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# Essences and Transformations in Objects, Animals, and Humans

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ESSENCES AND TRANSFORMATIONS IN OBJECTS, ANIMALS, AND HUMANS

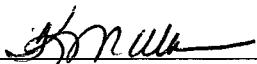
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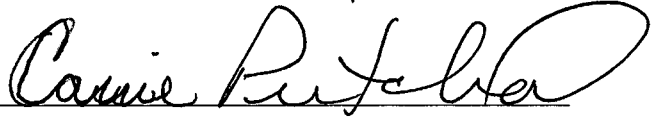
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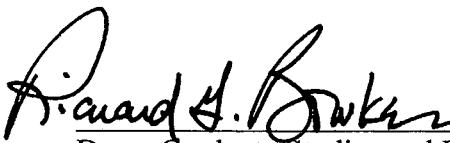
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ESSENCES AND TRANSFORMATIONS IN OBJECTS, ANIMALS, AND HUMANS

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# ESSENCES AND TRANSFORMATIONS IN OBJECTS, ANIMALS, AND HUMANS

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Research as to how humans group natural kinds, such as animals, is essential to understanding categorization processes. However, it lacks conventional application and generalization to everyday life. Humans are social beings that encounter a wide array of individuals on a daily basis. In these situations, we are required to consider various properties that make up these people. As Keller (2005) suggests, the way we categorize is shaped by our theories about the world. Therefore, when we determine the rationale behind people's social categorization processes, we are better able to understand people's perceptions of their social environment. Moreover, when we conduct scientific research on how people categorize race, we gain substantial information about their perceptions and understanding of race. Thus, the goal of the present study was to determine how and to what extent people categorize race and if they use the principles of psychological essentialism to do so.

In order to determine if people tend to essentialize race in a similar manner as other natural kinds, the third study of the Hampton, Estes, Simmons (2007) research was replicated. In Study 1 and Study 2, undergraduate participants were obtained from Western Kentucky University's psychology study board. In Study 1, participants were presented with transformation stories in which an animal or person came to look and act like another animal or person as a result of either mutation or maturation. Approximately one-half of the participants received scenarios that included information about the

exemplar's offspring. Approximately one-half received scenarios that excluded this information. Additional transformation stories that described changes to artifacts and the body (i.e. weight and hair length) were added as filler items. Participants rated the artifact/animal/person's typicality, category membership, and their level of confidence in their ratings. In addition, they provided justifications for their responses. In Study 2, transformations were described as being the result of unintended or intended changes. In Study 2, one-half of the scenarios included a statement that the animal or human's offspring resembled the initial state, *I*. One-half of the scenarios included a statement that the animal or human's offspring resembled the final state, *F*. Participants rated the artifact/animal/person's typicality and category membership. They were also asked to provide justifications for their responses.

This study provides further support for the belief of race as a natural kind given that subjects were more likely to essentialize race than animals. The study also suggests that people view race differently than other factors related to appearance (i.e. hair length and weight). In both studies, the majority of subjects were willing to state that a person changed if their hair or weight changed; however, they were unwilling to indicate a person could change their race. Furthermore, the justification data obtained in the study was one of the first studies to differentiate the reasoning used by those who did and did not essentialize animals and race.



## I.

### Introduction

Humans have a natural tendency to place things they encounter into categories (Rosch & Mervis, 1975; Markman, 1989). By classifying things, whether they are objects, animals, or humans, into categories, people can significantly lessen their cognitive load. Categorization often provides a quick, mental “short-cut” for people when they encounter new information in their environment. Habituation studies have suggested that even infants discriminate between novel category stimuli and categories of stimuli to which they have been habituated. This suggests that categorization is an early developmental process that begins in infancy. However, as we develop and gain more knowledge about the world around us, the way we categorize things often becomes more complex.

Although categorization serves as a cognitive “short-cut”, categorization is not as simple as it appears. There are many conflicting theories as to how people categorize information. Some theorists have argued that categorization is based on the similarity of things (Rips, 1989; Estes, 2003). Specifically, we categorize things by how much they resemble members of categories we already know (Estes, 2003). Therefore, we often depend upon certain clues (often visual clues such as appearance) to mentally group things together. In addition to similarity, typicality has been considered an important, but different, element of categorization (Rosch & Mervis, 1975; Rips, 1989). Typicality suggests that the more an item resembles a specific prototype, the more likely the item is believed to belong to the prototype category (Rips, 1989). Unlike similarity, a pre-

established category is not needed to group things together. While similarity is based on how much one thing resembles another; typicality focuses more on category membership. Despite their inherent differences, both typicality and similarity are two forms of categorization that tend to focus on grouping things based only on physical features. An example of categorization based on similarity was presented by Stepanova and Strube (2009). In this study, participants were shown either all color or all gray-scale images of males whose skin tone and physical features which ranged from high Afrocentric facial physiognomy, low Afrocentric facial physiognomy, to Eurocentric physiognomy. The subjects were shown each photo on a computer and rated the attractiveness of the image (measurement was not described), the typicality of the image (on a scale of 1, *very African American* to 7, *very European American*), and a racial categorization task (three-category judgment: 1, *African American*, 2, *cannot tell*, and 3 *European American*). Overall, the Stepanova and Strube (2009) study suggested that when people encounter a person with dark skin tone, they tend to classify them as African-American; whereas when we encounter a person with light skin tone, we tend to classify them as European-American. While this study confirms that physical features are an important factor people use when categorizing individuals, other studies suggest that other aspects are also considered.

Although physical characteristics are important elements of categorization, psychological essentialism is a fundamentally different theory about how people categorize things. In contrast to typicality and similarity, psychological essentialism suggests that physical features are less important than the “essence” of a thing. Furthermore, psychological essentialism requires an individual to analyze deeper, internal

properties as well. Gelman (2003) states that essentialism is “deeply ingrained in our conceptual systems, emerging at a very young age and across highly varied cultural contexts” (p. 6). Furthermore, Gelman (2003) describes essentialism as “a pervasive reasoning bias that affects human categorization in profound ways” (p. 6). According to psychological essentialism, people's classification of objects is based on the psychological belief that objects have internal properties. The person may not know what the “essence” of the object is, but believes these internal properties make them what they are (Medin & Ortony, 1989; Gelman, 2003). Ultimately, these beliefs are “psychological placeholders” that make the object display specific characteristics and traits. For example, people may not have knowledge of the internal properties (e.g. biological components) of a dog, yet they believe that something within a dog makes it have specific physical features and behavior patterns that are different from other animals.

Research on essentialism has often differentiated things based on two broad categories, artifacts and natural kinds. Artifacts can be defined as man-made objects that can be categorized by their function. Natural kinds encompass things such as animal and human categories that can be categorized by their underlying essence. Natural kinds are believed to have hidden, underlying properties that inherently make them what they are. However, artifacts are believed to lack these essential properties and are often categorized by their function. The theory of psychological essentialism suggests that when categorizing natural kinds, one must not only look at the object's appearance, but they may also consider internal properties (“essences”) that make them what they are. People may not know what the “essence” is, but acknowledge an underlying property that makes the natural kind what it is (Rips, 1989; Estes, 2003). Thus, psychological

essentialism is a theory that seeks to explain how and to what extent individuals consider a natural kind's essence to determine category membership.

A common method for studying psychological essentialism provides research participants with scenarios that describe transformations in the external properties of an artifact or natural kind; the object's initial category takes on the properties of a new category (Rips, 1989; Glerum, 2002; Wetton, 2006; Hampton, Simmons, Estes, 2007). For example, a coffee pot is described as taking on the characteristics and function of a birdfeeder (e.g. A person adds holes to a coffeepot, adds wire to hang the coffeepot from a tree, and then fills it with bird seed). Participants are then asked to decide whether the new object is a member of the initial category or the new category (e.g., "Is this object now a birdfeeder or is it still a coffeepot?"). Essentialist thinking is demonstrated by a tendency for subjects to deny that the object has changed from its initial category to the final category. Research has suggested that by fourth grade, children tend not to essentialize artifact categories, like coffee pots and bird feeders, but essentialize natural categories like animals. This finding suggests that even fourth grade children believe animals, but not man-made objects, have internal properties that make such "superficial" category memberships impossible (Glerum, 2002). Unlike similarity and typicality, with psychological essentialism one can conclude that the categorization of animals and objects is dependent upon the internal versus external state.

In a series of studies, Hampton et al. (2007) sought to contrast two essentialist theories, causal homeostasis and psychological essentialism. Psychological essentialism is based on the concept that one factor can define an essence, while causal homeostasis proposes that essences may be determined by a "cause" or several, related factors. These

related factors can vary by how much of a property exists within the natural kind. (Hampton et al., 2007). In order to differentiate these theories, Hampton et al. created transformation stories in which an animal came to look and act like another animal as a result of either mutation (i.e. contamination from the environment) or maturation (i.e. natural biological processes). Two different transformation stories were used to determine if the type of the change affected participants' willingness to essentialize animals. Psychological essentialism was measured by a participant's rating of the animal's category membership after the transformation occurred. For example, if a participant rated the animal as belonging to the beginning category after the change occurred, this rating would suggest the subject believed the animal's "essence" remained the same despite a transformation that changed the animal's appearance. In contrast, a belief in causal homeostasis would suggest that the animal had changed category due to actual changes in its essence. Furthermore, the "causal" aspect of causal homeostasis was measured by differences in participants' ratings of typicality and category membership in the mutation versus maturation conditions.

In Study 1 and 2, participants were asked to rate either the animal's typicality (on a scale of 1 - *initial category* to 10 - *final category*) and assign category membership (on a scale of 1 - *initial category* to 10 - *final category* in Study 1 in addition to absolute membership in Study 2) either before the change or after the change and participants were also asked to provide justifications for their responses. In Study 3, participants were asked to rate the animal's typicality (on a scale of 1 - *initial category* to 7 - *final category*) and assign category membership (either belonging to the initial category or final category) before and after the change. Participants were also asked to provide

justifications for their responses.

The results of the first study suggest that before the change occurred in both the mutation and maturation conditions, participants were likely to suggest that the animal belonged to and was more typical of the initial category. After the change in both the mutation and maturation conditions, participants were likely to indicate that the animal was typical of the final category but belonged to the initial category. However, in the maturation condition, categorization ratings changed less than typicality ratings after the change occurred. A second study was developed to measure the reasons why participants disassociated between typicality and category membership. Unlike the first study, category membership and typicality were measured between subjects and a new graded membership question was added. Hampton et al. (2007) did not indicate how the graded membership question was measured. Results of the second study revealed that before the change occurred, participants were likely to suggest that the animal belonged to and was typical of the initial category. After the change, participants were likely to indicate that the animal was typical of the final category and belonged to the final category. In contrast to the first study, participants were more likely to assign the animal to the initial category in the mutation condition than in the maturation condition.

In order to further disassociate between typicality and category membership, a third study was created. Unlike the previous two studies, participants were asked to assign category membership and rate typicality both before and after the change, category membership was measured by absolute judgments (being a member of either the *initial category* or *final category*), and a confidence rating was added to measure how sure the participant was of their choice. In addition, similarity was measured (on a scale of 1 -

*initial category* to 7 - *final category*) and participants received scenarios that either included or excluded information that described the animal's offspring in an unchanged state.

Results of their third study suggested that before the change occurred, participants were likely to rate the animal as being similar to and being typical of the initial category. After the change, participants were likely to rate the animal as being typical of the final category and similar to the final category. Unlike the previous studies, this pattern of responses was not dependent upon the cause of the change. Thus, the researchers were unable to disassociate between ratings of similarity and typicality. In addition, they found no further support for an effect of the cause of change (i.e. maturation and mutation) on participants' ratings of typicality and similarity. Hampton et al. (2007) suggested that ratings seemed to coincide with the animal's behavior and appearance. As for the results of category membership, before the change, participants rated the animal as belonging to the initial category almost all of the time (99%). After the change, participants rated the animal as belonging to the final category 84% of the time when information about the appearance and behavior of the animal's offspring was provided. When this information about the offspring was excluded, participants rated the animal as belonging to the final category 95% of the time. Overall, results of the third study suggest that people are willing to believe that animals can indeed change their category membership. However, we are unable to determine why people believe category membership can be changed. In relation to essentialism, this finding indicates that people tend not to essentialize natural kinds as previously expected. Moreover, the majority of subjects (84%) failed to essentialize animals even when the participants were provided

with information that hinted at a biological “essence” (e.g. an unchanged germline) that makes them what they are. In addition, we do not know why this factor ignored by participants. While this finding is indeed interesting, and suggests that subjects were more likely to use causal homeostasis principles when rating the animals, it also poses even more questions about how people essentialize and what information they use when categorizing natural kinds.

Although research as to how we group natural kinds, such as animals, is essential to understanding categorization processes, it lacks conventional application and generalization to everyday life. It is very rare that we would ever encounter a situation where we would need to classify animals into different groups. However, humans are social beings that encounter a wide array of individuals on a daily basis. In these situations, we are required, often automatically, to consider various properties that make up these people. Is the person male or female? Young or old? Black or white? As Keller (2005) suggests, the way we categorize is shaped by our theories about the world. Therefore, when we determine the rationale behind people’s social categorization processes, we are better able to understand people’s perceptions of their social environment. Moreover, when we conduct scientific research on how people categorize race, we gain substantial information about their perceptions and understanding of race. Thus, the goal of the present study was to determine how and to what extent people categorize race and if they use the principles of psychological essentialism to do so.

The concept of race has been investigated by researchers in biological, anthropological, sociological, and psychological fields. Despite numerous studies in these vastly different academic areas, researchers fail to come to one conclusion about the



biological origins of race and how we understand it. Furthermore, the concept continues to be a controversial topic in scientific research. While the average person may assume race is made of unchangeable, biological components, recent research suggests that race is a socially constructed phenomenon (Cosmides, Tooby, & Kurzban, 2003). Cosmides et al. (2003) describe genetics research and explain there is more genetic variance between members of the same race than between members of different races. Therefore, Cosmides et al. (2003) conclude that because race is not based on biological differences, differences between races are based on perceived differences determined by society.

Although research suggests that race is not biologically based, this finding may not prevent people from believing there is an “essence” within a person that makes them have specific physical and behavioral attributes of a particular race. Many studies on psychological essentialism have looked at essentialist beliefs in relation to objects and animals, only a few studies with adult participants have researched essentialism in relation to social categories such as race (Haslam, Rothschild, & Ernst, 2000; Keller, 2005; Mahalingam, 2007; Bhatia, 2007). Currently, much of the theoretical debate remains fixated on whether race is based on genetic and biological components or whether race is the construction of the social world (Cosmides et al., 2003). Previous techniques used to understand race as a natural kind (e.g. having an “essence”) have focused on asking adults general questions about how they categorize race (Haslam et al., 2000) or questions about genetic determinism (Keller, 2005). Such techniques only produce a superficial understanding of race as a natural kind because they lack a methodology that is focused on understanding the categorization process. Furthermore, methodology such as this leaves very little known about the cognitive underpinnings of

adults' belief about race. Aside from the limited empirical studies on racial categorization and essentialism, much of the research on racial essentialism with adult participants is philosophically based with no emphasis on the scientific aspects of categorization and essentialism (Mahalingam, 2007; Bhatia, 2007). Most of this philosophical research tends to focus on the anthropological and sociological aspects of race such as oppression and social dominance.

While qualitative data in relation to essentialism and race is useful, it is even more important to measure whether people perceive race as an artifact, a man-made creation, or a natural kind based on unseen, biological “essences” in a scientific manner. Haslam et al. (2000) sought to determine which social categories were likely to be essentialized (i.e. social categories which were believed to have a biological basis). In this study, 40 college students rated 20 social categories (e.g. ethnic groups, intelligence groups, age groups, personality, physical appearance, etc). Ten items (i.e. directness, uniformity, naturalness, stability, inherence, etc.) were provided to measure each of the twenty social categories. Nine of the 10 items were used to measure essentialism. An example of an item (naturalness) was: “Some categories are more natural than others, whereas others are more artificial (‘artificial’ vs. ‘natural’).” Participants rated each of the items on a scale of 1 to 9. Based on the subjects’ ratings of the 20 social categories, the researchers found that gender, race, and ethnicity were the only social categories determined to be natural kinds. This finding suggests that people perceive race as an unchangeable trait that may have internal properties that give people of a certain race similar characteristics.

Similar to Haslman et al. (2000), Keller (2005) conducted three experiments with undergraduates in Mannheim, Germany to determine the relationship between the

biological components of essentialism and social cognition, political attitudes, stereotypes, and prejudice. Specifically, Keller (2005) wanted to explore the association between people's tendency to essentialize based on biology and their social and political attitudes. In addition, Keller wanted to create and validate a scale that measured the belief in genetic determinism (BGD-scale). This scale was used to measure the extent to which subjects believed behavior and personality were caused by genetic factors. To validate this scale, 126 undergraduates from the University of Mannheim rated 21 items on a scale of 1 - *not at all true* to 7 - *completely true*. Items reflected beliefs that behaviors and personality are genetic (e.g. "In my opinion, alcoholism is caused primarily by genetic factors"). The scale was validated by assessing the discriminant, convergent, and predictive validity of the scale. Results indicated that stereotyping is related to a person's tendency to essentialize using biological components.

In a second study Keller (2005) provided more evidence for the relationship between essentialism, stereotyping, and prejudice. In this study, 249 undergraduates (in business and social science classes) from the University of Mannheim completed a questionnaire that contained items that reflected a belief in the idea that behaviors and personality are genetic, modern sexism, racial stereotyping, as well as blatant and subtle prejudice. Subjects were also asked to rate social categories (i.e. age groups, gender groups, religious groups, etc.) on a variety of features (e.g. uniformity, naturalness, stability, etc). Results of the second study also suggested that participants who were higher in social dominance orientation (a tendency to prefer hierarchy in social systems), patriotism, nationalism, and Protestant ethic were more likely to hold essentialist beliefs. Keller concluded that the belief in biological components of essentialism is associated

with negative racial stereotyping, sexism, and prejudice.

Finally, a third study was conducted to find the causal impact of essentialism on prejudice and stereotyping. The third study used 41 students from the University of Mannheim. Participants first read an article about genetics in different groups. In the second part of the study, participants completed an opinion poll to measure their likeability of Eastern European citizens. The third part of the study, required participants to complete a questionnaire that included some of the BGD (Belief in Genetic Determinism) Scale. Results of the third study suggest that people who hold essentialist beliefs show an increased likelihood of prejudice and in-group bias. Ultimately, the results of Haslam et al. (2000) and Keller (2005) suggest that people have a tendency to believe social categories, such as race, are natural kinds. Furthermore, such results indicate that social categories are assumed to be the product of biological components or an “essence” that makes them what they are.

In contrast to these studies with adult participants, several studies have explored the process children use to understand race and whether they essentialize race. Studies of essentialism involving children have suggested that the use of essentialism in categorization is a developmental process. Keil’s (1989; as cited in Gelman, 2003) research revealed that as children advance from age five to second grade, they depend less on appearance and more on internal properties to categorize natural kinds such as animals. As age increased the children’s responses tended to be more essentialist in nature. These results suggest that as children grow older they become more aware of the internal properties that make natural kinds what they are. With regard to race specifically, Hirschfeld (1996; as cited in Gelman, 2003) discovered that children tend to essentialize

race when asked about a person's racial inheritance or growth over time. In Hirschfeld (1995; as cited in Gelman, 2003), children were presented with stories about infants of one race who came to live with families of another race. When asked what the children looked like when they grew older, three-year-old participants responded at chance, but four-year-olds knew the child would look like their biological parents instead of the adopted parents. Results of this denote a tendency for children to rely on essentialist reasoning more often as they grow older.

In addition to these studies, two studies have studied the essentialism of race by presenting children with transformation stories typical of the essentialist paradigm. Glerum (2002) and Wetton (2006) presented children ranging from preschool to fifth grade with stories describing alterations in objects and medical changes in people and animals that caused them to physically transform from one state to another. In the stories involving humans, medical procedures were conducted which permanently changed people's physical characteristics from those typical of one race to those typical of another. Children were then asked whether the object, animal, or human would belong to the initial or final category. Children were also asked if the animal or human's offspring belonged to the initial or final category. Glerum (2002) and Wetton (2006) both concluded that, at the most, about a third (38.89% and 34%) of child participants essentialized race of the target person. Both Glerum (2002) and Wetton (2006) also concluded there was a tendency for children to essentialize offspring who had not undergone a direct transformation more than the target person. However, Glerum (2002) found that older children were more likely to essentialize race than younger children. This main effect of age was not confirmed by the Wetton (2006) study. A main effect of

age may not have occurred for Wetton (2006) due to the fact that her subject pool was much older than the participants in Hirschfeld (1995; as cited in Gelman, 2003) and Glerum (2002). Hirschfeld's (1995; as cited in Gelman, 2003) participants were three and four-years-old and Glerum's (2002) subjects were preschool, second grade, and fourth grade students. In contrast, Wetton (2006) used participants in second/third, fourth, and fifth grades. This sample of older children may have decreased an effect of age because middle to upper elementary school students rely less on appearance and thus may respond in an essentialist manner more often than much younger groups used in Hirschfeld (1995; as cited in Gelman, 2003) and Glerum (2002).

Overall, previous research has shown that, by second grade, children have a tendency to essentialize natural categories like animals and humans, more than artifact categories, like coffee pots and bird feeders (Glerum, 2002; Wetton, 2006). Analysis of this data would suggest that children and adults assume there are deeper internal components that make the transformation of natural categories (i.e. animals) unlikely when compared to the supposed "superficial" transformation of artifacts. Although transformation stories are often used to measure one's tendency to essentialize artifacts, animals, and racial categories, using such methods have yielded conflicting results about whether people essentialize. Study 1 of Hampton et al. (2007) speaks against essentialism while Study 3 presents conflicting findings about the way we essentialize. Ultimately, their research suggested that people are more willing to suggest an animal can change category membership; thus indicating less willingness to essentialize natural kinds (e.g. animals) than previously suggested. Despite conflicting results, using transformation studies to understand if and how people essentialize natural kinds appears to be the

method most commonly used.

Unlike previous studies that have examined race, Hampton et al. (2007) used transformation stories in which an animal came to look and act like another animal as a result of either mutation or maturation. Their results confirmed that the cause of the transformation (i.e. mutation vs. maturation) can affect how we essentialize natural kinds. In Study 1 and 2, the cause of the transformation led participants to be more likely to essentialize in some instances more than others. In Study 1, participants were more likely to essentialize in the maturation condition while in Study 2 subjects were more likely to essentialize in the mutation condition. However, this effect was not found for Study 3. This addition to the transformation studies may be the reason why participants were less willing to essentialize natural kinds than previously suggested. Ultimately, the type of change (i.e. mutation or maturation) may have affected how the participants perceived the actual change within the animal. Overall, by using two types of transformation stories like Hampton et al. (2007) we can determine what property or set of properties people may use to categorize natural kinds, specifically race.

The present study sought to explain under which conditions and to what extent people essentialize race. In addition, the study sought to gain more information about this process by obtaining subjects' justifications for their responses. Furthermore, like the Hampton et al. (2007) study, the current study sought to contrast two theories of categorization, causal homeostasis and essentialism, specifically in relation to animals versus race. Therefore, the basic design of Study 3 in the Hampton et al. (2007) study was replicated. Furthermore, I wanted to determine if there is a difference between participants' willingness to essentialize animals and racial categories. While the Hampton

et al. (2007) study focused on essentialism only in relation to animals, the goal of the present research is to determine if people continue to essentialize when presented with human racial categories. Using the examples provided by Hampton et al. in the appendix of their article, new stories describing artifact, body, and racial changes were created using the same transformation model (e.g. a black person now possesses the characteristics of a white person as a result of maturation or mutation). Following the same experimental method used by Hampton et al. (2007), each participant was asked to rate the category membership and typicality of the entity before and after the transformation. In addition, the justifications that are required of each participant provided further insight into the how and why people essentialize racial categories and if a difference exists between the essentialism of animals and human racial categories.

Considering that children are more likely to essentialize natural kinds (i.e. animals and race) than artifacts (Glerum, 2002; Wetton, 2006), I hypothesized that adult participants will tend not to essentialize artifacts and body changes, but will essentialize animals and racial categories. Furthermore, since Hirschfeld (1995; as cited in Gelman, 2003) suggested that four-year-old children acknowledge that offspring would look like their biological parents instead of the adopted parents, I hypothesized that adult participants will be more likely to essentialize humans and animals when information about the exemplar's offspring is provided. Information about offspring would also suggest a biological "essence" that makes the animal or person what it is. In addition, because Study 3 of Hampton et al. (2007) suggested that category membership was not dependent upon the cause of the change (i.e. maturation vs. mutation, I believe subjects will be equally likely to essentialize animal and racial categories despite the cause of the



change. Finally, since race has been determined to be a natural kind and is believed to be an unchangeable trait (Haslam et al., 2000; Keller, 2005), I hypothesize that subjects will be more likely to essentialize racial categories more than animal categories.

## II.

### Study 1

#### *Methods*

##### *Participants*

Thirty-seven undergraduate students (19 male, 18 female; 30 Caucasian, 5 African-American, 1 Hispanic, 1 biracial) from Western Kentucky University participated in the study for extra credit or course credit. Participants were obtained through the university's psychology study board. Informed consent was obtained from all participants.

##### *Stimuli*

Following the stimuli from the Hampton et al. (2007) study, all scenarios depicted either an artifact, an animal, or a person that came to look and act like another artifact, animal, or person. All scenarios had the same format: (1) a brief description of the artifact, animal, or person, including references to it looking and acting like an *I (initial)*; (2) a change in the artifact, animal, or person due to either maturation, mutation, or superficial alteration; (3) a brief description of the changed artifact, animal, or human, including reference to its looking and acting like an *F (final)*.

Three of the four animal scenarios printed in the appendix of the Hampton et al. (2007) article were used. These stories described the transformation of an animal that came to look like another animal. Seven new scenarios about objects and humans were also constructed. Two object stories were created and described how artifacts were changed to look and serve the purpose of another artifact. Two of the human

transformation stories described changes made to the body (hair length and body type changes) that changed the appearance of a person. These stories were used as filler items. Although they followed the same format as the other stories, they were based on superficial changes about an object or person and were described as being caused by human alterations (e.g. adding a handle, creating holes, receiving a haircut, losing weight, etc.). Three scenarios explaining racial transformations (black to white, white to Asian, etc.) were also used. These stories explained how a child of one race came to look and act like a child of another race (see Appendix pp. 58-59).

Like the Hampton et al. (2007) transformation stories, animal and racial changes were based on the mutation or maturation of the animal or person. Maturation stories described the change as a result of natural processes that caused changes in the animal/human's biological processes. In contrast, mutation stories described the change as a result of contamination in the environment that caused changes in the animal/human's biological processes. Scenarios also included or excluded information about the exemplar's offspring. Stories that included offspring information added a statement in which an animal or human's offspring physically and behaviorally resembled the animal or human's initial state, *I*. Scenarios that excluded offspring information removed the statement about the physical and behavioral attributes of the animal or human's offspring (see Appendix pp. 58-59).

### *Design and procedure*

All scenarios were reversed (e.g. snake to lizard and lizard to snake). This scenario reversal was referred to as story direction. Story direction was counterbalanced

between-subjects. Thus, each participant received only one story direction for each object, animal, or human category (see Appendix p. 57). Hampton et al. (2007) suggested a difference in theoretical beliefs (causal homeostasis versus essentialism) may be the reason why subjects are more or less likely to essentialize based on the type of change. The condition (i.e. maturation or mutation) was also counter-balanced across participants. Approximately one-half of the participants received stories describing the change as a result of maturation while approximately one-half of the participants received stories describing the change a result of mutation. Approximately one-half of the participants received scenarios that included a statement in which an animal or human's offspring physically and behaviorally resembled the animal or human's initial state, *I*. Approximately one-half of the participants received scenarios that excluded all information about the physical and behavioral attributes of the animal or human's offspring.

Each scenario was followed by three rating scales. Questions followed the same typicality, categorization, and confidence rating format used in Experiment 3 of the Hampton et al. (2007) study. Because Hampton et al. (2007) found no statistical difference between the participants' typicality and similarity responses, only typicality ratings were gathered for the purposes of the present experiment. Typicality questions followed the format "[Before/After] it changed, was the object/animal/human more typical of the *initial category* or *final category*?" (e.g. Before/After it changed, was the animal more typical of a horse or a zebra?) For each scenario, typicality was asked about the object, animal, or human in both the before and after states. Scales of typicality ranged from 1 - *initial category* to 7 - *final category*. Category judgments followed the

format “After it changed, is the object/animal/human an  $x$  or  $y$ ?” The category judgment responses were binary, with one choice indicating the initial category and the other indicating the final category. Participants also rated their confidence of the judgment category, on a scale of 1 - *completely unsure* to 5 - *completely sure*. In addition to the rating scales, participants were asked the following open-ended question: “Why do you believe this object/animal/person is an  $x$  or a  $y$ ? Please provide a full justification for how you arrived at this decision.” This question was used to gather information about how the subject came to their decision. Participants were asked to provide written justifications for their response about the object, animal, or human’s final category. These justifications serve as a means to understand how each participant arrived at their final decision about the object/animal/human’s category membership. Following completion of the survey, the experimenter debriefed the participants (see Appendix p. 56).

### *Results*

Stories that described changes to artifacts and bodily changes were treated as “filler” scenarios used to keep participant interest. The results of these scenarios were not analyzed. The majority of subjects (82%) stated that any changes that occurred to objects or bodily changes (e.g. weight loss/gain and increased/decreased hair length) changed the typicality and category membership of the object or individual.

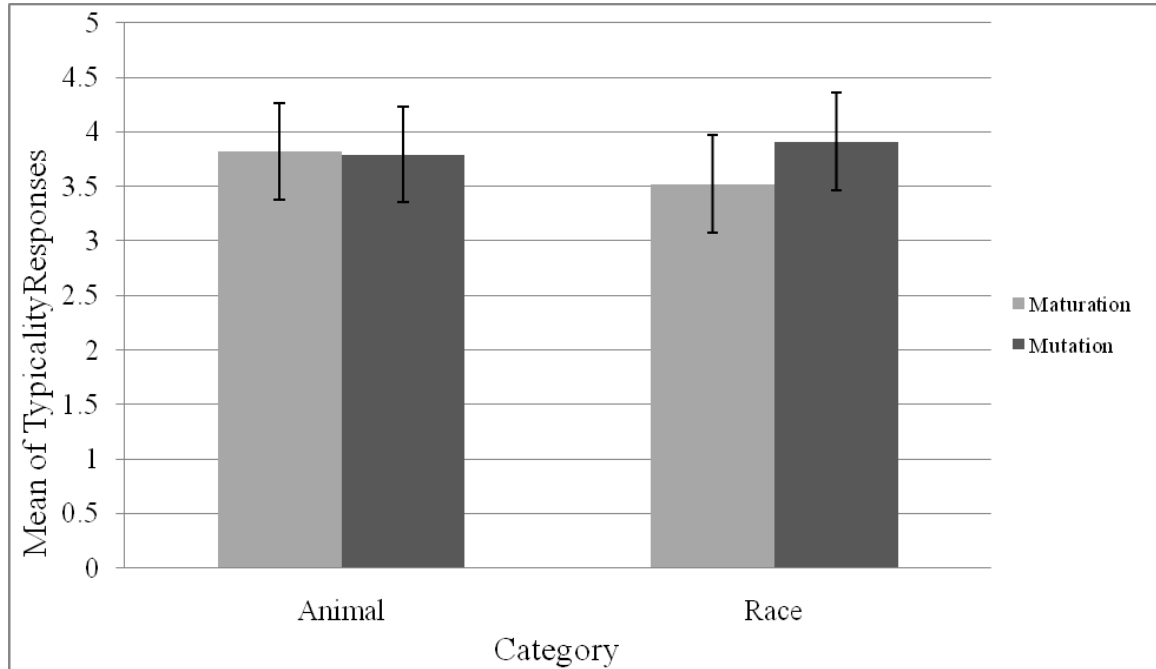
#### *Typicality ratings*

Typicality ratings (lower scores indicate that the entity was more similar to the initial category and higher scores indicate the final category) were averaged across stories

within a category (animal or race). Average typicality ratings were submitted to a 2 (category: animal vs. race) x 2 (condition: mutation vs. maturation) x 2 (offspring: included vs. excluded) x 2 (question: before change vs. after change) Analysis of Variance (ANOVA) with condition and offspring as between-subjects factors and category and question as within-subjects factors. The analysis resulted in a main effect of question  $F(1, 33) = 521.52, p = <.01$ . Subjects gave the before change question lower ratings ( $M = 1.28$ ) than the after change question ( $M = 6.25$ ). Before the change, the subjects rated the animal/person as more typical of the initial category whereas after the change, the subject rated the animal/person as more typical of the final category.

The ANOVA also revealed a Category x Condition interaction  $F(1, 33) = 4.39, p = <.05$ . Post-hoc single df contrasts approached significance for the race category  $F(1, 33) = 3.23, p = .08$ . When presented with race change stories, subjects in the mutation condition had a tendency to say that the person is more typical of the final category ( $M = 3.91$ ) than in the maturation condition ( $M = 3.52$ ). However, there was no condition effect in the animal category,  $F(1, 33) = .016, p = .89$  (see Figure 1).

Figure 1. Category x Condition Interaction



\*Error bars are used to indicate the statistical probability of errors (standard error).

#### *Sum change scores*

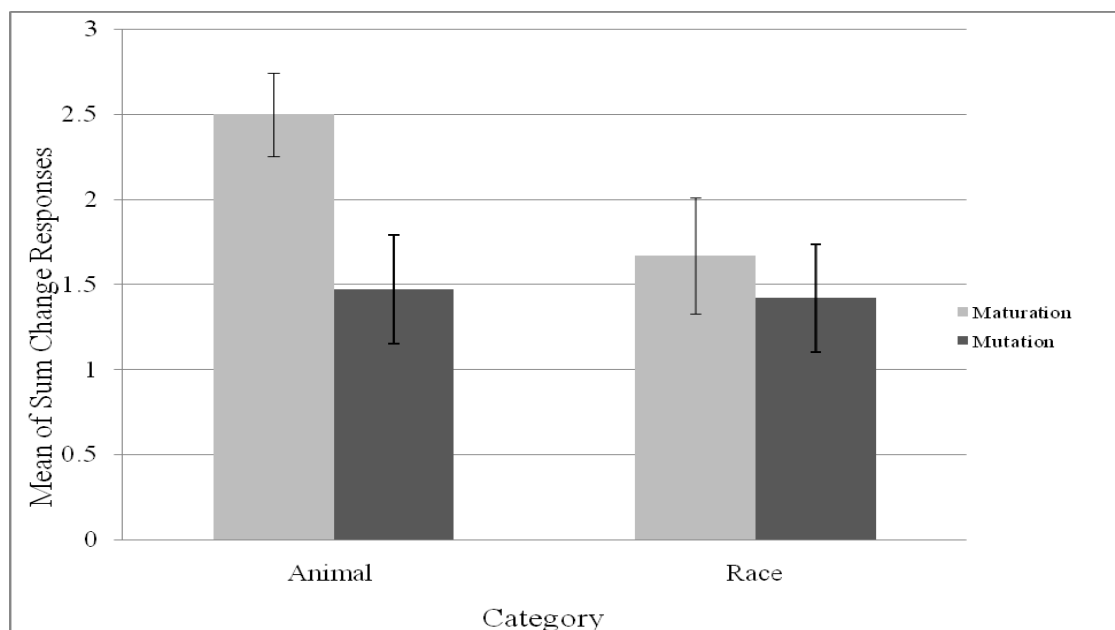
For each story, a score of zero was assigned if the subject said the exemplar did not change category membership and a score of 1 if the exemplar did change category membership. Scores were summed across the stories within each category (animal vs. race) and could range from 0 (none changed) to 3 (all changed). Change scores were submitted to a 2 (category: animal vs. race) x 2 (condition: mutation vs. maturation) x 2 (offspring information: included vs. excluded) x 2 (question: before change vs. after change) Analysis of Variance (ANOVA) with condition and offspring as between-subjects factors and category and question as within-subjects factors. The analysis resulted in a marginally significant main effect of offspring  $F(1, 33) = 3.98, p = .05$ . In the excluded condition in which the subjects were not given information about the

exemplar's offspring, subjects gave higher scores ( $M = 2.13$ ) than subjects in the included condition who received information that the physical and behavioral attributes of the exemplar's offspring were consistent with the initial category ( $M = 1.36$ ). Analysis also revealed a main effect of category  $F(1, 33) = 6.73, p = .01$ . Subjects had higher scores in the animal category ( $M = 1.97$ ) than in the race category ( $M = 1.54$ ) indicating they were less likely to say people changed their race than an animal could change its species.

The ANOVA also revealed a Category x Condition interaction  $F(1, 33) = 5.29, p = .03$ . Post-hoc single df contrasts showed a significant effect of condition at the animal level  $F(1, 33) = 7.20, p = .01$ . Subjects gave higher scores in the maturation condition ( $M = 2.5$ ) than in the mutation condition ( $M = 1.47$ ) indicating they believed the animal was more likely to change through natural processes rather than unnatural processes (i.e. mutation). However, there was no effect of condition at the race level  $F(1, 33) = .330, p = .57$  (see Figure 2).



Figure 2. Category x Condition Interaction



\*Error bars are used to indicate the statistical probability of errors (standard error).

Subjects consistently gave all of the stories either all zeros or all threes for both animal and race. In the reduced condition for animals, 11% of participants had change scores of zero and 63% had change scores of three. In the standard condition for animals, 44% of participants had change scores of zero and 50% had change scores of three. For race stories, in the reduced condition 26% of subjects had scores of zero and 53% had scores of three. For the standard condition, 56% of subjects had change scores of zero and 33% had scores of three. Overall, 84% of subjects were completely consistent with their scores. This suggests that people are not responding randomly, but in consistent ways.

### *Confidence ratings*

Confidence ratings (which measured the subject's confidence of their response on a scale of 1 - *completely unsure* to 5 - *completely sure*) were averaged within the animal and race categories. Confidence ratings were submitted to a 2 (category; animal vs. race) x 2 (condition; mutation vs. maturation) x 2 (offspring; included vs. excluded) x 2 (question: before change vs. after change) Analysis of Variance (ANOVA). The analysis revealed no main effects or interactions (all p-values were greater than .05). The overall confidence rating was  $M = 3.94$  suggesting that most participants tended to be more sure than unsure of their response.

### *Justifications*

Hampton et al. (2007) coded their participant's justifications into three different categories: *surface features* (what the exemplar looked and acted like; appearance and behavior), *deep* (the offspring were of a particular appearance) and *cause* (the nature of the change). In this study, participants provided a wide array of answers with various components. Therefore, new categories were made to address and understand the various justifications provided in the current study. Justifications were coded into one or more of the following categories: *appearance* (what the animal/person looked like), *behavior* (how the animal/person acted), *offspring* (subject made general reference to offspring or what offspring looked/acted like), *biology/genetics* (subject made reference to DNA, biological process, or "born that way"), *change* (subject made reference to the change or process the animal/person underwent), *initial* (subject made reference to the animal in the initial state, what it started out as), *final* (subject made reference to the animal in the final

state, what it ended up as), *country of origin/culture* (subject made reference of the person's nationality, ethnicity, where they were from, or the culture they were exposed to), and *supernatural power* (subject made reference to a supernatural power (e.g. God) making them a particular way) (see Appendix pp. 64-65). After justifications were coded, the participants were divided into groups based on whether they had stated that the animal/person had (final category) or had not changed (initial category). These groupings provided information as to why the subject either essentialized or did not essentialize animals or race.

In order to analyze subject's justifications within each justification category, a z-test for significance between two proportions was used. Statistical analysis revealed that participants who did not essentialize race were more likely to use appearance ( $z = 3.52, p = <.01$ ) and behavior ( $z = 2.16, p = <.05$ ) in their justifications. In contrast, participants who essentialized race, were more likely to use biology/genetics as their justification than those who did not ( $z = 4.70, p = <.01$ ). For the offspring category, there was not a significant difference between those who did (11%) and did not essentialize race (5%) ( $z = 1.37, p = .17$ ). Statistical analysis also revealed that participants who did not essentialize animals were more likely (47%) to use appearance in their justifications than those who did (21%) ( $z = 3.17, p = <.01$ ). Unlike race, behavior was not significant for those who did not essentialize animals (18%) and those who did (9%) ( $z = 1.43, p = .15$ ). Furthermore, the participants who essentialized animals, were more likely (19%) to use biology/genetics as their justification than those who did not (7%) ( $z = 1.43, p = <.05$ ). For offspring, there were not enough observations in the non-essentialized group to calculate a z-score (see Figure 3 and Figure 4).

Figure 3. Animal Justifications

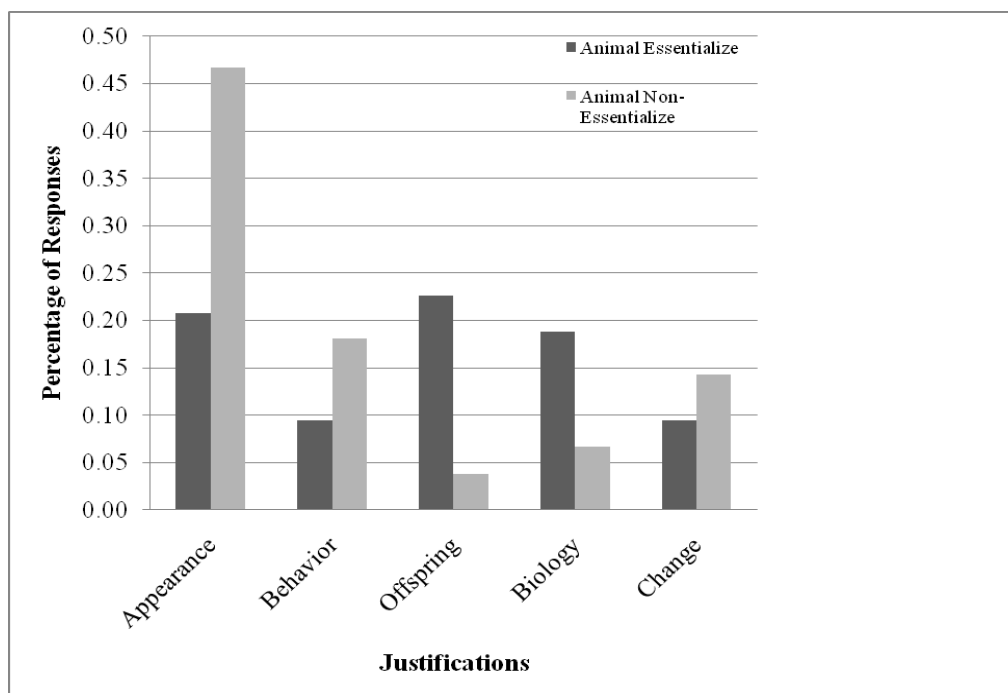
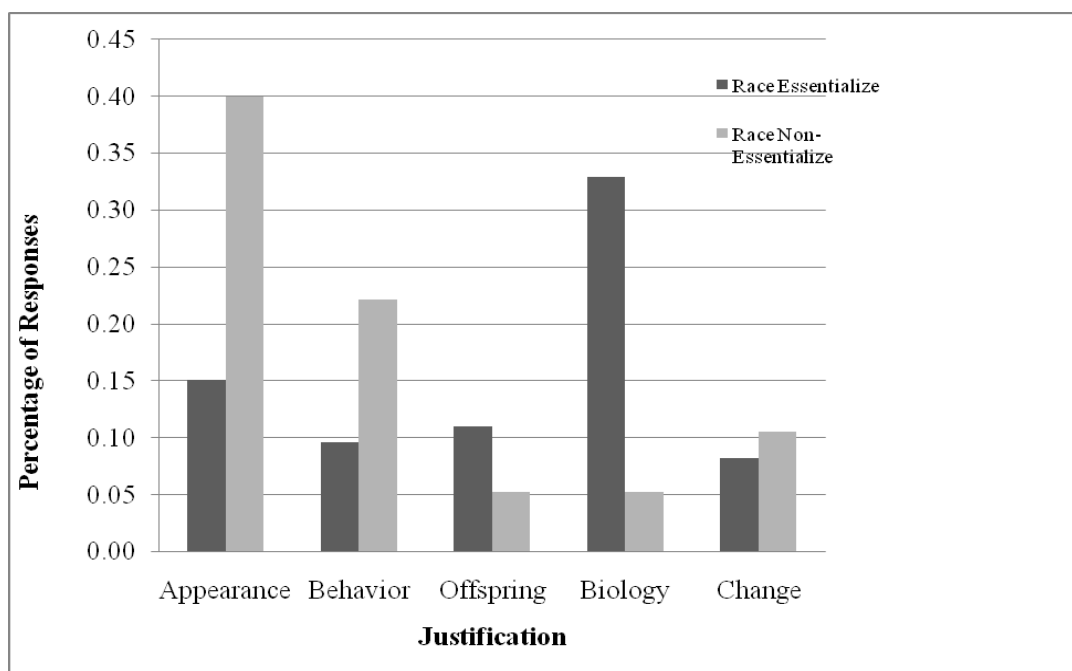


Figure 4. Race Justifications



### *Summary of Results and Discussion*

Consistent with the typicality results reported in Study 1 of the Hampton et al. (2007) article, subjects rated the animal or person more typical of their initial category before the change and more typical of the final category after the change. Unlike the Study 1 and Study 2 results from Hampton et al. (2007), a category by condition interaction revealed that subjects rated a person more typical of the final category in the mutation condition. This interaction was only found for race. These results indicate that subjects believed a person was more typical of the final category if mutation was the cause of the change.

Results from the change score analysis also confirmed several of my hypotheses about the essentialism of animals and race. A main effect of category revealed that people were more likely to say that an animal could change their species than a person could change their race. Furthermore, a main effect of offspring in the sum change analysis revealed that people were more likely to essentialize race in the included condition (i.e. offspring information is provided). Inconsistent with my hypothesis that subjects are equally likely to essentialize animal and race categories despite the cause of the change, an interaction between category and condition indicated that subjects were more likely to say the animal had changed as a result of maturation than as a result of mutation. However, this condition effect was not significant for race. This suggests that participants were more likely to indicate that a change in an animal (and not race) was due to biological changes within the animal. This finding may suggest that any prior knowledge the participants held (i.e. knowledge about animal's physical adaptation to their environment or evolution) may have made the maturation condition more realistic.

Furthermore, justification data indicated that participants who were more likely to essentialize animal categories relied on the animal's biology/genetics as the reason for why the animal did not change. For those participants who did not essentialize animals, they relied heavily on the animal's appearance. Similarly, participants who essentialized race also relied on biology/genetics to explain why the person's race had not changed. In contrast to animals, those who did not essentialize race stated appearance and behavior as their reasons for believing the person had changed. The fact that subjects who did not essentialize animals only used appearance, suggests that behavior is seen as a defining feature that separates humans and animals.

Overall, the results of Study 1 suggested that participants may not have distinguished between the maturation and mutation conditions since condition was not significant for race stories. This suggests the “natural transformation” was no more natural than the toxic transformation. Therefore, I decided to create new scenarios that provided a clearer distinction between these two processes. In the new scenarios, the changes were based upon an intended (changes that were naturally occurring in animals or a change based on a choice made by a person) versus unintended (changes in animals as a result of an unnatural occurrence or a side effect of medication in a person) change. Such changes help us to more clearly understand why participants are willing to essentialize animals and race. When presented with race change stories, subjects in the mutation condition had a tendency to say that the person is more typical of the final category ( $M = 3.91$ ) than in the maturation condition ( $M = 3.52$ ). However, there was no condition effect in the animal category,  $F(1, 33) = .016, p = .89$ .

This finding supports the theory of causal homeostasis. In the maturation

condition, the person may have been viewed as possessing an “essence” that would lead to the “predestined” changes as they matured. However, in the mutation condition, subjects may have viewed the mutation scenario as having actually changed the deep properties within the person. In addition, offspring proved to be a key factor in many of the participants’ choices. The excluded offspring condition was significant at the category level. This suggests that participants were more likely to say an animal or race had changed when a description about the offspring’s appearance and behavior was excluded. This suggests that genetic information (what kind of offspring does the person produce) is important to participants. At the same time, some of the participants cited social or cultural bases for race. If race is primarily social or cultural, then genetic information should be less important. In order to more directly test this idea, in Study 2, a new condition was created to determine the effect of a change in the germ line. In these instances, offspring information was provided for all animal and race stories. These new scenarios included a statement that the animal or human’s offspring resembled the initial state, *I* or that the animal or human’s offspring resembled the final state, *F*; thus creating an initial condition (the offspring resembled the initial state, *I*) and final (the offspring resembled the final state, *F*) condition.

### III.

#### Study 2

##### *Methods*

##### *Participants*

Ninety-six undergraduate students (67 female, 29 male; 80 Caucasian, 8 African-American, 2 Asian, 2 Hispanic, 1 Native American, 1 West Indian, 2 biracial) from Western Kentucky University participated in the study for extra credit or course credit. Participants were obtained through the university's psychology study board and each participant was provided informed consent.

##### *Stimuli*

Study 2 was the same as Study 1 except that one-half of the scenarios included a statement that the animal or human's offspring resembled the initial state, *I*. One-half of the scenarios included a statement that the animal or human's offspring resembled the final state, *F*. Because Study 1 revealed that condition (e.g. maturation and mutation) was not significant and did not affect how people responded to race stories, three new scenarios explaining racial transformations (black to white, white to Asian, etc.) were created. These new stories explained how a child of one race came to look and act like an adult of another race. Conditions were no longer a result of mutation and maturation. Instead, the new racial transformation stories described race changes as a result of unintended (e.g. change as a result of an unexpected side effect of medication) or intended (e.g. change brought about by one's decision to take medication to alter one's appearance) change. Changes were also made to the transformation stories about animals.



Much like the race stories, the scenarios described animal changes as a result of an intended (e.g. change as a result of a naturally occurring process) or unintended (e.g. change brought about by contamination from the environment) change (see Appendix pp. 60-61).

### *Design and procedure.*

Each scenario was followed by two rating scales. Questions followed the same typicality and categorization rating format used in Study 1. Because confidence ratings failed to reveal main effects in Study 1; therefore they were removed from Study 2. In addition to the rating scales, participants were asked the following open-ended question: “Why do you believe this object/animal/person is an  $x$  or a  $y$ ? What information was most important in arriving at this decision? Please provide a full justification for how you arrived at this decision.” The phrase “What information was most important in arriving at this decision?” was added due to the fact that many of the participants’ justifications in Study 1 were unclear in their reasoning for the responses. Thus, the new phrase was added to the justification question in order to probe participants for more fine-tuned answers (see p. 63).

Procedures for Study 2 remained the same as Study 1.

### *Results*

Stories that described changes to artifacts and bodily changes were treated as “filler” scenarios used to keep participant interest. The results of these scenarios were not analyzed. Furthermore, the majority (89%) of subjects stated that any changes that

occurred to objects or bodily changes (e.g. weight loss/gain and increased/decreased hair length) changed the typicality and category membership of the object or individual.

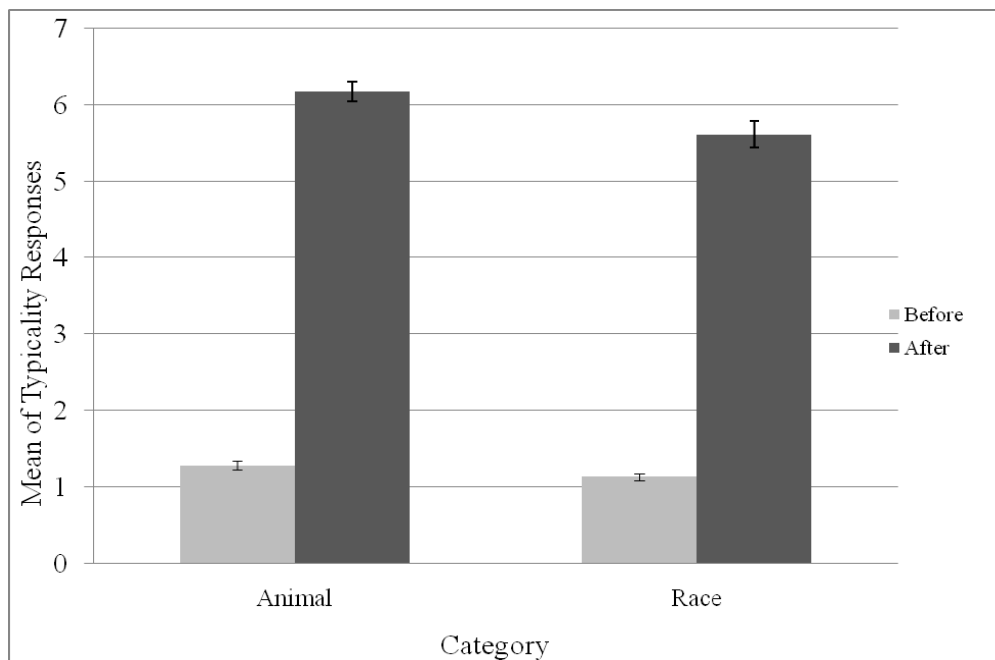
### *Typicality ratings*

Typicality ratings (lower scores indicate that the entity was more similar to the initial category and higher scores indicate the final category) were averaged across stories within a category (animal or race). Typicality ratings were submitted to a 2 (category: animal vs. race) x 2 (condition: intended vs. unintended) x 2 (offspring: initial vs. final) x 2 (question: before change vs. after change) Analysis of Variance (ANOVA) with condition and offspring as between-subjects factors and category and question as within-subjects factors. The analysis resulted in a main effect of offspring  $F(1, 92) = 8.93, p = <.01$ . Subjects gave lower ratings when the offspring were identified as the initial category ( $M = 3.37$ ) than when the offspring were identified as the final category ( $M = 3.73$ ). Therefore, the subjects saw the animal/person as more typical of the initial category if the offspring were also identified as the initial category and more typical of the final category if the offspring were identified as the final category. The analysis also indicated a main effect of question  $F(1, 92) = 955.09, p = <.01$ . Subjects gave the before change question lower ratings ( $M = 1.20$ ) than the after change question ( $M = 5.89$ ). Before the change, the subjects saw the animal/person as more typical of the initial category whereas after the change, the subject saw the animal/person as more typical of the final category. The ANOVA also revealed a main effect of category  $F(1, 92) = 17.13, p = <.01$ . Subjects gave higher ratings to animal categories ( $M = 3.73$ ) than to race categories ( $M = 3.37$ ) indicating that animals were viewed as being more typical of the

final category than were race categories.

The analysis also produced a Category x Question interaction  $F(1, 92) = 7.20, p = <.01$ . A post-hoc t-test revealed a difference between ratings of animal and race when measured by the before question ( $t(95) = 2.33, p = <.05$ ) and a difference between animal and race ratings when measured by the after question ( $t(95) = 3.79, p = <.01$ ). These results suggest that subjects believed that both animals and race were more typical of the final category after the change and that a change had occurred. Also, before and after questions showed a change in typicality for animals ( $t(95) = 32.63, p = <.01$ ) and race ( $t(95) = 23.57, p = <.01$ ). These results indicate that subjects believed animals were more typical of the final category than race was typical of the final category. However, this interaction is so small it is not psychologically meaningful (see Figure 5).

Figure 5. Category x Question Interaction



\*Error bars are used to indicate the statistical probability of errors (standard error).

### *Sum change scores*

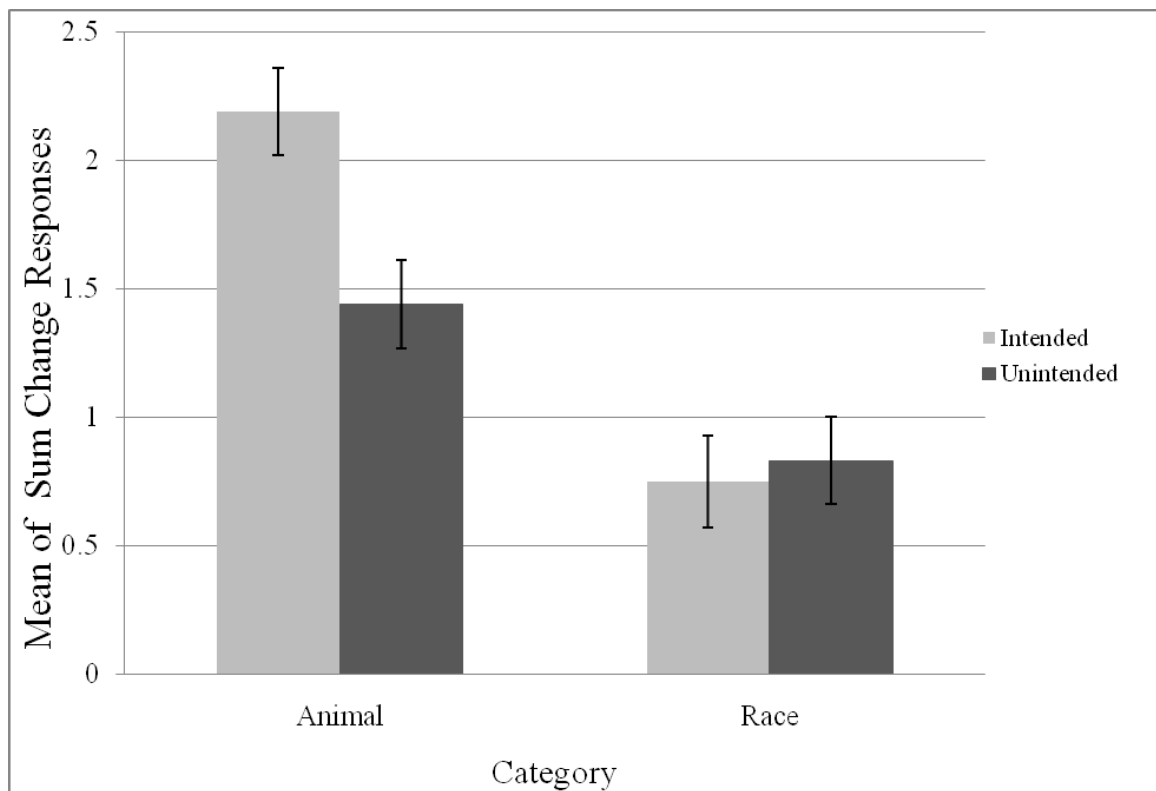
For each story, a score of zero was assigned if the subject said the exemplar did not change and a score of 1 if the exemplar did change. Scores were summed across the stories within each category (animal vs. race) and could range from 0 (none changed) to 3 (all changed). Change scores were submitted to a 2 (category: animal vs. race) x 2 (condition: intended vs. unintended) x 2 (offspring: initial vs. final) Analysis of Variance (ANOVA) with condition and offspring as between-subjects factors and category and question as within-subjects factors. The analysis resulted in a significant main effect of offspring  $F(1, 92) = 31.33, p = <.01$ . Subjects were more likely to indicate the exemplar had changed ( $M = 1.80$ ) when the exemplar's offspring resembled the changed (i.e. final) state than when the offspring resembled the unchanged (i.e. initial) state ( $M = .80$ ). There was also a marginally significant main effect of condition  $F(1, 92) = 3.48, p = .07$ . Subjects gave higher scores when they were presented with the intended condition ( $M = 1.47$ ) than when given the unintended condition ( $M = 1.14$ ). This indicates that subjects were more likely to accept the exemplar had changed as a result of an intended change (natural processes) rather than an unintended change (contamination). Therefore, subjects were more likely to say an animal or race had changed when the change was intended.

The ANOVA revealed a Category x Condition interaction  $F(1, 92) = 10.17, p = <.01$ . Single df contrasts showed that in both the intended condition  $F(1, 47) = 49.69, p = <.01$  and unintended condition  $F(1, 47) = 12.58, p = <.01$ , subjects rated animals as more likely to change than race. However, the magnitude of the difference was greater for the intended condition than the unintended condition.

A t-test ( $t(94) = 3.11, p = <.01$ ) also revealed a difference between intended

versus unintended conditions for animals. This suggests that subjects were more likely to indicate a change in the animal if the change had been the result of an intended change rather than an unintended change. However, a t-test ( $t(94) = .03, p = .74$ ) did not reveal the same trend for race. Therefore, subjects were not any more likely to say race had changed if presented the intended or unintended condition (see Figure 6).

Figure 6. Category x Condition Interaction



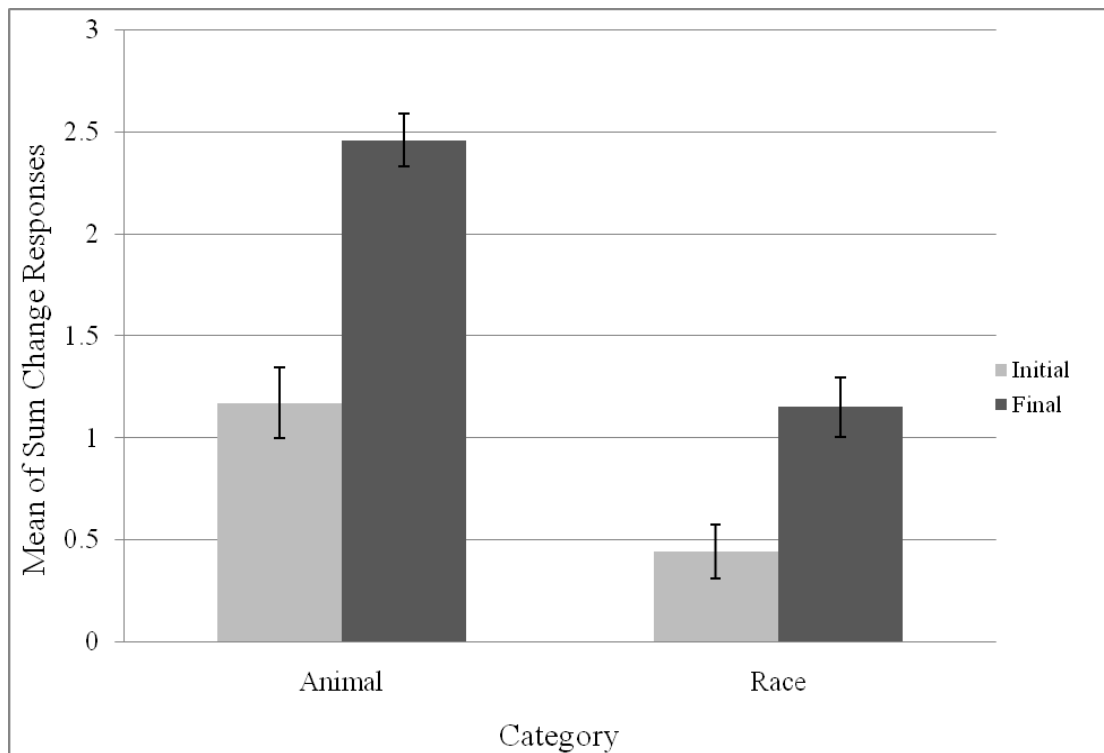
\*Error bars are used to indicate the statistical probability of errors (standard error).

The analysis also revealed a Category x Offspring interaction  $F(1, 92) = 4.98, p = <.05$ . A t-test revealed a significant effect of offspring for animals and race. For animals, in both the initial ( $t(94) = 3.87, p = <.01$ ) and final ( $t(94) = 5.87, p = <.01$ )

conditions, subjects were more likely to say that category had changed than race. This suggests that subjects were more likely to say category had changed for animals when the offspring were described as having characteristics of either the initial or final state than race.

A t-test also revealed a main effect of category for offspring. For both animals ( $t(94) = 5.99, p = <.01$ ) and race ( $t(94) = 2.99, p = <.01$ ), participants were more likely to say the animal or race changed when offspring were described as having characteristics of the final state than the initial state (see Figure 7).

*Figure 7. Category x Offspring Interaction*



\*Error bars are used to indicate the statistical probability of errors (standard error).

Moreover, as in Study 1, subjects consistently gave all of the stories either all zeros or all threes for both animal and race. In the offspring as final category condition for animals, 4% of participants had average change scores of zero and 69% of subjects had average change scores of three. In the offspring as initial category, 40% of participants had average change scores of zero and 21% had average change scores of three. For race stories, in the offspring as final category condition 52% of subjects had average change scores of zero and 31% of participants had average change scores of three. For the offspring as initial category condition, 73% of subjects had average change scores of zero and 8% had average change scores of three. Overall, 93% of subjects were completely consistent with their scores for all animal stories and all race stories. Like the results of Study 1, this suggests that people were not responding randomly, but in consistent ways.

### *Justifications*

In accordance with Study 1, justifications were coded into one or more of the following categories: *appearance* (what the animal/person looked like), *behavior* (how the animal/person acted), *offspring* (subject made general reference to offspring or what offspring looked/acted like), *biology/genetics* (subject made reference to DNA, biological process, or “born that way”), *change* (subject made reference to the change or process the animal/person underwent), *initial* (subject made reference to the animal in the initial state, what it started out as), *final* (subject made reference to the animal on the final state, what it ended up as), *country of origin/culture* (subject made reference of the person’s nationality, ethnicity, where they were from, or the culture they were exposed to), and

*supernatural power* (subject made reference to a supernatural power (e.g. God) making them a particular way) (see Appendix pp. 64-65). After justifications were coded, the participants were divided into groups based on whether they had stated that the animal/person had (final category) or had not changed (initial category). These groupings provided information as to why the subject either essentialized or did not essentialize animals or race.

Like Study 1, a z-test for significance between two proportions was used. Statistical analysis revealed that participants who did not essentialize race were more likely to use appearance ( $z = 4.66, p = <.01$ ), behavior ( $z = 3.32, p = <.01$ ) and type of change ( $z = 3.28, p = <.01$ ) in their justifications. In contrast, participants who essentialized race, were likely to use biology/genetics as their justification than those who did not ( $z = 5.47, p = <.01$ ). For the offspring category, there was not a significant difference between those who did (19%) and did not essentialize race (14%) ( $z = 1.13, p = .26$ ). Similar to the race category, statistical analysis revealed that participants who did not essentialize animals were more likely to use appearance ( $z = 2.92, p = <.01$ ) and change ( $z = 5.28, p = <.01$ ). For participants who used behavior in their justifications, there was a marginally significant difference between those who did not essentialize animals (13%) and those who did essentialize animals (8%) ( $z = 1.93, p = .054$ ). Furthermore, the participants who essentialized animals, were more likely to use biology/genetics ( $z = 5.06, p = <.01$ ) and offspring ( $z = 5.48, p = <.01$ ) as their justification (see Figure 8 and Figure 9).



Figure 8. Animal Justifications

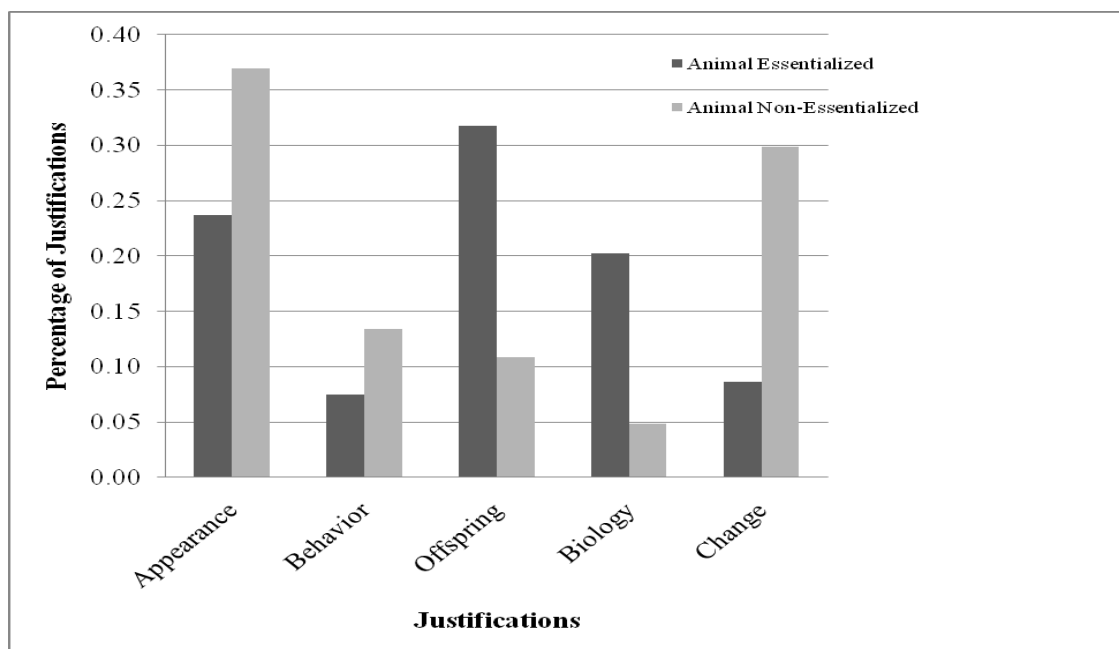
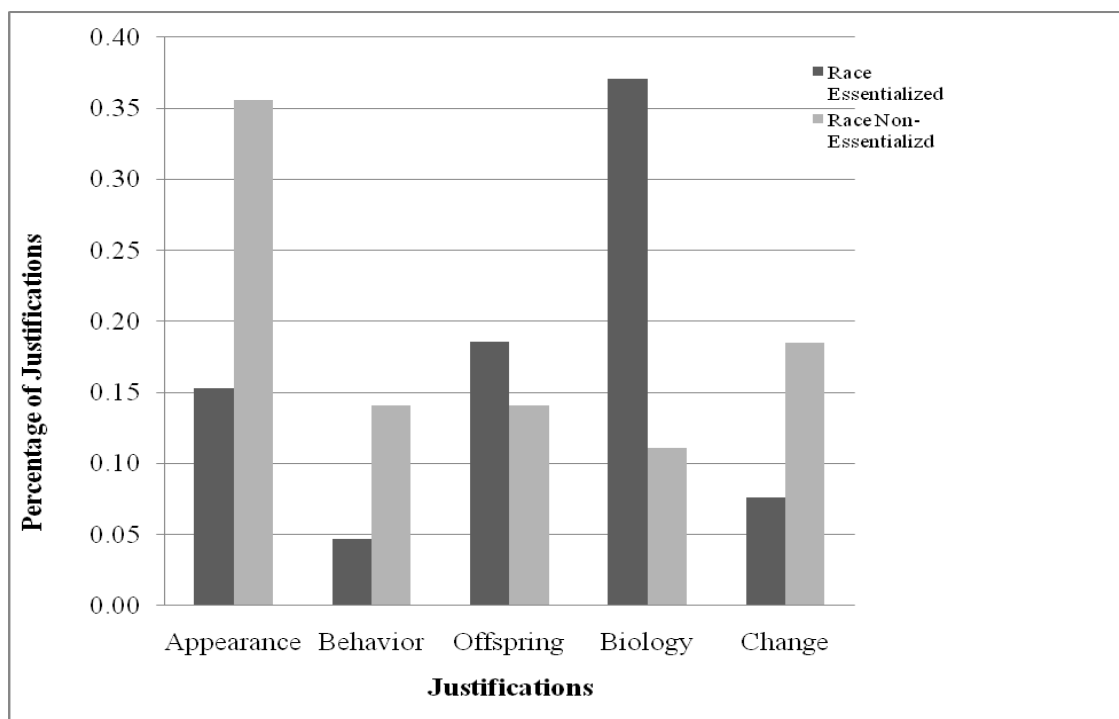


Figure 9. Race Justifications



### *Summary of Results and Discussion*

Consistent with the typicality results reported in Study 1 of the Hampton et al. (2007) article and Study 1 of the current research, a main effect of question revealed that subjects rated the animal or person more typical of their initial category before the change and more typical of the final category after the change. However, typicality results from the current study revealed a main effect of category. This main effect of category revealed that subjects gave higher ratings to animal categories; indicating that participants viewed animals as being more typical of the final category than race. Unlike Study 1 of the current research project, typicality rating analysis revealed a main effect of offspring which suggests that subjects perceived the animal or person as more typical of the initial category when offspring were described as being in the initial stage. Coinciding with the main effect of category found in Study 1 and Study 2 of the current research, a category by question interaction revealed that subjects rated an animal and person more typical of the final category after the change.

Results from the change score analysis greatly differed from the change score results found in Study 1. Although I hypothesized that subjects would be equally likely to essentialize animal and race categories despite the cause of the change, an interaction between category and condition revealed that people were more likely to say that an animal had changed as a result of an intended change (i.e. natural process) than the result of an unintended change (i.e. contamination). However, this trend was not found for race; indicating that participants were no more likely to say race has changed in either the intended or unintended condition. Furthermore, a main effect of offspring revealed that people were more likely to suggest that the animal or person had changed when provided

with information stating the offspring resembled the animal/person in the final state. A category by offspring interaction also revealed that subjects were more likely to say an animal or race had changed when their offspring were described as being in the final state. However, for animals only, subjects were more likely to indicate that the animal had changed regardless of the offspring's state (either initial or final).

Furthermore, justification data indicated that participants who essentialized animal categories relied on the animal's biology/genetics and offspring information as the reason for why the animal did not change. Participants, who did not essentialize animals, relied heavily on the animal's appearance, behavior, and change. In contrast to animals, participants who essentialized race only relied on biology/genetics to explain why the person's race had not changed. Similarly, those who did not essentialize race stated appearance, behavior, and change as their reasons for believing the animal had changed.

#### IV.

##### General Discussion

The main goal of the current study was to determine if people essentialize race and if so, to what extent. The study modeled the Hampton et al. (2007) research which focused on people's tendency to essentialize animals. By comparing the current study to the results of Hampton et al. (2007) research, I hoped to determine how the essentialism of animals differed from the essentialism of human categories such as race. Overall, the results found within the current study confirmed several of my hypotheses while also yielding some surprising and interesting results.

The first goal was to determine if the results of the current study were similar to the findings of Hampton et al. (2007). Consistent with the typicality results reported in Study 1 of the Hampton et al. (2007) article, the current research revealed that subjects rated the animal more typical of the initial category before the change and more typical of the final category after the change. This suggests that participants were willing to accept that physical changes did occur. Furthermore, this implies that people are willing to believe that animals can go through a physical transformation that greatly alters the animal's original appearance.

Consistent with Hampton et al.'s (2007) results in Study 3, when offspring information (information that described the offspring as having the same appearance and behavior as the animal or person before the change) was omitted in Study 1, participants were more likely to suggest that the animal had changed. These results are believed to have occurred because offspring provides further information about the animal's biology, genetics, and ultimately their "essence". If such information is omitted, participants have

to rely on information about the animal's appearance and behavior after the change.

Furthermore, when offspring information is unknown to the subject, the change can be viewed as having actually changed the internal properties of the animal. Thus, the cause of change becomes the main focus instead of information (i.e. offspring characteristics) that may negate how "deep" the change occurred.

In contrast to Hampton et al. (2007) findings in Study 3 that people were likely to say the animal had changed regardless of the cause of transformation, Study 1 of the current research revealed that subjects were more likely to say the animal had changed as a result of maturation. This finding may suggest that participants found the maturation more believable than the mutation condition. Furthermore, any prior knowledge the participants may have held, such as knowledge about animal's physical adaptation to their environment as well as evolution, may have made the maturation condition more realistic; thus making it more plausible to rate that the animal had changed.

Hampton et al. (2007) found that participants were more sure of their category judgments of animals before the change occurred. In addition, participants were less sure of their category judgments after the change in conditions where information about the animal's offspring was provided versus scenarios that excluded information about the animal's offspring. Contrary to these results, Study 1 of the current study revealed no main effects or interactions. Furthermore, the overall confidence rating was  $M=3.94$  suggesting that most participants tended to be more sure than unsure of their response. Ultimately, I am unsure as to why differences in confidence ratings occurred between the current study and the study conducted by Hampton et al. (2007).

Finally, justifications between the current study and the Hampton et al. (2007)

research were also similar. Justification results of Study 2 are consistent with the Study 1 results Hampton et al. research in that people who failed to essentialize animals relied heavily on appearance as their justification for why the animal had changed. However, in Study 1 of the current research, people who failed to essentialize animals relied only on appearance as their justification; behavior was not found to be significant. Furthermore, people who failed to essentialize animals in Study 2, also used change (the fact that some transformation had occurred) as part of their justification for why the animal had changed. Consistent with the results of Study 1 in the Hampton et al. (2007) article, subjects who essentialized in Study 2, but not Study 1, used information about offspring as justification for why the animal had not changed. Furthermore, unlike the results of the Hampton et al. research, those who essentialized animals in Study 1 and Study 2 also used biology/genetics as their justification for why the animal had not changed.

### *Do people essentialize race?*

The second goal of the study was to determine if subjects have a tendency to essentialize race. Typicality results of Study 1 reveal that before the change, participants rated the person as more typical of the initial category and more typical of the final category after the change. Furthermore, for typicality ratings, people rated race as more typical of the final category in the mutation condition. These results suggest that participants may have viewed changes in race as more plausible in the mutation condition than in the maturation condition. Change scores from Study 1 also revealed that people were less likely to indicate a change in race than a change in animals. Furthermore, the condition was not significant for race; indicating that the type of change (either mutation

or maturation) that occurred made participants no more likely to accept this change. Ultimately, these results suggest that participants were more likely to essentialize race than animals.

Study 2 revealed similar results for typicality ratings. Again, subjects rated a person more typical of the initial category before the change and more typical of the final category after the change. This indicates that participants were willing to accept that physical changes did occur to the person to make them more typical of the new race. Furthermore, a category by question interaction reveals that animals were viewed as more typical of the final category after the change than race. This is an important finding because it implies that people are more willing to believe that animals, not people, can go through a physical transformation to alter their appearance. For change score data, subjects were less likely to say that race had changed in both intended and unintended conditions when compared to animals. Again, these results indicate a tendency for participants to essentialize race more often than animals.

### *How do people essentialize race?*

One of the most important goals of this study was to determine how and to what extent people essentialize race. Results from Study 1 indicated that when information about offspring was provided, people were less likely to indicate that race had changed. Change score results from Study 2 also suggest that people were less likely to say race had changed (when compared to animals) in either the intended or unintended condition. Furthermore, justification data was collected and analyzed to determine what information people used to reach their final decision. Those subjects who essentialized race indicated biology/genetics (in Study 1 and Study 2) as the reason for why they believed the person

had not changed. In comparison, people who essentialized animals used biology/genetics (in Study 1 and 2) as well as offspring (in Study 2). Although similar information was used as justification for why animals and race had not changed, people were still less willing to accept that a change occurred in race. This may suggest that people believe there is a larger genetic/biological component to race than animals. Furthermore, people may be more willing to accept changes in animals due to the fact that the scenarios (i.e. maturation and mutation vs. natural process and toxic contamination from the environment) may be more believable for animals than humans. This may be the case given that environmental adaptation and evolution are more widely accepted for animal categories than for humans. However, a change in race may be viewed as more as being static given societal and biological components and perceptions of race.

As mentioned in the introduction, when we study how individuals define the characteristics or the “essences” that are believed to “cause” race; we gain knowledge about how people create racial categories and how those groupings shape our racial judgments. Justification data provided in Study 1 and Study 2, confirms participants’ belief that race is an “essence” or an unseen and underlying property with complex biological and genetic components. While subjects who failed to essentialize race relied on information about the person’s appearance or behavior; subjects who essentialized race used biology/genetics as the reason for why race cannot be changed. This suggests that the majority of participants believe race to be more complex than one’s appearance and behavior. In addition, they point to biology and genetics as the “essence” that differentiates racial categories. Moreover, this study has confirmed people’s resistance to state that race is a changeable feature. Although they are more likely to state that a person



can take on the characteristics of a new race, they are still reluctant to believe the person's "essence" has indeed changed.

Overall, this study has added to the field of psychology by providing even more insight about the ways people understand and categorize social categories such as race. This study provides further support for the belief that race as a natural kind given that subjects were more likely to essentialize race than animals. The study also suggests that people view race differently than other factors related to appearance (i.e. hair length and weight). In both studies, the majority of subjects were willing to state that a person changed if their hair or weight changed; however, they were unwilling to indicate a person could change their race. Furthermore, the justification data obtained in the study was one of the first studies to differentiate the reasoning used by those who did and did not essentialize animals and race. Aside from these contributions, this study also reveals important information about the participants. Participants in Study 1 and Study 2 were able to distinguish typicality from category membership. Although they were likely to suggest the animal or person was typical of the final category after a change occurred, they were unwilling to indicate that the animal or person had actually changed category membership after such change occurred. These judgments are quite mature and suggest that participants had the ability to disassociate between the exemplars' appearance and the "essence" that defined the animal or person. Despite these mature judgments, participants' tendency to essentialize race and associate race with biological components (e.g. genetics) may have negative social implications. As Keller (2005) concluded, a belief in biological components of essentialism is associated with negative racial stereotyping, sexism, and prejudice. Therefore, participants who were more likely to

respond in an essentialist fashion may hold more sexist, prejudice, and stereotypical ideas of racial groups than those who failed to essentialize race.

Despite the interesting discoveries found in Study 1 and Study 2 of the current research, questions still remain. What part does one's own race play in the essentialism of race? Why are people more likely to essentialize racial categories than animals? When presented with the same scenarios, do children essentialize race? If so, do children essentialize race in the same way as adults? Although hypotheses can be made, specific answers cannot be directly determined by the current study. While these questions are worth exploring in future research, we must look at the current research as a small step in understanding the complex realm of race.

## REFERENCES

- Bhatia, S. (2007). Opening up cultural psychology: Analyzing race, caste, and migrant identities. *Human Development, 50*, 320-327.
- Cosmides, L., Tooby, J., & Kurzban, R. (2003). Perceptions of race. *Trends in cognitive sciences, 7*(4), 173-179.
- Estes, Z. (2003). Domain differences in the structure of artifactual and natural categories. *Memory & Cognition, 31*(2), 199-214.
- Gelman, S.A. (2003). The essentialist child: Origins of essentialism in everyday thought. New York, NY: Oxford University Press, Inc.
- Glerum, J.N. (2002). Children's understanding of racial classification as a function of their knowledge of inheritance. Unpublished graduate thesis, Western Kentucky University, Bowling Green.
- Hampton, J.A., Estes, Z., & Simmons, S. (2007). Metamorphosis: Essence, appearance, and behavior in the categorization of natural kinds. *Memory & Cognition, 35*(7), 1785-1800.
- Haslam, N., Rothschild, L., & Ernst, D. (2000). Essentialist beliefs about social categories. *British Journal of Social Psychology, 39*, 113-127.
- Keller, J. (2005). In genes we trust: The biological component of psychological essentialism and its relationship to mechanisms of motivated social cognition. *Journal of Personality and Social Psychology, 88*(4), 686-702.
- Mahalingam, R. (2007). Essentialism, power, and the representation of social categories: A folk sociology perspective. *Human Development, 50*, 300-319.

Markman, E.M. (1989). *Categorization and naming in children: Problems of induction*.

Cambridge, MA: The MIT Press.

Medin, D. & Ortony, A. (1989). Psychological essentialism. In S. Vosniadou & A. Ortony (Eds.), *Similarity and analogical reasoning* (pp. 179-195). Cambridge: Cambridge University Press.

Rips, L. J. (1989). Similarity, typicality, and categorization. In S. Vosniadou & A. Ortony (Eds.), *Similarity and analogical reasoning* (pp. 21-59). Cambridge: Cambridge University Press.

Rosch, E. & Mervis, C.B. (1975). Family resemblance: Studies in the internal structure of natural categories. *Cognitive Psychology*, 7, 573-605.

Stepanova, E.V. & Strube, M.J. (2009). Making of a face: Role of facial physiognomy, skin tone, and color presentation mode in evaluations of racial typicality. *The Journal of Social Psychology*, 149(1), 66-81.

Wetton, R.E. (2006). Children's beliefs in relation to the essences of race. Unpublished graduate thesis, Western Kentucky University, Bowling Green.

## Appendices

## INFORMED CONSENT DOCUMENT

Project Title: Essences and Transformations in Objects, Animals, and Humans

Investigator: Brooke Smith, B.A. and Kelly Madole, Ph.D., Dept. of Psychology, 745-6475

You are being asked to participate in a project conducted through Western Kentucky University. The University requires that you give your signed agreement to participate in this project.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask him/her any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have.

If you then decide to participate in the project, please sign on the last page of this form in the presence of the person who explained the project to you. You should be given a copy of this form to keep.

**1. Nature and Purpose of the Project:** The goal of this study is to understand how adults think about important categories such as objects, animals, and people.

**2. Explanation of Procedures:** You will be asked to read 10 to 20 scenarios and then answer some brief questions about the identity of the object, animal, or person in the story. In addition, you will be asked to supply your reasons for these answers. The entire procedure should take no more than 45 minutes.

**3. Discomfort and Risks:** This study has no risks beyond those you would incur in everyday life.

**4. Benefits:** Your instructor may provide you with course credit or extra credit for participating.

**5. Confidentiality:** Your participation in this research is confidential. Your name will not appear on any answer sheet. In the event of publication of this research, only group data will be reported. No personally identifying information will be disclosed.

**6. Refusal/Withdrawal:** 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.*

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Signature of Participant

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Date

---

Witness

---

Date

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT  
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY  
THE WESTERN KENTUCKY UNIVERSITY HUMAN SUBJECTS REVIEW BOARD  
Paul Mooney, Compliance Coordinator  
TELEPHONE: (270) 745-4652

## Debriefing Document

### Essences and Transformations in Objects, Animals, and Humans

Why do we categorize things the way that we do? What makes a horse a horse and not a zebra? Is it just the way it looks, or is there something deeper (an “essence”) that determines its identity? Cognitive psychologists have suggested that even young children are capable of ignoring appearance and instead act as though there is an essence that determines the category membership of natural objects. We may not know what this essence is, but we act as though it exists. So, in many studies, participants will deny that an animal can change its species membership just by changing its appearance. However, people are somewhat more likely to say an animal can change if the change is the result of a natural developmental process. Although there has been a fair amount of research on how people categorize animals and artifacts categories, less is known about how we categorize people. We know that racial categories, for example, can have a big impact on society as well as individuals. However, we do not know that much about what people think race is. Is it just the way a person looks, or is there some deeper essence to racial categories? We are using the same kinds of stories that researchers have used to understand animal categories to try to understand how people think about the social categories that are so important in everyday life. We very much appreciate your participation.

Brooke Smith ([alicia.smith@wku.edu](mailto:alicia.smith@wku.edu))

Kelly Madole ([kelly.madole@wku.edu](mailto:kelly.madole@wku.edu))



**Story Direction**

Direction 1:

Direction 2:

White-Black

Black-White

Asian-Black

Black-Asian

Asian-White

White-Asian

Curvy-Skinny

Skinny-Curvy

Short-Long

Long-Short

Snake-Lizard

Lizard-Snake

Bee-Hummingbird

Hummingbird-Bee

Horse-Zebra

Zebra-Horse

Pipe-Flute

Flute-Pipe

Flower Vase-Coffeemug

Coffeemug-Flower Vase

## Story Samples

### Study 1-Mutation, Included

#### **Object:**

When this object was made, it was used to hold coffee and other drinks. The object had other features associated with coffee mugs and was used for the kinds of things coffee mugs are used for. One day, as a result of alterations made by people, the coffee mug was changed. The handle was removed, it was filled with water, and roses were placed in it. Finally, the object looked like and served the purposes of a flower vase.

#### **Body Change:**

A child was thin and had other physical features of skinny people. The child did the kinds of things skinny people do. Over time, the child gained weight. The child developed fat in different areas of their body and developed other physical features associated with curvy people.

#### **Animal:**

This black and white animal had stripes, four legs, an elongated head, and a tail-it looked and acted just like a zebra. But over time, as a result of toxic contamination in its environment, the animal began to change. Toxic contamination caused a restructuring of the biological processes in the animal's body. It lost its stripes, turned brown, and it came to look and act just like a horse. When it mated, the offspring looked and acted just like zebras.

#### **Race:**

A white child had straight hair, light skin, and other physical features associated with white people. The child did the kind of things other white children do. One day, as a result of toxic contamination in its environment, the child began to change. Toxic contamination caused a restructuring of the biological processes in the child's body. The child developed the physical features associated with Asian people and began to act like Asian children. When the child grew older, got married, and had children of their own, their children looked and acted just like white people.

## Study 1-Maturation, Excluded

### **Object:**

When this object was made, it was used in a fountain. Water flowed through it and sprayed out in a lovely pattern. The object had other features associated with pipes and was used for the kinds of things pipes are used for. One day, as a result of alterations made by people, the pipe was changed. A section was cut off, holes were placed in it, a mouthpiece was added so people could blow through it, and it was polished. After these changes had been made, wonderful music could be made with it. Finally, the object looked like and served the purposes of a flute.

### **Body Change:**

A child had short hair and other physical features associated with short-haired people. The child did the kinds of things people with short hair do. One day, the child decided to let their hair grow longer. The child's hair became so long that the child was able to put their hair in a ponytail.

### **Animal:**

There was a small animal with transparent wings and a black and yellow striped body. It always went buzzing about. The animal looked and acted just like a bee. But then, as a result of natural developmental processes, the animal began to change. Natural developmental processes caused a restructuring of the biological processes in the animal's body. Eventually, it ended up with wings and feathers and lived on the nectar of flowers. It looked and acted just like a hummingbird.

### **Race:**

An Asian child had dark, straight hair, light skin, and other physical features associated with Asian people. The child did the kind of things other Asian children do. One day, as a result of natural developmental processes, the child began to change. Natural developmental processes caused a restructuring of the biological processes in the child's body. The child developed curly hair, dark skin, and other physical features associated with black people. The child began doing the kind of things black children do.

## Study 2-Unitended, Final

### **Object:**

When this object was made, it was used in a fountain. Water flowed through it and sprayed out in a lovely pattern. The object had other features associated with pipes and was used for the kinds of things pipes are used for. One day, as a result of alterations made by people, the pipe was changed. A section was cut off, holes were placed in it, a mouthpiece was added so people could blow through it, and it was polished. After these changes had been made, wonderful music could be made with it. Finally, the object looked like and served the purposes of a flute.

### **Body Change:**

A child had short hair and other physical features associated with short-haired people. The child did the kinds of things people with short hair do. One day, the child decided to let their hair grow longer. The child's hair became so long that the child was able to put their hair in a ponytail.

### **Animal:**

There was a small animal with transparent wings and a black and yellow striped body. It always went buzzing about. The animal looked and acted just like a bee. But then, as a result of toxic contamination from chemicals in its environment, the animal began to change. The chemicals caused a restructuring of the biological processes in the animal's body. Eventually, it ended up with wings and feathers and lived on the nectar of flowers. It looked and acted just like a hummingbird.

### **Race:**

An Asian child had dark, straight hair, light skin, and other physical features associated with Asian people. The child grew up in an Asian family and did the kinds of things families like them do. One day the child became sick with stomach problems. The child went to the doctor and the doctor prescribed medicine. As a result of side effects from the medication, they began to change. As the child grew older, the medication caused a restructuring of the biological processes in the person's body. The person developed the physical features associated with white people and began to act like white people. When the person got married, and had children of their own, their children looked and acted just like white people.

## Study 2-Intended, Initial

### **Object:**

When this object was made, it was used in a fountain. Water flowed through it and sprayed out in a lovely pattern. The object had other features associated with pipes and was used for the kinds of things pipes are used for. One day, as a result of alterations made by people, the pipe was changed. A section was cut off, holes were placed in it, a mouthpiece was added so people could blow through it, and it was polished. After these changes had been made, wonderful music could be made with it. Finally, the object looked like and served the purposes of a flute.

### **Body Change:**

A child had short hair and other physical features associated with short-haired people. The child did the kinds of things people with short hair do. One day, the child decided to let their hair grow longer. The child's hair became so long that the child was able to put their hair in a ponytail.

### **Animal:**

This brown animal had four legs, an elongated head, and a tail- it looked and acted just like a horse. But over time, as a result of natural development processes, the animal began to change. Natural developmental processes caused a restructuring of the biological processes in the animal's body. It developed black and white stripes, and it came to look and act just like a zebra. When it mated, the offspring looked and acted just like horses.

### **Race:**

An Asian child had dark, straight hair, light skin and other physical features associated with Asian people. The child grew up in an Asian family and did the kind of things families like them do. However, when the child grew older, they wanted to be different. As a result of chemicals provided by a doctor, they began to change. The chemical caused a restructuring of the biological processes in the person's body. The person developed the physical features associated with white people and began to act like white people. When the person got married, and had children of their own, their children looked and acted just like Asian people.

## Format of Survey

### Study 1

This black and white animal had stripes, four legs, an elongated head, and a tail-it looked and acted just like a zebra. But over time, as a result of natural developmental processes, the animal began to change. Natural developmental processes caused a restructuring of the biological processes in the animal's body. It lost its stripes, turned brown, and it came to look and act just like a horse. When it mated, the offspring looked and acted just like zebras.

**Instructions:** Please circle your response.

Before it changed, was the animal more typical of a zebra or a horse?

1	2	3	4	5	6	7
Zebra						Horse

After it changed, was the animal more typical of a zebra or a horse?

1	2	3	4	5	6	7
Zebra						Horse

After it changed, is the animal a zebra or a horse?

Zebra	Horse
-------	-------

How sure are you that this animal is either a zebra or a horse?

1	2	3	4	5
Completely		Neutral		Completely
Unsure				Sure

Why do you believe this animal is either a zebra or a horse? Please provide a full justification for how you arrived at this decision.

## Format of Survey

### Study 2

This brown animal had four legs, an elongated head, and a tail—it looked and acted just like a horse. One day, as a result of toxic contamination from chemicals in its environment, the animal began to change. The chemicals caused a restructuring of the biological processes in the animal's body. It developed black and white stripes, and it came to look and act just like a zebra. When it mated, the offspring looked and acted like zebras.

**Instructions:** Please circle your response.

Before it changed, was the animal more typical of a zebra or a horse?

1	2	3	4	5	6	7
Zebra						Horse

After it changed, was the animal more typical of a zebra or a horse?

1	2	3	4	5	6	7
Zebra						Horse

After it changed, is the animal a zebra or a horse?

Zebra	Horse
-------	-------

Why do you believe this animal is either a zebra or a horse? What information was most important in arriving at this decision? Please provide a full justification for how you arrived at this decision.

## **Examples of Justifications**

### **Appearance**

“They story said that the animal looked and acted like a horse. The chemicals changed the animal’s appearance...”

“It is still a horse its physically appearance just changed to look like a zebra.”

### **Behavior**

“It grew feathers and it acted as a hummingbird.”

“It no longer did the same things as a bee, so it wasn't a bee. It did all the things characteristic of hummingbirds and passed them down.”

### **Biology/Genetics**

“The person appeared white but internally their DNA hadn't changed. They were still black. Albino people, for example, appear white but they are black if they were born in a black family with a black mother and father.”

“The animal is still a zebra even after the contamination. Its offspring were zebra and its DNA is still that of a zebra.”

### **Offspring**

“The person is still a white person because even after alterations their offspring are white. A person's physical features don't determine race, genetics do.”

“The main information that proves this is a snake is what it produces. Since its offspring are snakes it must be a snake.”

### **Change**

“I believe the animal is a bee due to the toxic contamination from chemicals in the environment.”

“Their biology is very similar but the environmental changes altered specific DNA to cause changes.”

### **Initial**

“She started off Asian [...] therefore technically she is Asian.”

### **Final**

“It is a snake because it said it ended up looking like a snake.”



**Country of Origin/Culture**

An Asian person needs to have family or actually be themselves from Asia. You cannot change your nationality.

**Supernatural Power**

“God made you what you are. You can change the features but you're still the same as before.”

“It is still Asian because you can't change the soul or spirit of a person.”