This view is the foundation for Navajo life and regulates what is acceptable and not acceptable in everyday practice. While the young students did not articulate their understanding in this way, it was clear in both their drawings and in the interviews that the natural environment, earth and sky, are an important part of their world. The Navajo elementary students in this study exhibited strong ties to the natural environment. Students' drawings indicated interest with all part of the outdoors, especially those related to earth science principles. Unfortunately, the study of earth science is virtually absent from grade school K-12 on the Navajo Reservation (Dubiel, Hasiotis, & Semken, 1997). Good science teaching capitalizes on students' interests, so why wouldn't the same hold true in instructing Navajo students? When student knowledge that is grounded in cultural beliefs is accepted, acknowledged, and perhaps even celebrated, a different sort of effect will occur. Students, rather than being on the outside of what is science, will become a part of it. In developing science curricular frameworks for Navajo students, their interest in the environment could serve as a relevant and meaningful theme. This supports the ideas of Haukoos and LeBeau (1992) who believe that the integration of science and culture is an essential component of a meaningful and relevant science curriculum for Native students.

Changing student perceptions about science and scientists is a task that falls to the schools. While difficult to counter the stereotypes portrayed in the media, what happens in schools also greatly influences what students believe about science. The students in this study were greatly influenced by a video they saw of volcanoes and many of them used this in their portrayal of scientists. A video showing American Indian scientists could similarly influence student perceptions.

Where science content is concerned, a connection was not made through classroom science instruction between what students learned in the video about volcanoes and the evidence of ancient volcanoes at their doorstep. Good science teaching capitalizes on students' interests and on things that are relevant to their lives. Science teachers of Navajo students could use this to their advantage by providing numerous opportunities for students to do science activities outdoors since this seems to be of special interest to this population of students. Cooperation, a value of the Navajo culture and portrayed in student drawings, could guide teachers in planning group configurations in science classes. Cooperative learning would seem to be a useful strategy for science teachers to employ.

The insights offered by the Navajo students' scientists drawings indicate that much work needs to be done in helping Navajo students believe that they too can be scientists and that they have much to offer. The ultimate goal is to help students view themselves as not on the outside of what is science, but as valuable contributors to the discipline. Not only would that approach have the potential to impact Navajo students, but would also add a valuable dimension to science for everyone.

Limitations of the Study

While providing useful information for educators, several factors should be considered in viewing information in this study. The fact that the researcher, an Anglo woman, was introduced to one class of students as a "scientist" biased results of four of the female students. This could have also influenced responses of other students in that particular class. Data were collected from only one school and all the students were taught by one science teacher. It is difficult to determine what effect the teacher had on student perceptions. Additional data collected in other schools are needed to support the findings from this study. It is also important to remember that this study deals specifically with Navajo students and it is inappropriate to generalize this information to other American Indian tribes.

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Appendix
DAST-C

1. _____ Lab Coat
2. _____ Eyeglasses
3. _____ Facial growth of hair (beards, mustaches, abnormally long sideburns)
4. _____ Symbols of research (scientific instruments, lab equipment of any kind)
5. _____ Symbols of knowledge (books, filing cabinets, clipboards, pens in pockets, etc.)
6. _____ Technology (the products of science like televisions, telephones, missiles, computers, etc.
7. _____ Relevant captions (formulas, taxonomic classification, the eureka syndrome)
8. _____ Male gender
9. _____ Caucasian
10. _____ Indications of danger
11. _____ Presence of light bulbs
12. _____ Mythic stereotypes (Frankenstein creature, Jekyll/Hyde figures, mad or crazed figures)
13. _____ Indications of secrecy (signs or warnings of "Private" "Keep Out" "Do Not Enter" "Go Away" "Top Secret" etc.)
14. _____ Scientists doing work indoors
15. _____ Middle aged or elderly scientist

Total Score _____

(Finson, Beaver, & Crammond, 1995)