Children's Beliefs in Relation to the Essence of Race

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CHILDREN'S BELIEFS IN RELATION TO THE ESSENCE OF RACE

A Thesis
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
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In Partial Fulfillment
Of the Requirements for the Degree
Specialist in Education of School Psychology

By
Rachel Ezell Wetton
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# TABLE OF CONTENTS

List of Tables .................................................................................................................. iv

Abstract ............................................................................................................................ v

Chapters

I. Introduction .................................................................................................................. 1

Categorization and Essentialism: Where Does It Begin? ............................................ 2

Essentialism as It Relates to Concepts of Race ............................................................ 6

Cognitive Development and Race Essentialization .................................................... 9

Knowledge of Inheritance and Essentialization of Race ........................................... 10

II. Method ....................................................................................................................... 14

Participants ..................................................................................................................... 14

Stimuli .............................................................................................................................. 14

Design and Procedure .................................................................................................. 16

III. Results ..................................................................................................................... 19

IV. Discussion ............................................................................................................... 26

References

Appendixes

A. Parental Informed Consent and Child Assent Forms

B. Knowledge of Inheritance Scale and Pictures

C. Orders for Transformation Stories Presentation

D. Transformation Stories and Stimulus Pictures
LIST OF TABLES

1. Percentage of Children Essentializing Race Questions ................................................. 20
2. Direction x Grade Interaction .......................................................................................... 21
3. No Significant Effect of Grade ....................................................................................... 21
4. Knowledge of Inheritance x Question Interaction ......................................................... 25
The way in which children categorize race is a highly debatable topic for which a conclusive result has not yet been found. Researchers hold different views as to whether the concept of race is present at birth, or whether it is something that develops. Previous research has shown that children do not treat race in the same way as adults do. Even by fourth grade, children do not consistently believe in the essence of race (Glerum, 2002).

This study more closely examines one of the potential factors for the point at which race is essentialized: knowledge of inheritance. Children were presented with stories and pictures describing superficial changes to a person’s racial characteristics, causing the target person to change from black to white or from white to black. The children were asked whether the target’s offspring would be transformed as well. Similar stories were also presented for animal transformations, artifact transformations, and hair length transformations. In addition, the students were assessed using a scale for knowledge of inheritance based on the work of Springer (1996), which described characteristics of animal parents in heritable and accidental scenarios and asked about the characteristics of the offspring. It was hypothesized that a greater knowledge of inheritance would be correlated with a greater tendency to essentialize race. This hypothesis was confirmed in regards to the target stimuli’s offspring. A wealth of potential for future research on this topic is opened up.
I.

Introduction

Race is an important, salient category in our social world. When thinking of ways that people categorize other humans, race and gender are probably the two most prominent categories that come to mind. Race may be significant in part because we attribute other characteristics, such as social attributes, to the concept of race (Aboud & Skerry, 1983).

Researchers have debated whether the concept of race is present at birth, or whether it is something that develops. Some researchers believe that the category of race is somewhat of an inborn concept that is present and evident at a very early age (Gelman, 2003; Hirschfeld 1993; 1994). These researchers believe that children have very similar thought processes in regards to race as adults do. Other researchers suggest that the concept of race becomes more complex or multifaceted with age, as physical or external attributes become less significant and internal and social attributes become more prominent (Aboud & Skerry, 1983). Aboud and Skerry (1983) as well as Madole and Oakes (1999) also believe that the concept of race as a salient, constant category is something that develops in conjunction with cognitive development.

The belief that race has an essence can affect our world in many ways, most notably with the rationalization of racial stereotyping and racial prejudices. Essentialism in some ways justifies stereotyping as natural (Gelman, 2003). Research suggests that all children will become cognizant of the essence of race eventually, not only because of what they are taught by parents and society, but also because of their development of ethnic attitudes based on the idea that race is a constant, unchangeable category and that
race is a strong characteristic of ethnicity (Aboud & Skerry, 1984). Research looking at ethnic and racial constancy and the age at which this develops is vital to the reduction of racism and prejudice (Aboud, 1983).

Categorization and Essentialism: Where Does It Begin?

All humans categorize. It is an adaptive skill that helps people simplify and make sense of the world around them. Rather than reacting to every person, situation, or object differently, humans are able to place well known and new encounters in categories with other objects possessing similar traits. A great deal of research has been devoted to studying this skill and its implications on development. Researchers have shown that categorization begins in infancy, as infants begin using perceptual distinctions to group objects or to determine what they will focus their attention and cognitive efforts toward (Madole & Oakes, 1999).

Past research has made a distinction between nominal kinds, artifacts, and natural kinds when it comes to the criterion by which people categorize. Nominal kinds have to do with the descriptive feature or features of the category member that makes it distinctly part of that particular category (Schwartz, 1979). In other words, a nominal kind is a label that defines properties of the category member. An artifact is an object that is created or man-made and is defined solely by its function or purpose (Keil, 1989; Schwartz, 1979). An artifact has no characteristics that maintain its essence across transformations, but instead it can be changed simply by changing its form or purpose (Madole, Oakes, & Cohen, 1993). Natural kinds, much as the name implies, refer mostly to living things, such as plants and animals, and of course humans.
The categorical description of natural kinds is when essences first come into play, the idea that there is more than just function or perceptual differences involved in separating the categories (Keil, 1989; Schwartz, 1979; Springer & Keil, 1989). Something makes a human a human, regardless of a full bear costume and the desire to eat trout and berries and growl a lot. There is an underlying trait that makes the natural kind what it is and the meaning of a natural kind category is dependent on this fundamental or essential trait.

Essentialism, or the belief that natural kind categories have essences, can be viewed as an expected result of how humans organize and categorize the world around them (Keil, 1989; Medin & Ortony, 1989). The belief that some categories are constant and unchangeable helps to simplify the cognitive overload that would be experienced if there were no stability within natural kinds. The idea behind essentialism is that there is something deeper, less tangible, and more mysterious defining a natural kind category that remains constant despite outward changes (Glerum, 2002; Keil, 1989). The belief in an essence affects the interpretation of an object. Regardless of whether or not the essence of an object exists, people’s beliefs pertaining to an object’s essence affects how they categorize and whether or not the object can maintain constancy despite transformation (Keil, 1989; Medin & Ortony, 1989).

Researchers have used several different methods to determine whether or not a child conceives of the essence of a natural kind category. One method is to use transformation stories in which a natural kind or artifact is described as changing in such a way that they now possess all the apparent qualities of a different natural kind or artifact category (Glerum, 2002; Keil, 1989; Madole et al., 1999). For example, a rabbit
may be described as being changed in such a way that it possesses the identifying traits of a squirrel. In conjunction with these transformation stories, subjects are shown before and after pictures. With the conclusion of the story, subjects are asked which category the natural kind or artifact belongs to, the original or the transformed. (Is this now a squirrel or is it still a rabbit?) If the subject demonstrates a belief in the essence of the category, he or she will affirm that the category membership has not changed. As one might expect, results indicate that natural kinds are essentialized but not artifacts (Keil, 1989). This method relies upon constancy despite change as the measure of a belief in an essence.

There are primarily two different views in regards to the development (or lack of development) of essentialist beliefs. One view of essentialism is that children function as miniature adults, already holding beliefs about the essence of certain categories before they are even able to fully apply these beliefs (Gelman, 2003; Hirschfeld, 1994). Gelman (2003) suggests that children may not have the knowledge to determine if a transformation to an animal is kind altering, but they nevertheless understand that the animal has an essence. In other words, the child may not know what is essential to an animal being the animal it is, but they do know that something is essential to the category membership. According to Gelman (2003), part of the problem with studies that suggest children develop an understanding of essences may be that the tasks used to evaluate children’s knowledge of essences are not realistic enough based on their experiences. Typically researchers use a child’s demonstration of constancy to indicate that the child conceives of an essence, as in the studies that ask the child if the natural kind has changed or is still the same after the physical and functional transformations. Gelman (2003), however, explains that children may know a category, such as gender, has an essence, but
they do not have the biological knowledge about sex necessary to acknowledge constancy after transformation. Researchers (i.e., Gelman, 2003; Hirschfeld, 1994; Medin & Ortony, 1989) who hold that a belief in essences is not a developmental shift, but instead that humans have an inborn quality to recognize essences, are difficult to disprove because in their theory they take away the most measurable aspect of essence—constancy, by saying a child may understand the essence of a kind without having the knowledge to demonstrate, when appropriate, constancy of that kind despite transformation. Gelman (2003) holds that children in Piaget’s preoperational stage have already established the concept of constancy, and that by the age of 4, children regard membership in a category as inherent and fixed. She also proposes that young children use essentialism more than adults, which does not take into account the research that indicates just the opposite in regards to race. Another problem in the theory that children function as miniature adults and thereby reason conceptually is that often adults do not reason conceptually, but instead tend to depend upon perceptual characteristics when categorizing until they are provided new information that changes their perception (Glerum, 2002; Keil, 1989).

In concurrence with these weaknesses, the other view for the development of essentialist beliefs is that an understanding of essences develops in conjunction with cognitive development. As children attend to more and more information in relation to categories and as they begin to understand the properties of certain categories, they begin to believe that there is more to the category than meets the eye—there is more to the category than just perceptual traits. Just as the example with the rabbit who is physically and functionally changed into a squirrel, but who manages to maintain its rabbit
classification. With time and experience, the child will begin to develop a belief that certain things cannot change category membership, regardless of superficial, physical changes. The researchers that hold this viewpoint suggest that cognitive factors contribute to the development of category constancy (Aboud & Skerry, 1983; Alejandro-Wright, 1985; Madole & Oakes, 1999). Decentration, a cognitive factor involving such things as conservation and moral judgment, is believed by many researchers to be a necessary prerequisite for constancy, for example believing that a person’s ethnicity does not change despite a change in appearance (Aboud & Skerry, 1983; 1984; Clark, Hocevar, & Dembo, 1980; Semaj, 1980). Basically the child has to reach the stage labeled by Piaget as concrete operational thought before the child can fully conceive identity constancy across physical transformations (Aboud, 1983; Aboud & Skerry, 1984). The child has to have the ability to see beyond the peripheral exterior and conceive of an implied internal quality (Aboud, 1983; Semaj, 1980). This ability has been examined in regards to natural kinds with transformation stories that involve changing a natural kind object in such a way that it possesses all the perceptible characteristics of the other object, as was described in the earlier example (Glerum, 2002; Keil, 1989). Children first attend to and are swayed by perceptual cues alone, but later, with more information and experience, they develop concepts and thereby a belief in essences (Madole & Oakes, 1999). Children make progressively more intricate correlations based on perceptual clues and they gradually increase the consideration given to abstract characteristics (Madole & Oakes, 1999; Springer, 1996).
Essentialism as It Relates to Concepts of Race

Research has shown that adults believe that race has an essence; in other words, they believe that even if a person were to undergo physical changes to alter the perception of race, they would still consider the person as belonging to the original race (Madole et al; 1999). It is important, however, not to use adult views of race as an organizer or filter when attempting to discover children's beliefs in regards to the essence of race (Alejandro-Wright, 1985). As adults, people still have difficulty fully conceiving the category of race and all that it implies, so it would be faulty to assume children have an innate grasp of this ambiguous concept. It would be more plausible to assume that like other conceptual categories, children develop their beliefs in regards to the essence of race as they go through developmental stages and add more information to their concepts (Glerum, 2003).

Research has been inconclusive in determining at what point children begin to believe that race has an essence (Aboud & Skerry, 1983; Clark et al., 1980; Gelman, 2003; Glerum, 2002; Hirschfeld, 1994; Semaj, 1980). Some researchers indicate that children have adult beliefs about the essence of race as early as age three (Aboud & Skerry 1983; Clark et al., 1980; Hirschfeld, 1994). In theory, they propose that children may always have this inborn belief (Gelman, 2003; Hirschfeld, 1994). Hirschfeld (1995) provides evidence that very young children believe that race cannot be changed, even though body types can. Specifically, when children are presented with tasks that involve inheritance, such as father to son transference, they are more likely to use race as the constant than they are to use a social category such as job type or a physical category such as body build. Children concede that race has an essence much earlier on tasks such
as these than they do on transformation tasks (Gelman, 2003). Hirschfeld (1995) believes that very young children have an understanding of race that assumes a great deal of knowledge in regards to biological transmission of traits. The problem with his findings may be, however, that the stimuli used lacked realism. The realism of stimuli has been shown to greatly impact children’s responses to categorization and conservation tasks (Hirschfeld, 1995; Madole & Oakes, 1999).

Other research has suggested that the belief in the essence of race comes with development (Aboud, 1988; Aboud & Skerry, 1983; Semaj, 1980). At young ages, children strictly attend to the easily perceptible, physical cues of race such as skin color and hair type, rather than comprehending biological inheritance or an underlying essence. In a study performed by Semaj (1980) with African American girls, a true comprehension of racial constancy was not demonstrated until after 11 years of age when skin and hair color were altered, indicating that even children 10 and 11 years of age did not fully conceive of the notion of the essence of race. Research from Madole et al. (1999) on the other hand demonstrates that almost all adults preserve racial constancy across transformation and believe that there is more to race than perceptual qualities.

The reason for the development of the belief that race has an essence is unclear. It appears that almost all adults believe that race is a constant, so it may be that adults feel that there is something different internally that is the “essence” of race. Some adults hold the once black, always black theory or the “one drop” rule that was so prominent in the United States in the early to mid twentieth century (Gelman, 2003; Hirschfeld, 1994). Gelman (2003) suggests that this is an example of “boundary intensification,” or an attempt to make natural kinds that blur the lines between categories more distinct. Still
other adults may be creating the belief in an essence of race in response to the desire to
maintain distinct races. Some researchers suggest that children who believe social
attributes are more significant will also be more likely to cling to race as a constant,
believing that race does indeed have an essence (Aboud & Skerry, 1983).

Other adults may be thinking in a more scientific way as to genetic differences
between races. This may be a result of thinking of race as a natural, as well as biological,
category (Gelman, 2003). This way of thinking is not necessarily accurate considering
that the genetic differences among races are much greater than the genetic differences
between races. Anthropologists and biologists have debated for years the accuracy or
biological relevancy of distinct races, and most would agree that race, in fact, has no
essence (Gelman, 2003; Springer, 1996).

For children it may be that the belief in the essence of race develops in
conjunction with their cognitive development and intelligence, their knowledge of
inheritance, or from hearing their parents talk about racial categories.

*Cognitive Development and Race Essentialization*

Some research indicates that adults essentialize race more than children do;
however, they essentialize gender less than children (Madole et al., 1999). In other words,
adults believe it is easier to change gender than to change race, and children believe it is
easier to change race than to change gender. In fact, children begin to essentialize gender
before they begin to essentialize race (Aboud & Skerry, 1983). Past studies have pointed
toward older children essentializing race more than younger children. A couple of studies
noted that not until the age of 8 did external or physical features begin to lose their hold
as a child’s primary mode for categorizing race and ethnicity (Aboud & Skerry, 1983;
Alejandro-Wright, 1985). The cognitive ability of decenteration appears to be important in understanding the cause of skin color, as well as discovering the essence of race (Aboud & Skerry, 1984; Clark et al., 1980). The presumption held across research is that all children will eventually essentialize race, as that is the “adult” way of thinking (Madole et al., 1999). A child’s intellectual ability may be more predictive than age in regards to when the belief in the essence of race is formed, as research has demonstrated that the accomplishment of cognitive stages coincides with the child’s conceptualization of race (Clark et al., 1980).

**Knowledge of Inheritance and Essentialization of Race**

Race constancy and gender constancy have frequently been closely linked, often if only for the fact that they are both salient social categories. Past research indicates that these two concepts may also follow a similar developmental track (Aboud, 1983; Bem, 1989; Clark et al., 1990). In consideration of this correlation, it is important to consider the factors previous research suggests are involved with the accrual of gender constancy. Bem (1989) demonstrates that a knowledge of genital difference, combined with the realization that genital differences are more significant than social differences for determining gender, led to greater responses in favor of gender constancy. Therefore, it appears that knowing the “facts” necessary for the determination of sex leads to the belief that there is something unchangeable for the natural kind category of gender. This leads to the presumption that some type of knowledge in relation to race and ethnicity may lead to the belief in the essence of race.

As described previously, children must have a grasp on the developmental concept of conservation before they will be able to recognize racial constancy. Clark et
al. (1980) demonstrated that the way children even describe the reason for differences in skin color, a child’s first perception of what race is, goes through a series of stages ranging from the mystical to the more biological and scientific. A child must understand that identity does not change with age, i.e., they must have identity constancy before they can understand even the most rudimentary aspects of race. As children develop this more detailed and scientific “biological” theory, they are developing a knowledge of inheritance. Therefore, one theory would be that a child’s knowledge of inheritance plays an important role in his or her belief in the essence of race. A wealth of research indicates that children use inheritance principles and their knowledge of innate potential when they essentialize (Gelman, 2003). For most children, innate potential is much stronger than environment when it comes to acknowledging the essence of race. In Glerum’s (2002) thesis, he hypothesized that knowledge of inheritance would be the key to the point at which children essentialize race. To follow in line with Bem’s (1989) theory of gender constancy, the child must also know when knowledge of inheritance should be applied.

Studies have been done to assess children’s knowledge of parent-offspring relations and whether children follow a biological or non-biological construal of traits (Springer & Keil, 1989; Springer, 1992; Springer, 1996). Often people treat natural as biological, and vice versa, but this does not, by the rule of logic, guarantee scientific accuracy (Gelman, 2003). Young children may have a naïve theory of biology that they use when determining the likeliness of the transference of categorical traits (Hatano & Inagaki, 1994). In order for this knowledge to be useful when categorizing or when trying to maintain constancy despite transformation, a child must know what types of things biology applies to, i.e., living things, and physical rather than feeling characteristics.
Hatano and Inagaki (1994) propose that children develop a naïve theory of biology because it serves a useful purpose. Children use the theory to make predictions in regards to familiar and unfamiliar living kinds and to make sense of the living world around them. A child’s predictions may not always be accurate, but they are often very reasonable ideas in theory. Hatano and Inagaki (1994) suggest that children as young as 6 begin developing and using a theory of biology. In regards to using this theory for racial categorization, Alejandro-Wright (1985) demonstrated in her study that by age 8 children begin to believe race is more than just a physical trait—it involves something biological as well. By age 10, children begin to acknowledge that there is more to race than just biology or physical attributes. At this age there appears to be the beginnings of race having an essence and a more social aspect (Alejandro-Wright, 1985).

Further, some children have been given more information in regards to inheritance, either through school, parents, or heightened intellectual perceptions. Some studies indicate that the way parents talk to their children about race and cultural identity varies between races, and this variance may affect the age at which children of different races begin to believe in the essence of race, as well as the way they think about race in general (Aboud & Skerry, 1984). The difference in believing in the essence of race may lie between children who are informed rather than uniformed in regards to their knowledge of inheritance.

In the current study there are two primary goals. One is to further analyze the age at which children begin to believe that race has an essence. Most of the children assessed will be older than the ones in Glerum’s (2002) thesis, or at the upper end of his age range, focusing on the age group where children began to show a belief in essence. The second
goal is to determine the role that knowledge of inheritance plays in that development. Glerum (2002) attempted to subtly tap children’s knowledge of inheritance. However, his measure may have been a bit too subtle, since there was very little difference in the responses to his inheritance condition compared to his association condition. This study proposes to create a measure of a child’s knowledge of inheritance based on Springer’s (1996) study assessing knowledge of inheritance. Hopefully, this scale will be more indicative of children’s knowledge and more purposeful than showing visual cues of inheritance labeled as parents.

Based on previous findings from Glerum (2002), Bem (1989), Madole et al. (1999), Springer and Keil (1989), and Springer (1992; 1996) I hypothesize that children will essentialize race more with age. That is, younger children will tend to respond in a way that indicates race is superficial and can easily be transformed. Older children will be more likely to respond in a way that indicates there is something more to race and it cannot be transformed simply by changing outward appearance. I also hypothesize that children with a greater knowledge of inheritance will essentialize race more. That is, those children who appear to have a greater knowledge of inheritance based on the scale I have designed will also be more likely to say that there is something more to race than physical appearance and it cannot be changed. I hypothesize that knowledge of inheritance will be more predictive of children’s beliefs in the essence of race than age.
II.

Methods

Participants

Students from a public elementary school in rural Kentucky participated in the study. The students were in the second to the fifth grades and ranged in age from 7 to 11. Thirty-three students participated in all, 9 second to third graders, 10 fourth graders, and 14 fifth graders. The fifth graders ranged in age from 10 to 11, the fourth graders ranged in age from 9 to 10, the third graders ranged in age from 8 to 9, and the second graders ranged in age from 7 to 8. The researcher contacted the local school board for permission to conduct the study within the school system. Teachers were contacted for permission to conduct the study within specific classrooms. Parents of the students were contacted through a letter sent home with the children (see Appendix A). The letter emphasized that participation was voluntary and that children would receive a small token (a pencil) for returning the consent forms. The token was presented for the return of the form and was not contingent upon willingness to participate. Students at each grade level, with parental consent to participate, were randomly selected and assigned to orders of the prompts. All procedures were approved by the Human Subjects Review Board of Western Kentucky University.

Stimuli

The Knowledge of Inheritance scale presented scenarios adapted from Springer (1996) that required participants to make decisions based on their knowledge of inheritance. The scenarios involved animal “couples” with internal versus external
characteristics and heritable characteristics versus accidental characteristics. Four different scenarios were possible: Heritable-Internal, Heritable-External, Accidental-Internal, and Accidental-External. Two of each type of scenario were included in the scale. The Knowledge of Inheritance scale, along with the corresponding pictures, can be seen in Appendix B. The participants were told stories in which parent animals are described as having one of the afore mentioned characteristics, and then they were asked if the offspring would have the same characteristic.

The interviewer then presented stories adapted from Madole et al. (1999) and Glerum (2002) to communicate various changes to an object, animal, or person at a level accessible to children. As in Glerum’s (2002) thesis, the race change stories presented a scenario that introduced a person of either white or black appearance. The person was described as looking and acting like “most black/white boys/girls” while growing up, after which a picture of the person’s skin color and hair was shown (unlike Glerum’s (2002) thesis, the entire person will not be shown). Another picture, supposedly of the person’s natural parents, was presented as well. This is similar to Glerum’s (2002) Inheritance Trials. Next, a visit to the doctor was described, during which the doctor changes the appearance of the person to resemble the other ethnicity (black/white). New pictures were shown with the description, “Now the person’s skin looks like this” (show opposite race arm) “and his (or her) hair looks like this” (show opposite race hair). The child was then asked what he or she thought the person now was, “still a black/white person, or now a white/black person?” The response was recorded along with the response to the follow up question involving the race of the person’s offspring, “If this person had children, what would his/her children be, white or black?” A similar pattern
was followed for the artifact changes, animal changes, and for the hair length changes, with minor adjustments made to accommodate the differences in storyline. Two different orders were used to present the stories. The orders can be seen in Appendix C. Examples of the transformation stories and pictures can be seen in Appendix D.

Design and Procedure

Children were interviewed at their school. Data were collected from each child in a single, 15-20 minute interview. Interviews were scheduled at the discretion of the children’s classroom teachers. Each child was told that his or her parents gave permission for him or her to participate in what we would be doing. They were told, in age-appropriate language, that they did not have to participate if they did not want to and could quit at anytime without penalty. After the child indicated his or her agreement to participate by signing the assent form (See Appendix A), the experimenter read a brief set of instructions telling the child that some of the questions would “seem unusual, but you should answer as best you can, and there is no ‘right’ answer.”

Sessions were conducted in a vacant workroom or office within the school, depending upon changing availability. Children were seated across a table from the examiner. The examiner first administered the Knowledge of Inheritance measure, reading the stories of the various animal parent characteristics and questioning whether or not the characteristic would be passed on to the offspring (See Appendix B). The examiner then read seven short transformation stories involving a change in appearance of an animal, an object, or a person. Four of the stories read to the children involved a change in the physical characteristics that specify an individual’s race, and three were control stories. The gender of the Stimulus person (Stimulus Gender) and direction of
race change (Direction of Change) were within subjects variables: each child received one set of stories and pictures demonstrating a black male changing in appearance to a white male, a white male changing in appearance to a black male, a black female changing in appearance to a white female, and a white female changing in appearance to a black female. In conjunction with the stories, the participants were shown a picture of the stimulus person’s parents in the original race before the transformation is described, in addition to pictures of the stimulus’s skin and hair before and after transformation (See Appendix D).

All participants received the same three control stories. One story described artifact changes (coffeepot to birdfeeder), one story described animal changes (squirrel to rabbit), and the other story described hairstyle changes (short hair to long hair). These stories were also accompanied with “parent” pictures that were comparable to the parent pictures for race.

The stories were presented in two different, semi-random orders (See Appendix C). The order was arranged so that no more than two race change stories were presented in sequence; the artifact, animal, and hair change stories were used to divide up the race change stories. The order was counterbalanced for the participant’s gender. Following each story, participants were asked to verbally indicate the stimulus’ category membership, indicating whether or not the person was still the originally presented race, or was now the transformed race. Participants’ responses were marked on an answer sheet. To further probe the inheritance aspect, follow-up questions were asked regarding the category membership of the stimulus’ offspring (that is, if the target had babies, what race would the babies be?).
Participants were debriefed at an age-appropriate level and any questions that they had were answered. As a precaution, children were assured in debriefing that this kind of change does not actually happen, even by mistake, and that the questions we asked were just to discover what children would think if it could have happened.
III.
Results

As in Glerum (2002), the presentation of each transformation story was followed by a question for which one of two answers was possible: change of category membership or no change of category membership. Each child was given a score of 1 for each response that indicated a change in category membership of the target and assigned a score of 0 for each response that indicated retention of category membership.

Participants were also asked whether the target’s offspring would change category membership, and again, they were assigned a score of 1 for a response that indicated a change and a zero for a response that indicated retention of the original category. Therefore, lower scores indicated greater essentializing of the category. The score could range from 0 to 1 for each question.

A hypothesis based on Glerum’s (2002) study was that older children would essentialize race more than younger children. He broke participants into three grade levels: Preschool, mostly second, and mostly fourth. The grade levels in this study were second-third (7 to 9 years of age), fourth (9 to 10 years of age), and fifth (10 to 11 years of age). Table 1 shows the percentage of responses at each grade level indicating responses of essentialization, or that the target or offspring could not change.

For the analysis, a 3 (Grade: Second-Third, Fourth, Fifth) x 2 (Order of Transformation Stories) x 2 (Direction: White to Black versus Black to White) x 2 (Question: Target versus Offspring) repeated measures ANOVA was used to analyze the effect of Grade. Grade and TS Order were between subject variables, and Question and Direction of Change were repeated measures. The dependent variable was the
participants' scores from the Transformation Stories. A significant main effect of question, $F(1, 27)=14.14, p<.01$, was revealed, indicating that, as in Glerum (2002), participants received higher scores for target transformation questions than for offspring transformation questions. They were less likely to say offspring would change category membership.

Table 1
*Percentage of Children Responses Essentializing Race Questions*

<table>
<thead>
<tr>
<th>Type of Question</th>
<th>2nd/3rd</th>
<th>4th</th>
<th>5th</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd/3rd</td>
<td>3%</td>
<td>27%</td>
<td>34%</td>
</tr>
<tr>
<td>4th</td>
<td>39%</td>
<td>65%</td>
<td>59%</td>
</tr>
</tbody>
</table>

This analysis also revealed a significant Direction x Grade Interaction, $F(2, 29)=4.94, p=.015$. This Direction x Grade interaction indicated that the Second-Third grade group responded differently on questions asking about a change from white to black than they did to questions asking about a change from black to white. A post hoc comparison with a single degree of freedom contrast exposed the Second and Third grade group tendency to receive a higher score on black to white transformation questions ($M=1.78$) than they received on white to black ($M=1.39$), $F(1, 7)=7.00, p<.05$. Fourth graders and Fifth graders did not respond significantly differently to questions asking about a change from white to black ($M=1.15, M=1.07$ respectively) than they did to questions asking about a change from black to white ($M=1.00, M=1.07$ respectively),
$p > .05$. See Table 2. Overall, however, Grade by itself did not have a significant main effect on responses to transformation questions, $F(2, 27) = 1.78, p = 0.19$. See Table 3.

Table 2

*Direction x Grade Interaction*

![Direction x Grade Interaction](image1)

Table 3

*No Significant Effect of Grade*

![No Significant Effect of Grade](image2)
Prior to analyzing the Knowledge of Inheritance score in connection with the Transformation Stories, the Knowledge of Inheritance scale was analyzed. By assigning a 1 for all responses indicating the offspring would be like the parents and a 0 for all responses indicating the offspring would be like the general species, the subjects’ responses could be compared to heritable and accidental scenarios. The score of 1 versus 0 did not, therefore, necessarily indicate a correct response. A participant responding that the offspring would always have the characteristic of the parent would earn a score of 8. Those responding the offspring would never have the characteristic of the parent, but would have that of the general species, would receive a total score of 0. Scores were submitted to a 3 (Grade) x 2 (Type of Change—Heritable vs. Accidental) x 2 (Location—Internal vs. External) repeated measures ANOVA, with Type of Change and Location as repeated measures and Grade as a between-subjects variable.

The analysis resulted in a significant main effect of Type Change, $F(1, 30) = 14.05, p < .01$. Heritable questions ($M = 1.29$) received higher scores than accidental questions ($M = .56$). That is, subjects were more likely to say that offspring were like their parents when the scenario involved characteristics the parents were born with (heritable) than when the scenario involved characteristics the parents acquired after an accident.

There was also a trend toward a Location x Grade interaction. Post hoc analyses revealed that all grades responded the same for internal characteristics, but second-third graders received lower scores for the external characteristics ($M = .61$) than fourth graders ($M = 1.10$) or fifth graders ($M = .93$), $F(2, 29) = 2.49, p < .09$. In other words, younger children were more likely to say external characteristics were not like their parents, but were like the species as a whole, regardless of the heritable or accidental condition. This
may possibly indicate a bias toward what they know about animals, that is, if they know something about the external traits of an animal, they are more likely to say that the offspring has the traits of that general species rather than the parents, regardless of the heritable versus accidental scenario. Grade had no significant effect by itself.

For the next analysis the Knowledge of Inheritance was coded in terms of correct versus incorrect response with a range of 0 to 8. A score of 4 could be obtained by chance. The participants were divided into three groups—low, medium, and high—based on their scores on the Knowledge of Inheritance Scale. The low group (N=11) had scores ranging from 0 to 4, the medium group (N=10) had scores ranging from 5-6, and the high group (N=12) had scores ranging from 7 to 8.

A major hypothesis was a main effect of knowledge of inheritance, specifically, children with a greater knowledge of inheritance would have lower scores than children with a lesser knowledge of inheritance, indicating that children with a greater knowledge of inheritance were less likely to accept a transformation of race. I also predicted that a child's knowledge of inheritance would have an even greater effect on their willingness to accept that a stimulus' offspring would also be changed, meaning that children with higher Knowledge of Inheritance scores would be less likely to accept the transformation of the race of the stimulus' offspring.

The possibility that Age might confound the predictability of Knowledge of Inheritance was taken into consideration. A Pearson Product Moment Correlation indicated that Age and Knowledge of Inheritance were not correlated, r=.005. Therefore, age is not a significant factor and was thus left out of the analysis.
In order to evaluate these hypotheses, transformation scores were entered into a 3 (Knowledge of Inheritance group: Low, Medium, and High) x 2 (Direction of Change) x 2 (Question) repeated measures ANOVA. Knowledge of Inheritance group was the between-subjects variable. Question and direction of change were repeated measures. The response to the transformation stories was the dependent variable.

The analysis again revealed a main effect of Question, $F(1, 30)=14.82, p=<.01$. Change scores were higher for the target stimuli ($M=1.53$) than for the offspring of the target stimuli ($M=0.89$). This replicated findings from Glerum (2002).

The main effect of Knowledge of Inheritance, $F(2, 30)=.64, p=.54$ was not significant. This means that participants, regardless of Knowledge of Inheritance level, did not differ in responses taken as a whole across questions.

Most interestingly, the analysis revealed a Knowledge of Inheritance Group x Question interaction (see Table 4), $F(2, 30)=3.92, p=.05$. This result indicates that Knowledge of Inheritance does have an effect on participant responses to the transformation stories depending upon the question: target or offspring. Post hoc single df contrasts revealed that question had no significant effect on the Low Knowledge group $F(1, 10)=.11, p=.75$. Question did have an effect on the Medium Knowledge group $F(1, 9)=4.69, p=.06$ and the High Knowledge group $F(1, 11)=17.67, p=<.01$. Participants with a High Knowledge of Inheritance did not receive significantly lower scores ($M=1.50$) than participants with a Medium ($M=1.80$) or Low ($M=1.32$) Knowledge of Inheritance on transformation of Target Questions (See Table 4). Participants with a score in the High category of Knowledge of Inheritance received lower scores ($M=.33$) on transformation of the Offspring Questions than participants with a Medium category.
score ($M=1.20$) or a Low category score ($M=1.23$). The Offspring Question scores for the High category were significantly lower than the Low category, $F(1, 29)=9.54, p<.01$, and also significantly lower than the Medium category, $F(1, 29)=6.72, p<.05$. The Medium and Low category scores were not significantly different from one another for the Offspring Question, $p=.68$. See Table 4.

Table 4

Knowledge of Inheritance x Question Interaction
IV.
Discussion

Replication of Previous Research

One of the goals of this study was to replicate some of Glerum's (2002) findings while additionally discovering new information and making some improvements. Much like Glerum's thesis, the results of this study provided some evidence to support the predictions made, but evidence was also obtained that simply raised more questions.

In a finding that replicated Glerum (2002), participants had lower scores when responding to the question about the transformation of the offspring than they did for the transformation of the target—they were more likely to essentialize offspring than they were to essentialize the target. In other words, they were more willing to say the target had changed race than they were to say the offspring would change race. This effect is possibly a result of children having an understanding of essence and inheritance that they cannot apply when conflicting visual information is present. Another possibility is that children do believe that race as a label is superficial and can be changed simply with external changes, but they also know that race has a genetic component that will be passed on to offspring.

Another hypothesis, that older children would essentialize race more than younger children, was not fully confirmed. Based on this analysis, Grade (or age groups) did not play a significant role in the point at which children essentialized race. Children did not necessarily essentialize race more as their age and grade increased. This is unlike the results that Glerum (2002) obtained, where older children essentialized race more. This
may be partly because Glerum’s age groups were more distinct, from Preschool, to second, to fourth.

Unlike Glerum’s (2002) finding, there was no effect of story order. As mentioned previously, it is probable that the effect of order in Glerum’s study was a result of the additional probing that was done. After the transformation questions, the participants in Glerum’s study were asked why they thought the target had or had not changed and why they thought the offspring had or had not changed. If the participants received the coffeeepot to birdfeeder story first, this probing was not going to elicit the same types of responses as when participants received the rabbit to squirrel first. In this study, the additional probing questions were omitted. They were difficult to analyze in Glerum’s study and did not provide much useful information.

In a finding that also replicated Glerum (2002) second-third graders were more willing to accept a black to white transformation than they were to accept a white to black transformation. Fourth graders and fifth graders did not respond differently based on direction. The fact that second-third graders displayed this trend, while the older students did not, may be an indication of the greater proportion of white participants and the mindset in the younger students that “people can become like me, but I cannot change”. However, it may also only be a result of the smaller sample size of the younger children. A greater proportion of this age group would need to be assessed using this study’s design. Another avenue for future research would be to address this interaction with a wholly minority population, such as solely assessing African American children in the second to third grade age range.
The Knowledge of Inheritance Scale

A second purpose of this study was to develop an effective and applicable way of measuring a child’s knowledge of inheritance. The second analysis looked at how participants responded to the scale that was developed. More children responded that offspring in the heritable scenario would have the characteristics of the parent, rather than offspring in the accidental scenario. Children were responding more often that the offspring would have the characteristic of the parents, not the species-typical characteristic, in the stories that described animal parents who were both born with a characteristic. This result is what would be expected, and it is an indication that participants did have some knowledge of inheritance and were able to apply that knowledge at appropriate times.

This analysis also revealed that second-third were more likely than fourth graders or fifth graders to say external characteristics in the Knowledge of Inheritance scale would not be like the parents regardless of whether the characteristic was heritable or accidental. As suggested previously, this could be a result of the priming effect of their current knowledge. Some of the scenarios included situations where parent birds lose their feathers, giraffes get elongated tails, geese have unwebbed feet, and tigers have hairless bellies. Younger children may think, “I know what a bird’s tail looks like in real life—it has feathers!” They make decisions based on what they know regardless of the situation. Despite this trend, grade had no significant main effect on the Knowledge of Inheritance scale in this analysis.
**Knowledge of Inheritance’s Role**

A final goal of this research was to assess the role that knowledge of inheritance plays in children’s tendency to essentialize race. Somewhat surprisingly, there was no significant correlation between the Knowledge of Inheritance score and Age. This means that children did not necessarily develop a greater knowledge of inheritance with age as expected and that a child’s knowledge of inheritance is independent of age with regards to their essentialization of race.

One of the main hypotheses, that greater knowledge of inheritance would lead to more essentializing, was not confirmed in regards to the transformation of the target. The hypothesis was confirmed, however, at least in regards to the transformation of the target’s offspring. Therefore greater knowledge of inheritance, as measured by the Knowledge of Inheritance scale, is correlated with a willingness to say that the offspring’s race is still that of the original target race, rather than the transformed race. Based on these findings, it appears that children with high knowledge of inheritance understand that there is something more to race than just the physical attributes (as can be seen by the response that the offspring has not changed); however, they appear very willing to say that a person (i.e., the target in the transformation stories) can change race simply with superficial changes to appearance. This was one of the most interesting findings of this study. Apparently, children with a greater knowledge of how genetic characteristics are passed are aware that race is one of those characteristics and would therefore be passed to the target’s offspring. However, these children also still view race as a superficial, surface quality—a label that changes simply with a change in appearance.
General Discussion

Based on these results, my assessment of knowledge of inheritance appeared to be more effective than Glerum’s inheritance versus non-inheritance conditions. His inheritance versus non-inheritance conditions were manipulated simply by showing a picture of the target’s parents or a picture of the target’s neighbors. I felt that this was too ambiguous a distinction, and that was probably why he did not see a difference in responses. I wanted a measure that would more accurately capture knowledge of inheritance, since I believed that it was still a factor. Fortunately, I obtained a good range of responses with my scale. One of the reasons for including the younger students in my sample was because of the possibility of a "ceiling effect" in the Knowledge of Inheritance scale. Based on the results, that was certainly not the case. Oddly enough, some younger students did well with the scale and some of the older students did very poorly. The age at which all children have effective knowledge of inheritance has not yet been reached and may be a good reason to assess an older sample in a future study.

Another question to probe may involve finding what is needed to have knowledge of inheritance. Is it learned in school? One would imagine that by fifth grade this subject has typically been taught in science classes, but many of the fifth graders still appeared not to “get it.” Is it correlated with intelligence? This is another area worth exploring, in addition to whether or not knowledge of inheritance is correlated with cognitive development in general. Overall, my study confirms that knowledge of inheritance does play a role in the point at which children begin to essentialize race.

One of the adjustments made to Glerum’s (2002) study was to not show pictures of the entire target person, but instead to use pictures showing the skin and hair of the
target without showing the entire individual. Glerum had suggested that seeing an entire
target person change into a clearly different person might have been too strong an
influence over children’s abilities to use their knowledge of inheritance and essentialize.
Not showing the whole person during the transformation stories was supposed to lead to a
greater reluctance to say the person had changed, but instead my participants tended to be
more willing to say the target had changed race than they were in Glerum’s (2002). It is
not clear whether this result is due to the difference in stimuli or simply the difference in
population (or maybe, more specifically, the population demographics). It is also possible
that starting with the Knowledge of Inheritance scale when running participants played
some role, although I do not see why it would have affected this aspect. Doing the
Knowledge of Inheritance scale before the transformation stories was probably a mistake.
The purpose was to put the participants more at ease (since the scale is more amusing and
shows fun animal pictures), but for consistency of the replication of Glerum’s study, I
should have done the transformation stories first.

As in Glerum’s, even the oldest students in the sample were not essentializing in
the same way as adults. So what really changes in regards to beliefs in the essence of
race? When does this change occur? More research is needed, but it does appear that
knowledge of inheritance is more important than age. It may be useful to do a study
simply to discover the point at which children have a full understanding of inheritance.

What can be done to expand and improve upon this study? One possibility would
simply be to replicate this study with older students to see the point at which almost all
students essentialize race as adults do. In addition, taking out the picture prompts
altogether may eliminate the possibility of the photographic details or specifics affecting
the responses. Without pictures, however, older participants would probably be a necessity because of interest level and attention span. Also, the Knowledge of Inheritance scale could be adapted for older participants using humans instead of animals and for much older participants by using real characteristics and genetic facts. Another possibility would be to replicate the study with a more diverse population. It would be interesting to see if different racial, cultural, or SES populations performed differently on the Knowledge of Inheritance Scale. What role do demographics play in a person’s willingness or unwillingness to essentialize race? This study is a stepping-stone to a wide range of possibilities in this fascinating and obscure area—the belief in the essence of race.
REFERENCES


Appendixes
Appendix A

Parental Informed Consent and Child Assent Forms
Dear Parent/Guardian:

We would like to ask for your help in a study of children's understanding of social categories. Dr. Kelly Madole of Western Kentucky University and Rachel Ezell Wetton, in cooperation with Logan County School System and your child's school will be conducting this study. We hope to learn how children think about social categories. The project will be conducted in one short session at your child's school. Your child will receive a small token (such as a pencil or stickers) for participating.

If you decide to take part, your child will participate individually in one 15-20 minute session during school. Your child will be read a few simple, brief stories about animals, objects, and people. He or she will be asked to respond to some questions based on his or her beliefs about how people can change.

Your child's participation in this project is entirely voluntary. If you or your child decide not to participate, it will have no negative outcomes for you or your child in any way. Your child may withdraw from this study at any time or refuse to answer any questions at any time. All information will be kept strictly confidential. Your child's name will appear only on the consent form. Your child's individual results will never be reported. Only group averages will be reported.

We hope that you will allow your child to take part in this study and help us in exploring this area of development. If you agree to participate, please fill in your child's name and your child's date of birth and sign your name on the attached consent form. If you have any questions concerning this project, please feel free to contact Dr. Kelly Madole, Research Director for this project at (270) 745-6475. Please leave a message if no one is there.

Sincerely,

Kelly Madole, Ph.D.
Associate Professor of Psychology
PARENTAL CONSENT DOCUMENT

Project Title: Children’s Beliefs and Inferences Based on Categories

Investigators: Rachel Ezell Wetton and Kelly Madole, Ph.D., Dept. of Psychology, WKU, 745-6928

The University requires that you give your signed agreement in order for your child to participate in this project.

1. Nature and Purpose of the Project: The purpose of this project is to help us understand the way children think about and interpret groups of people.

2. Explanation of Procedures: The session will take about 20 minutes; your child will participate individually. Your child will be read simple, short stories about people, animals, or objects. He or she will be asked to respond to some questions based on their beliefs about these things. We are interested in whether children believe the members of those categories can be changed and what kinds of characteristics the members of those categories share. The answers may be taped to ensure accurate data collection, but no one aside from the researcher will have access to the tapes and they will be destroyed upon completion of the study.

3. Discomfort and Risks: There are no risks other than those your child would encounter in everyday life.

4. Benefits: Your child will receive a small token of appreciation, such as a pencil or sticker.

5. Confidentiality: All of your child’s information will be strictly confidential. Your child’s information will be marked by a number only and no names will be mentioned on audiotapes. All information, including audiotapes, will be securely stored and when the information is reported, it will only be reported in terms of group performances. Your child will in no way be singled out during any part of the project or reporting of the results.

6. Refusal/Withdrawal: Your child’s participation is completely voluntary. Your child may refuse to answer any question at any time. Your child also may withdraw from the project at any time. Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

Child’s Name: ___________________________ Date of birth: _____________

_________________________________________ __________________________
Signature of Parent or Legal Guardian Date

For any questions about your child’s rights as a human subject, please contact
Dr. Phillip E. Myers, Human Protections Administrator, (270) 745-4652
CHILD/MINOR ASSENT FORM

I, ________________________________, understand that my parents (mom and dad), or the person who takes care of me, have given permission (said it's okay) for me to take part in a project about what kinds of things can change and what kinds of things go together with Dr. Kelly Madole or one of her students.

I am taking part because I want to. I have been told that I can stop at any time I want to and nothing will happen to me if I want to stop.

Signature ___________________________   Date ___________________
Appendix B

Knowledge of Inheritance Scale
This is Mr. and Mrs. Bear. Most bears have pink hearts, but Mr. and Mrs. Bear were both born with orange hearts. When their child, Bobby Bear, is born, do you think he will have an orange heart like his parents, or will he have a pink heart?

This is Mr. and Mrs. Giraffe. Most giraffes have short tails, but Mr. and Mrs. Giraffe both had an accident that made their tails extra long. When their child, Ginny Giraffe is born, do you think she will have an extra long tail like her parents, or will she have a short tail?

This is Mr. and Mrs. Goose. Most geese have webbed feet, but Mr. and Mrs. Goose were both born with not webbed feet. When their child, Gary Goose, is born, do you think he will have not webbed feet like his parents, or will he have webbed feet?
This is Mr. and Mrs. Cat. Most cats have brown livers, but Mr. & Mrs. Cat both had an accident that made their livers’ yellow. When their child, Carrie Cat, is born, do you think she will have a yellow liver like her parents, or will she have a brown liver?

This is Mr. and Mrs. Tiger. Most tigers have hairy bellies, but Mr. and Mrs. Tiger were both born with no hair on their bellies. When their child, Tina Tiger is born, do you think she will have a hairless belly like her parents, or will she have a hairy belly?

This is Mr. and Mrs. Finch. Most finches have feathers on their tails, but Mr. & Mrs. Finch both had an accident that made their tail feathers fall off. When their child, Frankie Finch, is born, do you think he will have no tail feathers like his parents, or will he have feathers on his tail?
This is Mr. and Mrs. Beagle. Most beagles have white inside their stomachs, but Mr. and Mrs. Beagle were both born with stomachs that were black inside. When their child, Barret Beagle is born, do you think he will have a stomach that is black inside like his parents, or will he have a stomach that is white inside?

This is Mr. and Mrs. Seal. Most seals have gray lungs, but Mr. & Mrs. Seal both had an accident that made their lungs turn purple. When their child, Sonya Seal, is born, do you think she will have purple lungs like her parents, or will she have gray lungs?
Appendix C

Orders for Transformation Stories Presentation
<table>
<thead>
<tr>
<th>Order One</th>
<th>Order Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal transformation</td>
<td>Artifact transformation</td>
</tr>
<tr>
<td>White to Black Female transformation</td>
<td>Black to White Male transformation</td>
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<tr>
<td>White to Black Male transformation</td>
<td>Black to White Female transformation</td>
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<tr>
<td>Long Hair to Short Hair transformation</td>
<td>Long Hair to Short Hair transformation</td>
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<tr>
<td>Black to White Female transformation</td>
<td>White to Black Male transformation</td>
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<tr>
<td>Black to White Male transformation</td>
<td>White to Black Female transformation</td>
</tr>
<tr>
<td>Artifact transformation</td>
<td>Animal transformation</td>
</tr>
</tbody>
</table>
Appendix D

Transformation Stories and Stimulus Pictures
When this animal was born, it did things that squirrels usually do and looked like most squirrels. Here are pictures of this animal's mom and dad. Here is a picture of this animal's ears and tail when it grew up. One day the animal got sick, so the vet gave it some medicine, but the medicine was too strong, and the little animal lost its bushy tail, it grew long ears, and began to behave like a rabbit. Nothing the vet did could be changed back. Here is a picture of the animal's ears and tail now. What is the animal? Is this animal still a squirrel, or is it now a rabbit? If this animal had babies, what would its babies be, squirrels or rabbits?
When Sharon was little, she did the things that young black girls usually do and looked like most black people. Here are some pictures of Sharon’s mom and dad. Here is a picture of Sharon’s skin and hair when she was grown. One day Sharon went to the doctor, who changed the way Sharon looks. Her skin was made to be lighter and her face and hair were changed. None of what the doctor did could be changed back again. Here is a picture of Sharon’s skin and hair now. What is Sharon? Is she still a black person, or is she now a white person? If Sharon had babies, what would her babies be? Black or white?
When Billy was little, he did the things that young black boys usually do and looked like most black people. Here are some pictures of Billy’s mom and dad. Here is a picture of Billy’s skin and hair when he was grown. One day Billy went to the doctor, who changed the way Billy looks. His skin was made to be lighter and his face and hair were changed. None of what the doctor did could be changed back again. Here is a picture of Billy’s skin and hair now. What is Billy? Is he still a black person, or is he now a white person? If Billy had children, what would his children be?
When Bruce was little, he did the things that young white boys usually do and looked like most white people. Here are some pictures of Bruce’s mom and dad. Here is a picture of Bruce’s skin and hair when he was grown. One day Bruce went to the doctor, who changed the way Bruce looks. His skin was made to be darker and his face and hair were changed. None of what the doctor did could be changed back again. Here is a picture of Bruce’s skin and hair now. What is Bruce? Is he still a white person, or is he now a black person? If Bruce had children, what would his children be?
When Sally was little, she did the things that young white girls usually do and looked like most white people. Here are some pictures of Sally’s mom and dad. Here is a picture of Sally’s skin and hair when she was grown. One day Sally went to the doctor, who changed the way Sally looks. Her skin was made to be darker and her face and hair were changed. None of what the doctor did could be changed back again. Here is a picture of Sally’s skin and hair now. What is Sally? Is she still a white person, or is she now a black person? If Sally had babies, what would her babies be?
When this thing was made, it was used to pour out coffee. Here are some other things made in the same factory. This is a picture of this thing’s spout and handle when it was made. Then some people took it. They took some pieces off of it, made some other changes, and filled it with seeds. None of what they did to it could be changed back again. After they did all of this, they used it to feed birds. Here is a picture of this thing’s top and openings now. What is this thing? Is it still a coffeepot, or is it now a birdfeeder?
When Bob was little, he did the things that most shorthaired people do, and looked like most shorthaired people. Here is a picture of Bob's mom and dad. Here are pictures of Bob's hair when he grew up. One day Bob went to the barbershop to have his hair changed. The barber added lots more hair to Bob and made it so he could never have short hair again. It could not be changed back. Here are pictures of Bob's hair now. What is Bob? Is he still a shorthaired person or is he now a longhaired person? If Bob had children, what would his children be?