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|  | **ACKNOWLEDGMENTS**  We would like to give our special thanks to Mr. Eric Thiel, our biology teacher, who guided and supported us in this project; Mrs. Joanne Nash, our statistics teacher who advised us through the statistic analysis; and to all the twins and siblings who took their time out to participate in the survey.  **INTRODUCTION**  **Hypothesis:**  Genes are the primary factor responsible for the similarity in thoughts, personality, and other psychological characteristics between twins.  **Prediction:**  If genes are primarily responsible for the unique bond of twins, then a personality evaluation survey given to identical twins, fraternal twins, and siblings close in age should show significant differences in the statistical results.  **History and Development**  The scientific significance of twins first became apparent just over a hundred years ago. Sir Francis Galton, the cousin of the great biologist Charles Darwin, first spotted the potential of twin studies. In 1865 Sir Francis Galton predicted the differences between monozygotic (MZ) and dizygotic (DZ) twins and began to look for the consequences of this distinction.  Twinning is the process that leads to the production of more than one offspring at birth. The two common types of double births are dizygotic (DZ) twins and monozygotic (MZ) twins. In human beings, one egg is normally released at each ovulation; if fertilized, it grows into a single fetus. Dizygotic twins, commonly called fraternal, occur when two eggs are released during ovulation, and each is fertilized independently with a different sperm. As a result, two separate fetuses grow, each with its own placenta. Dizygotic twins are conceived and delivered together, but are genetically different, like other brothers and sisters, and can be of the same or different gender. Monozygotic twins, commonly called identical, begin from a single fertilized egg but instead of developing into a single fetus, gradually split into two separate individuals. Thus, identical twins have identical sets of genes, and are always of the same sex with similar appearance.  Studies have found "that twins usually are born earlier and are smaller than single babies" (Cole, 44). And "premature twins actually have a greater chance of survival than premature singletons. In addition, all but 4% of singleton children emerge from the womb in the easiest and safest way, head first, but this is true only for half the twins. For about 37% of twin births, the baby comes out headfirst and the other baby is buttocks first" (Watson, 119). On average, singletons weigh approximately 8.16 � 8.82 pounds at birth while twins weigh approximately 5.51 � 6.17 pounds.  At birth, "one twin may look quite different, bigger, healthier, and more advanced than the other" (Watson, 24). Michelle and Jill�s (one set of twins who participated in our survey; their actual names are not used) mother recalls that her doctor said that the twin born first would tend to be stronger than the second twin. The mother found this to be true in her twins as Michelle was the more active, and larger in size at birth then Jill. In addition, Michelle is more outgoing, whereas Jill is more shy and timid. "She doesn�t really bring herself up to the crowd," described Michelle.  The occurrence of twinning varies among racial groups in the United States. Multiple births are most common among African-American, less common among Caucasians, and least common among Orientals. Dizygotic twins are most common among older mothers and tend to occur again in families having a history of multiple births. About 25% of the sets of dizygotic twins are both male, 25% are both female, and 50% are male-female combinations. Monozygotic twins, on the other hand, occur randomly in all races and follow no discernible genetic pattern. However, it does tend to occur more frequently in older mothers as well.  **Determination of Monozygotic Twins vs Dizygotic Twins**  How does one determine whether twins are identical (MZ) or fraternal (DZ)? First, monozygotic twins must be of the same sex, same blood groups, and the same haptoglobin types (haptoglobin is a blood serum protein). Strong physical likeness is not a reliable criterion for determining the types of twins because it can be modified during embryonic development. The analysis of blood groups is the most reliable data to determine twinning. Identical twins have *all* blood groups identical. An examination of the haptoblobins of the blood, studied by starch gel electrophoresis, increases further the accuracy of the determination. Other methods for diagnosing zygosity include physical resemblance questionnaires, dermatoglyphic analysis, and examination of placentas and placental membranes.  **Some Features Used in Diagnosing Twins**  Features  Types of Twins: Identical (MZ) Fraternal (DZ)  Sex: Same or opposite  Placenta: Single monochorionic, single dichorionic or two separate placentas Single dichorionic or two separate placentas  Blood groups: Same or different  Hand and foot prints: Close similarity, Close similarity or marked dissimilarity  Physical resemblance: Very strong  Ordinary familial  **Genes, Environment, or ESP?**  Twin research has been incorporated into a large number of behavioral science and medical science research programs. Because of the fact that twins have identical genes, it has been taken into consideration of the roles that genes and environment play in a person�s behavior and characteristics. There has been controversy among those who believe that "people are largely the same and that differences are imposed upon them by their environment," (Wright, 9) and others who believe that "people differ mainly because of their genes, and that the environments they find themselves in are largely of their own making or choosing" (Wright, 9).  **Extrasensory Perception**  Many professors and scientists have performed studies on twins, in hopes of finding the reason for the similarities and coincidences that occur between them. Some professors believe that twins have a "psychic" ability. Professor J.B. Rhine at Duke University in North Carolina investigated parapsychology--known also as extrasensory perception (ESP), precognition or psychokinesis. Some of Rhine�s experiments have yield results so improbable that they would occur by chance less than once in 10,000,000,000 times. Rhine is convinced that at points where twins have similar thought at the same time, paranormal is involved. However, mathematician Warren Weaver felt that with such a conclusion, "we are asked to accept an interpretation [the psychic] that destroys the most fundamental ideas and principles on which modern science has been based; we are asked to give up the irreversibility of time, to accept an effect that shows no decay with distance and hence involves �communication� without energy being involved; asked to believe in an effect: that depends on no known quantities and for which no explanation has been offered, to credit phenomena which are subject to decline or disappearance for unexplained and unexplainable reasons" (Watson, 132). Weaver believed that ESP is not an acceptable explanation for the simultaneous thoughts and similarities occurred among twins.  **Environment**  The Minnesota study was one of the important twin studies performed in the mid 1900s. One of the results showed that "all differences between monozygotic twins must be due to the effects of their environment, whereas the differences between dizygotic twins can be due either to environment or their genes. If the coincidences are not an "artifact of the investigation and they are not due to extrasensory perception (ESP) or other �psychic� powers, then they suggest that our genes affect our lives in all sorts of ways" (Watson, 18).  Environmental that the parents create also affect the behavior of twins. Studies show that "behavior by the mother of twins can highlight the similarity between them-- and may therefore *create* the appearance of more similarity" (Watson, 99). For example, mothers often tend to dress twins the same and regard them as a "unit." Studies show that by doing so, "in the early years of twins, parents may actually impede the development of a sense of individuality" (Watson, 155).  Thus they came up with conclusion that "twins often do have similar thoughts, but this is because they are so much alike and have so many experiences in common, not because they have some mysterious ability to share their thoughts" (Cole, 43). Twins are not just copies of each other, but they have a unique life of their own, and each have own experiences as well as personal memories for themselves.  **Genes**  Because of the genes that twins share, it is found that there may be a special bond between them. The special bond between twins often shows during infancy. Through observations, baby twins may have similar eating, sleeping, and behavior habits. It is said that "one twin may sometimes know something about what is going to happen [to the other]�there may also be unwitting signs between twins that offer clues as to what each one is about to do" (Watson, 37).  In a study by Dr. Peter Neubauer, a prominent psychiatrist at New York University�s Psychoanalytic Institute and a director of the Freud Archives, a pair of identical twin girls became subjects for a twin study in an adoption agency in New York City in the late 1960s. They were separated at birth and brought up in very different families. Neubaurer did an examination and after studying them for years found that their childhood habits and feelings toward family members as well as oneself were very similar, despite the fact that one was raised in a lower class and not as caring family while the other was raised in an higher class and more pleasant family. "The differences between the girls seemed merely stylistic; despite the differences in their environments, their pathology was fundamentally the same" (Wright, 6).  In a study of 105 same-sex twins from the Louisville Study, results showed that "identical twins are more similar [in personality traits] than fraternal twins" (Watson, 167). It also supported the idea that "quite a strong genetic component underlies personality, presumably acting on our brains in some way, and affecting the basic organization of our behavior" (Watson, 168).  **The Experiment**  In order to identify whether genes or environment are factors that influence the behavior or similarities between twins, a personality evaluation survey is conducted for sets of identical twins, fraternal twins, and siblings of close ages to fill out. Each set of twins and siblings are separated far from each other and are then asked to fill out the survey as to how they would respond then take the survey again and answer the questions as to how they think their twin will respond to the same questions. The questions asked are based upon situations that teenagers can relate to yet have not encountered before or discussed with their twins or siblings. The questions ranged from everyday situational type questions to in depth questions. This way, the results will not show how much they *know* each other, but rather, their personality types and how well they think their twin will respond. According to our hypothesis, the results should show that when comparing the answers between "how one twin answer the questions" verses "how that twin think the other twin will respond to the same questions," the identical twins would have the highest percentage of having the same answer, the fraternal twins have the second highest, and the siblings have and least percentage of having the same answers. If this is the case, then we can conclude that it is because of the sets of genes that twins have which influence their similar ways of thinking, thus able to have a higher accuracy of "prediction." In addition, if the answer results comparing between "how one twin answer the questions regarding him/herself" verses "how the other twin answer the questions him/herself" have a higher percentage of the same answers among identical twins than the other two groups, then we can also conclude that it is due to their genes that allow them to have the same personality traits and psychological characteristics. | |
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