IMPACT OF BIRTH ORDER ON INTELLECTUAL CAPACITY, MEMORY SPAN, AND CONCEPT FORMATION AMONG MIZO CHILDREN

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Thesis Submitted for the Degree of
Doctor of Philosophy in Psychology

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2010

Chapter I

INTRODUCTION

Birth order refers to the order in which siblings are born into a family. Although siblings may be ranked numerically according to their order of birth, four positions typically are recognized: first, middle, youngest, and only child. Birth order might not be defined the same way in all studies, which could lead to contradictory results; many could mistake ordinal position for birth order position (Manaster, 1993). Ordinal position was not referred to in this study as the specific rank or order in a numerable series (such as first, second, or third). Birth order was defined in this study as a category or type of person whose distinctive character can be made known or demonstrated (such as First, middle, and Last). Study by Rodgers, Cleveland, Oord, and Rowe (2000), supported this same idea.

Birth order can affect many aspects of an individual's life. It has been shown to affect things like personality (Howarth, 1982), self-esteem (Romeo, 1994), and cognitive achievement (Travis, 1995). Birth order has even been thought to have an effect on the big five personality traits, or five factors, with correlations between what a person's birth order is and how they manifest qualities in the big five.

Individuals' family members, including their siblings, are the first and most long lasting social relationships in their lives. For the first few years of life, a child's family serves as the primary social network. Children learn how to act socially within the context of their family, which can be a very different experience for each child based on the structure of the family or family constellation. Family constellation refers to the unique structural make-up of a family, including the ordinal birth position, sex of each sibling, years between children, and the total number of children in the family (Toman, 1959). Given that the earliest context of social and personality development is the family, then what people learn about themselves in relation to the family is how they come to understand themselves in relation to the world. The way in which people interact with the world is a reflection of their individual uniqueness, also known as their personality (Allport, 1937).

The ordinal position among siblings and their differences in relation to achievement, cognition and personality has been under study since hundred years back, in 1874, Sir Francis Galton suggested that eminent male scientists were far more likely to be first-borns in their families than later-borns (Forer, 1969). Research has shown that first-borns are overrepresented in political office (Hudson, 1990), and there are birth-order differences in intelligence (Zajonc, 2001), and in the Big Five personality dimensions of extroversion, neuroticism, conscientiousness, agreeableness, and openness to experience (Paulhus, Trapnell, & Chen, 1999; Sulloway, 1996).

The literature in this area reveals inconsistent results that have stemmed largely from confounding variables present in many birth order studies, including socioeconomic status, race and ethnicity, and age of participants (Rodgers et al. 2000; Steelman, 1985; Sulloway, 1996). Additionally, much of the research in this area indicates that birth order effects are inextricably related to family size, with stronger effects appearing in larger families (Heer, 1985; Sputa and Paulson, 1995). Even studies of the effects of family size have been equivocal. Joseph Rodgers and colleagues (2000) analyzed the relationship of birth order and family size to the intelligence quotient (IQ) within families using data from the National Longitudinal Survey of Youth. Their results suggest that neither birth order nor family size directly affects IQ; rather, it is the parents' IQ that is more likely to influence both family size and children's IQ levels. Several studies found achievement motivation, rather than intelligence, to be associated with ordinal position in the family (Vandergriff and Rust 1985). Later research on birth order and achievement began to focus on aspiration levels and achievement attributions more than simply on academic achievement.

Firstborns attribute success or failure to internal causes and may even underestimate how their situations might have affected success, compared to laterborns (Phillips and Phillips 1994). Toni Falbo (1981) observed a significant relationship between birth order and competitiveness. First and middle children scored significantly higher than lastborns on competitiveness. Only children did not differ significantly from any of the other groups on this variable. William Snell, Linda

Hargrove, and Toni Falbo (1986) explored the relationship between birth order and achievement motivation and found a significant correlation between birth order and one specific facet of achievement motivation, competitiveness.

Birth order studies does not limit only to human subjects, a wide variety of animal species exhibit birth-order differences in behavior, usually in competition for parental investment. These behavioral effects are influenced by two distinct kinds of biological causes: ultimate and proximate. Ultimate causes include adaptive tendencies that have evolved by natural selection. Proximate causes comprise influences operating during the lifetime of the organism and encompass biological as well as environmental factors, which almost always interact with one another. For example, some avian species possess an instinct to migrate during the autumn and spring, an adaptation that has its ultimate cause in natural selection. Temperature and day length, along with the various neuropsychological mechanisms they trigger, supply the proximate causes of bird migration (Mayr, 1961).

According to Needlman (2001), there are exceptions to every idea about birth order, but there are also average outcomes. In general, first born children are seen as more responsible, with high parental expectations. The middle born children often feel more adrift in the family and turn to other means of validation, such as friends and activities. Last born children tend to be more easygoing and used to having their way.

The birth order theory states that a person's position in their family does seem to affect their behavior both at home and at school (Morales, 1995 as cited in Dreikurs, 1958). First born children seem to have higher academic achievement than middle or last born children (Paulhus, Trapnelll, & Chen, 1999; Phillips, 1994). These findings have been seen as false by some researchers, who say that factors such as the mother's age at birth, number of siblings, genetics and environment have more to do with academic achievement . In fact, birth order is a controversial topic, and has been debated for decades.

To make the birth order controversy more complicated, Adler (1927, as cited in Gfroerer, Gfroerer, Curette, White, and Kern, 2003) has argued that individuals also have a psychological birth order, which also has effects on personality and therefore achievement. Adler has said that "an individual's given place in the family does not always correspond with how the person psychologically interprets that place."

Adler's well-known theoretical approach to birth order (Adler, 1928) proposes that the eldest sibling is the center of attention until the arrival of a younger child. With the arrival of other siblings, the firstborn feels threatened and must struggle to achieve recognition from parents and to preserve his or her personal position in the family. Consequently, in Adler's view, firstborns will try to fight feelings of inferiority throughout their development. In this attempt, they tend to be higher achievers in school than children of other birth order (Altus, 1967; Bradley, 1968; Carlson and Corcoran, 2001; Cheng and Kuo, 2000; Houser and Sewell, 1985).

Besides the high achievement orientation that typifies firstborn children, research on human birth order has focused on characteristics such as the need for affiliation (Arrowood and Amoroso, 1965; Schachter, 1954), and the tendency toward conformity (Craig, 1983). Regarding the need for affiliation, it has been argued that more firstborns choose to join fraternities, sororities, or other social organizations than children of other birth order. By affiliating themselves with a group, firstborns try to fill the void caused by parental deprivation with the addition of new siblings (Ewen, 1984). As for conformity, Ansbacher and Ansbacher (1956) followed Adler's approach, which suggests that the firstborn child often seeks to maintain the status quo in his social environment. This orientation toward conformity is expressed by the firstborn children's emphasis on the importance of rules, law, and discipline when they grow up (Craig, 1983). On the basis of these arguments, it was assumed that the orientation toward conformity leads firstborns to exhibit more ability than children of other birth order. Besides the many studies focusing on the impact of birth order on personal characteristics of firstborns, a considerable number of studies examined the impact of birth order on parents' attitudes toward their children (Chalfant, 1994;

Kiracofe and Kiracofe, 1990). For example, Toman (1993) claimed that parents tend to have higher expectations of the older child than they do of younger siblings. These expectations are often accompanied by investment of more parental time and attention in socializing the firstborn.

The lastborn position is also unique, but for different reasons. For the lastborn, standards and expectations are relaxed, and paternal attention is directed toward greater enjoyment of the last child—the "baby of the family" (Kindwell, 1982).
In contrast, middle children feel neglected because of lack of a unique status in the family (Kindwell, 1982). When the middle child is born, parents often have less strength and energy to invest in socialization and transmission of attitudes. Thus, by the time the youngest child is born, the parental influence is weakest, owing to a tendency to acquiesce to the demands of the youngest child.

Alfred Adler (1931, as cited in Greenberg, Gueiuno, Lashen, Mayer & Piskowski, 1963) used birth order theory to predict behavior. He theorized that birth order had a significant effect on personality, with both first born and last born children exhibiting higher levels of problem behavior, and middle children ending up resentful of authority. However, he didn't just focus on negative outcomes, as he saw differences in leadership abilities and other positive qualities.

Lewis Madison Terman published the first volume of his studies of 1000 "gifted" school children-that is, children with IQ's of 140 or higher, which is the IQ of the top 1 percent of the general population. Most of these children are from small families; only a few came from families of five or more children. Among those from families of two, three, and four children, Terman found that the eldest score higher IQ, followed by the youngest, and then by the in-between children. Terman noted that the breakdown was quite similar to the one Cattell had found among eminent American scientists some 20 years before, but he did not attempt to bind these separate studies together by theory.

Alfred Adler believed that order of birth was influential in the channeling of the socially very significant power drives. The first-born, he said, is a "power-hungry conservative." Sulloway (1996, 2001) has proposed a family dynamics model of birth-order effects in personality and behavior, which has several ‘‘causal mechanisms’’. For example, Sulloway suggests that when parental resources are low, investment is focused more heavily on one offspring, typically the first-born. Also, Sulloway supposes that first-borns are bigger and stronger than later-borns and use these competitive traits to their advantage.

Additional causal mechanisms in the family dynamics model include de-identification, where siblings try to differentiate themselves from one another in terms of interests, social attitudes and personalities, and niche differentiation, where siblings adopt different roles within the family (e.g. ‘‘the rebel of the family’’), in order to reduce Competition (Sulloway, 1996, 2001).

Sears, Maccoby, and Levin (1957) concluded that the firstborn show greater "conscience" development than does the later-born. They thought that the differences they found in children were probably due to differences in handling of the firstborn by parents, which the first-born had more metes and bounds set to his behavior and was more likely to be punished for transgressions. The father, it was noted, often participated in the disciplining of the first-born, a practice he did not usually continue with the later children. Dean found the first-born to be more cooperative and more given to curiosity, the later-born to be more pugnacious and also more affectionate. This latter finding-that the later born are more affectionate may have a sequel in a recent report by Schachter (1964) that first-born were not so well liked as later-born by their fraternity brothers in the University of Minnesota.

Koch (1956) found in her study of 5- and 6-year-old boys and girls from two-child families that the sex of their siblings together with birth order could influence their social behavior. For instance, a boy who is junior to a sister close to him in age (Within 30 months, say) will often be rather "sissy" in comparison with a boy who has an older brother. The boy with the not-much-older sister will more commonly admit to liking to play with girls and with dolls than will boys reared in other sibling relationships.

Since the 1970s, one of the most influential theories to explain why firstborns frequently score higher on intelligence and achievement tests than other children is the confluence model of Robert Zajonc. This model states that because firstborns mainly have adult influences around them in their early years, they will spend their initial years of life interacting in a highly intellectual family environment. This effect may also be observed in siblings who, although later born, have a sibling at least five years senior with no siblings in between. These children are considered to be "functional firstborns". The theory further suggests that firstborns will be more intelligent than only children, because the latter will not benefit from the "tutor effect" (i.e. teaching younger siblings).

Zajonc's theory has been criticised for confounding birth order with both age and family size, and alternative theories (such as Resource Depletion Theory) have been offered to explain the Belmont and Marolla findings. In a meta-analysis of the research, Polit and Falbo (1988) found that firstborns, only children, and children with one other sibling score higher on tests of verbal ability than laterborns and children with multiple siblings. This effect suggests that smaller families lead to children with higher test scores. Because there was no specific advantage for firstborn children, the results are consistent with Resource Depletion Theory, but not the confluence model.
The basic finding that firstborns have higher IQ scores has been disputed. One group of researchers examined data from the National Longitudinal Survey of Youth (NLSY) (USA), which gave them the opportunity to look at a large randomly selected sample of US families. The sample included children whose academic performance had been reviewed multiple times throughout their academic careers. This study found no relationship between birth order and intelligence.

Numbers of research on birth order found that "the eldest children in families tend to develop slightly higher IQs than their younger siblings." This could be a consequence of parents spending more quality time with their first-born children than with subsequent children. Studies have suggested that while first borns may be higher in creativity among males, the finding is reversed for females, with later borns being the highest in creativity (Eisenman & Cherry, 1970; Eisenman & Schussel, 1970; Taylor & Eisenman, 1968). Females are less likely than males to show deficits in intellectual development normally associated with larger numbers of siblings (i.e., family size), particularly if those siblings are younger brothers and sisters. Scholastic Aptitude Test scores, as well as measures of socioeconomic status, number of older siblings, and number of younger siblings, were available for each of 1,811 college freshmen (963 males and 848 females). With socioeconomic status controlled, the results indicate that number of older siblings is associated with lower SAT scores for both males and females. However, a sex difference emerges with respect to the impact of number of younger siblings. For males, increasing numbers of younger siblings are associated with lower SAT scores. But for females, increasing numbers of younger siblings are associated with higher SAT scores (Paulhus & Shaffer 1981).

The Taylor and Eisenman (1968) study find that first born males but later born females preferred the greatest complexity (complexity is associated with creativity: Barron, 1963; Eisenman, 1991b), but the first born males and later born females were also most likely to check adjectives like those of independent subjects in a conformity study of Barron (1963). Thus, in addition to preferring complexity, first born males and later born females showed likelihood of independence of judgment, which should also be consistent with creativity (Barron, 1963; Davis, 1992; Eisenman, 1991b).

According to Eisenman (1991, 1992), the first born female receives a "double whammy" by virtue of her birth order and gender. The reasoning is that parents tend to be more restrictive toward their first child, due to anxiety and not knowing how to deal with a new baby, and toward females in general, who receive harsher socialization than males in most, if not all, societies. Thus, the first born female not only has the greater parental anxiety and restrictiveness to put up with due to being a first born, but also has a second dose of this due to being female. This is thought to inhibit creativity in first born females, perhaps because it leads them to adopt conventional attitudes inconsistent with the risk taking and nonconventional thinking need for creativity (Eisenman, 1994). The first born male would also be inhibited somewhat by the overly strong parental concern, but overcomes this as far as creativity is concerned, perhaps due to the greater intellectual emphasis the first born male gets, as a child having only adult companionship in the family, until the birth of the second child.

There are a number of hypotheses suggesting that family size and birth order might affect educational investments, even apart from income effects. For a given level of parental income, family size is likely to reduce the per capita resources that can be spent on educational investments. But the shares of family resources that each child will receive are likely to differ across birth order for a number of reasons. First, given that parents have a fixed time endowment, the first born will receive a greater time endowment than subsequent children who have to compete for parental attention. To the extent that greater parental time inputs translate into higher educational achievement, first born children may far better than subsequent children. However, this argument also serves to emphasize the role of gaps between children; if children are widely spaced, then the last born child might benefit more as older children leave the family nest or through the expansion of time inputs as both parents and older siblings spend time with the last born child (Behrman and Taubman, 1986; Birdsall, 1991; Hanushek, 1992).

Life cycle effects can also matter. If parents are young at first birth, they may also be poorer than they will be later in the life cycle, and hence, resources might be lower for first-born children of young—and possibly immature—parents. Hence, Lacovou (2001) included dummy variables for the younger of two children, the middle of three children, the younger of three children, the middle of four children, the youngest of four children, the middle of five children, the youngest of five children, the middle of six or more children, and the youngest of six or more children.

Younger siblings might benefit through the growth of family income over the life cycle (Parish and Willis, 1993). Other factors can also work in both directions. If older children are expected to assume more responsibility in assisting with younger siblings, this training may lead them to perform more responsibly at school and become higher achievers. On the other hand, older siblings may be encouraged to leave school early to assist in providing resources for the family, giving an advantage to later birth order siblings with respect to educational attainment.

Biological factors may also matter. By definition, mothers having higher birth order children are older than when they have lower birth order children. To the extent that older mothers have lower birth weight children and birth weight is correlated with ability and/or access to resources, then later children may fare worse. But on the other hand, parents may learn with practice and experience, and hence, later children might be advantaged relative to earlier ones. Finally, cultural and legal factors may also play a part. If there is land or an estate to be passed on and inheritance customs favour the first born, parents may choose to invest more in the formal education of subsequent children to compensate.

Birth order theories predicting negative effects relate to greater parental time endowments for lower birth order children, greater devolvement of responsibility to lower birth order children and the simple fact that mothers are older when they have higher than lower birth order children. Those hypotheses predicting positive effects of birth order on education are: the growth of family income over the life cycle; the possibility that older siblings may be encouraged to leave school early to assist in providing resources for the younger members of the family; parental child-raising experience that might advantage younger siblings; and finally, the possibility that younger children may benefit from time inputs both from parents and older siblings.

A challenge in estimation of birth order and family size effects is that birth order relates to family size. The first born in any family always has a higher probability of being in a small family than those children born later in the birth order. Studies estimating separate birth order and family size effects typically include dummy variables for birth order and a separate continuous variable for family size. But this does not appropriately purge the family size effect from the birth order effect.

Among those theories in relation to Birth order and its effects, the most influencing theories of those may be:

(1) Quantity Dilution Hypothesis

The resource quantity dilution model suggests that growing up in a larger family is detrimental because a smaller share of the resources available at the family level at the time is allocated to the child (Blake, 1981; Leibowitz, 1977; Becker, 1965; Becker and Lewis, 1973). This model implies that being early in the birth order may be beneficial for attainment since a child that is early in the birth order lives in a smaller family for a longer time, hence may receive a larger share of the family resources when young than its later-born sibling(s).

(2) Quality Dilution Hypothesis

The dilution may not be limited to amounts invested in a child but may also occur with regard to the quality of the investments received by a child. If the parent cannot provide the same quality in the interaction with each child upon the arrival of another child, then the latter reduces the quality of the parental services provided to older or all siblings. If older siblings become jealous of the younger sibling, they may affect his or her development in a negative way. In this case, being in a larger family is detrimental but the relative effect of being a certain birth rank depends on the exact nature of the interactions. For example, Zajonc and Markus (1975) argued in their 'Confluence Model' that being in a larger family is detrimental due to less quality interaction with the parent.

(3) Quantity Accumulation Hypothesis:

The investments received by children may also differ between siblings if the resources in the household increase over the family life course. For example, the parents' child-rearing ability may increase with experience or maturing. Individual's earnings' profiles are increasing with age (e.g. Card, 1994), suggesting that the family level income available for consumption may be greater when a later-born child enters the family. Also, older siblings may benefit from having access to both new and existing goods, such as toys and books previously purchased for an older sibling.

In addition, children later in the birth order may receive more stimulation overall since they have more siblings around. However, older siblings may benefit from a larger family size as well since they have more opportunities to learn by instructing others. Overall, the investments per child may be greater later in the family life, implying that children late in the birth order may be better off than their older sibling(s).

(4) Quality Accumulation Hypothesis:

Interaction between siblings may benefit the younger sibling as well as the older sibling. Zajonc and Markus (1975) argue in the context of their 'Confluence Model' that older siblings benefit from teaching their younger siblings. At the same time, later-born children benefit from the presence of older siblings since the latter are intellectually more mature.

(5) Differential Investment/Preference Hypothesis:

Differences (or similarities) in development and attainment of siblings may be the result of parental preference for certain characteristics such as the rank in the birth order, the sex of the child, or the child's neediness. Historically, parents had an incentive to invest more in the first-born (male) child. However, nowadays parents may be more likely to invest towards achieving similar achievements across siblings (Becker and Tomes, 1975; Behrman and Taubman, 1986; Hanushek, 1992).

(6) Endowment Heterogeneity Hypothesis:

Birth order effects may also be the result of differential natural endowments of the child. Since later-born children are born to older mothers, higher birth order might be associated with birth defects and poorer health that may adversely affect other developmental outcomes.

Summarizing the predictions of the various hypothesis, it is noted that the a priori sign of the birth order effect is uncertain. The Quantity Dilution model, presents a strong argument for a negative birth order and family size effects since it suggests that older siblings exist who compete for scarce family resources. If Quality Dilution is at work, then being later in the birth sequence is detrimental since the quality of the services depletes as the family increases in size. The popular confluence model (cf. Zajonc and Markus, 1975; and Zajonc, 2001) can be viewed as a combination of both quantity and quality dilution since it conjectures that stimulation from the parent is substituted by less stimulating interaction with siblings upon arrival of a new siblings. Quantity and Quality Accumulation, provide reasons why being late in the birth order may be beneficial. Preference Hypothesis suggests no strong systematic birth order effects in the context of contemporary families Endowment Heterogeneity hypothesis suggests a negative association between birth order and development as a result of the correlation between birth order and mother's age.

Nevertheless, there appears to be no agreement in the literature on the significance of the role of sibling teaching (Teti, 2002, p. 203). One reason for this ambiguity may be that sibling caregiving is not very common in higher class families. However, it is found more frequently in working-class families (Zukow-Goldring, 1995), in families with children with special needs (McHale and Pawletko, 1992), and in rural-agrarian societies (Weisner , 1989). Evidence consistent with a quality dilution effect of having another sibling is provided by recent studies. Baydar, Greek, and Brooks-Gunn (1997a) and Baydar, Hyle, and Brooks-Gunn (1997b) find that the birth of a sibling increases the chance that the mother adopts more controlling parenting styles and that it can result in lower levels of verbal ability and behavioral problems of the older sibling. Confirming the importance of parenting style using a more careful statistical methodology, Hao and Matsueda (2000) show that authoritarian control based on force increases the likelihood that a child develops behavioral problems. This illuminates the nature of the family processes through which changes in the family size may affect child development. Since the evidence mostly comes from case studies with few observations that focus on one aspect of a family process based on one child (or sibling pair) per family, it may not generalize and it is not clear to what extent it is indicative of the overall effect of siblings on development.

An extensive multidisciplinary literature studies the role of birth order or family size on child development and achievement. This literature can be divided into three groups based on the empirical strategy adopted.

The first group of studies (primarily in the developmental psychology literature) directly analyzes aspects of the family processes characteristic of sibling and parent relationships. These studies typically use data that consist of sibling pairs from small surveys with an observational or experimental design. This literature provides evidence consistent with some of the reasons presented under the quality and quantity accumulation hypothesis, the younger sibling benefits from observing the older sibling (Wishart, 1986; Hesser and Azmitia, 1989) and learns faster when helped by an older sibling than when alone (Cicirelli, 1973). There is also evidence that the benefits to the younger sibling increase with the age-difference (Cicirelli, 1973). One may also expect that older siblings benefit from instructing their younger siblings as proposed by the quality accumulation hypothesis. The work by Dunn suggests that having a younger sibling may sharpen the social awareness of the older child (e.g., Dunn, 1989), and that the mother can improve the older child's ability as a caregiver by discussing the younger sibling's needs with him (cf. Dunn and Kendrick, 1982). Stewart and Marvin (1984) suggest that older siblings often assume care-giving responsibility and younger siblings seek attachment to older siblings with care-giving qualities in the absence of a parent.

The second group of studies presents evidence of birth order effects based on cross-sectional data. Using cross-tabulations or simple correlation, they report negative association between rank in the birth order and cognitive ability (e.g., Belmont and Marolla, 1973; Blake, 1981; Zajonc, 2001). Some studies have provided evidence for a mediating role as opposed to a causal role of birth order in the formation of cognitive ability (e.g., Page and Grandon 1979; Steelman 1985), and educational attainment and earning power (Olneck and Bills, 1979; Behrman and Taubman, 1986; Kessler, 1991).

Another group of studies employs family fixed effect models (also called sibling model or within family models) to analyze both short-run and long-run implications of birth order. Since family fixed effect models are identified based on the variation between children of the same family, they require a sample of siblings. The advantage of this approach is that it controls for all constant unobserved characteristics at the family level that may affect child development and achievement such as family endowments and preference. Consequently, the family fixed effects approach purges the birth order coefficients of a wide range of possible sources of omitted variable bias. Interestingly, using sibling samples, recent findings did not support a negative association between birth order and development (Retherford and Sewell, 1991; Rodgers et al. 2000). However, the evidence remains controversial. Lindert (1977) found that being early in the birth order is beneficial for educational attainment using sibling data. He argues in support of the dilution model citing evidence from time budget surveys that show that the amount of child-care time received by a child is decreasing in the birth rank.

A study that systematically analyzes the effect of birth order on child development/cognition using a large representative sample of children and siblings are less. Guo and VanWey, (1999) use a sample from the family and child fixed effects regression models to test the effect of changes in the family size on cognitive outcomes. Their findings suggest that there is no causal effect of the number of siblings during childhood on intellectual development. However, they focus on family size and do not investigate the potential role for birth order. While there are an increasing number of studies on developmental outcomes using large samples some of which also employ fixed effects (e.g. Joyce, Kaestner and Korenman, 2000 and Waldfogel, Han, and Brooks-Gunn, 2002) these studies typically control only for family size and/or whether a child is first-born. Often the estimated effects are not even reported because birth order and family size effects are not the focus of these studies.

Birth Order and Mizo family:

The average size of a Mizo family is between six and seven people. Usually the family consists of a parent of the male head of the family, the male head, his spouse, and his children. Mizos practice male ultimo geniture: the youngest son remains with his parents till death to become the heir. As a rule no woman can inherit property but if no other heirs are available a woman might inherit. The youngest son is treated as the heir because he has to look after his parents in their old age and lives with them (Parry, 1928). The system where the youngest male children inherit the family properties might have an impact in the psychological aspect of the last-born male child if there is psychological birth order as cited by Alfred Adler (1956). The youngest child may feel secure and dependent, since he is the heir to the family property, they might not feel the need to struggle for job, education and life in general as felt by the eldest, and this could lead to relatively poorer chance of developing cognitive functioning. While the eldest among the siblings are highly regarded and the expectation to look after their younger siblings are customary, "Fahmingkoh" father of … proceeded by the name of the first child, to address parents by other persons, indicated how the eldest siblings are highly regarded in the Mizo tradition.

In Mizo society, traditionally, women are not treated equally with men; their position is placed at a very insignificant position. A daughter has no share in the property of her father. Her responsibility is to become a true housewife. Despite this, they are treated with love and care, and adorned in much the same manner as men are treated. However, it is also opined strongly by certain sections of people that women are relegated to the lowest ebb of social hierarchical order though they occupy a place of honor within the family and in the socio-political life of the Mizos. In order to emphasize such opinion it is said that the epithet "Weaker Section" in the Mizo society is literally compared to parables, such as "As the meat of a crab is not meat, so the word of woman is no word", that "The wisdom of a woman does not extend beyond the limit of the village water source" and that "Let a woman and a dog bark, it pleases them". (Lal Biak Thanga, 1978) These contrasting views express gender inequality in the traditional mizo family, which still might have an impact in the child rearing practices of the today's mizo, thus gender is considered as ancillary variable in this study. In the olden days, Mizo children were considered attaining adulthood when they were able to work for the families in field, until that time they were considered children irrespective of their age. But in the modern mizo society, when school was opened and other means of livelihood are taken up by the mizos, almost all of the mizo children attend school and the expectation of the family is not just to become the farmer. Socialization of the children is prioritizing by many families; Children grow up with their parents and paternal grandparents. No serious distinction is made between boys and girls during early childhood. Mizos put much emphasis on teaching the child to develop a sense of group cooperation and Christian values.

Intellectual Capacity, Memory span and concept formation are the mental processes that are included in Cognition which refers to every mental process that may be described as an experience of knowing (including perceiving, recognizing, conceiving, and reasoning), as distinguished from an experience of feeling or of willing. Or The internal structures and processes that are involved in the acquisition and use of knowledge, including sensation, perception, attention, learning, memory, language, thinking, and reasoning. Intellectual capacity is defined as the potential intellectual ability of an individual, it is relating to the ability to think in an intelligent ways and to understand things, especially difficult and complicated ideas and subject.

Intelligence or intellectual capacity is an umbrella term describing a property of the mind including related abilities, such as the capacities for abstract thought, understanding, communication, reasoning, learning, learning from past experiences, planning, and problem solving.

Numerous definitions of and hypotheses about intelligence have been proposed since before the twentieth century, with no consensus yet reached by scholars. Within the discipline of psychology, various approaches to human intelligence have been adopted, with the psychometric approach being especially familiar to the general public. Influenced by his cousin Charles Darwin, Francis Galton was the first scientist to propose a theory of general intelligence; that intelligence is a true, biologically-based mental faculty that can be studied by measuring a person's reaction times to cognitive tasks. Galton's research in measuring the head sizes of British scientists and laymen led to the conclusion that head-size is unrelated to a person's intelligence.

Alfred Binet (1916), and the French school of intelligence, believed intelligence was an aggregate of dissimilar abilities, not a unitary entity with specific, identifiable properties. Scientists have proposed two major definitions of intelligence: from Mainstream Science on Intelligence is a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. It is not merely book learning, a narrow academic skill, or test-taking smarts. Rather, it reflects a broader and deeper capability for comprehending our surroundings "catching on," "making sense" of things, or "figuring out" what to do. And from Intelligence: “Knowns and Unknowns” (1995), a report published by the Board of Scientific Affairs of the American Psychological Association as Individuals differ from one another in their ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought. Although these individual differences can be substantial, they are never entirely consistent: a given person's intellectual performance will vary on different occasions, in different domains, as judged by different criteria. Concepts of "intelligence" are attempts to clarify and organize this complex set of phenomena. Although considerable clarity has been achieved in some areas, no such conceptualization has yet answered all the important questions, and none commands universal assent. Indeed, when two dozen prominent theorists were recently asked to define intelligence, they gave two dozen, somewhat different, definitions (Neisser et al, 1998).

Besides the foregoing organizational definitions, these psychology and learning researchers also have defined intelligence as:

1) Judgment, otherwise called "good sense," "practical sense," "initiative," the faculty of adapting one's self to circumstances (Alfred Binet, 1916).

2) The aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment (David Wechsler, 1944).
3) Innate general cognitive ability (Cyril Burt, 1931).
4) Goal-directed adaptive behavior (Sternberg & Salter, 1982).
5) A human intellectual competence must entail a set of skills of problem solving enabling the individual to resolve genuine problems or difficulties that he or she encounters and, when appropriate, to create an effective product and must also entail the potential for finding or creating problems and thereby laying the groundwork for the acquisition of new knowledge (Howard Gardner, 1993).
6) The ability to deal with cognitive complexity(Linda Gottfredson, 1998).
7) The theory of Structural Cognitive Modifiability describes intelligence as the unique propensity of human beings to change or modify the structure of their cognitive functioning to adapt to the changing demands of a life situation (Reuven Feuerstein, 1979; 2002).

Furthermore, in clinical and therapeutic practice, such theoretic and academic definitions of intelligence might not apply to patients with borderline intellectual and adaptive functioning, whose treatments require comprehensive analysis of every diagnostic, testing, educational placement, and psychosocial factor. The eighth (2005) and ninth (2009) editions of the Kaplan & Sadock's Comprehensive Textbook of Psychiatry, by Frank John Ninivaggi, MD, address these matters.

A popular theory of intelligence is based on psychometric testing, i.e. intelligence quotient (IQ) tests; however, some researchers' dissatisfaction with traditional IQ tests prompted their developing alternative theories of intelligence suggesting that intelligence results from independent capabilities that uniquely contribute to human intellectual performance. Charles Spearman (1927), is generally credited with defining general intelligence, which he reported in his 1904, American Journal of Psychology article titled "'General Intelligence,' Objectively Determined and Measured." Based on the results of a series of studies collected in Hampshire, England, Spearman concluded that there was a common function (or group of functions) across intellectual activities including what he called intelligence (i.e., school rank, which Spearman thought of as "present efficiency" in school courses; the difference between school rank and age, which was conceptualized as "native capacity;" teacher ratings; and peer ratings provided by the two oldest students, which was termed "common sense") and sensory discriminations (i.e., discrimination of pitch, brightness, and weight). This common function became known as "g" or general intelligence.

To objectively determine and measure general intelligence, Spearman invented the first technique of factor analysis (the method of Tetrad Differences) as a mathematical proof of the Two-Factor Theory. The factor analytic results indicated that every variable measured a common function to varying degrees, which led Spearman to develop the somewhat misleadingly named Two-Factor Theory of Intelligence.

The Two-Factor Theory of Intelligence holds that every test can be divided into a "g" factor and an "s" factor. The g-factor measures the "general" factor or common function among ability tests. The s-factor measures the "specific" factor unique to a particular ability test. Spearman's g-factor account for positive correlations among any cognitive ability tests. However, the necessary condition for g-factor to exist is routinely violated in correlation matrices of cognitive tests, according to the work by Peter Schonemann and others.

L.L. Thurstone (1934) extended and generalized Spearman's method of factor analysis into what is called the Centroid method and which became the basis for modern factor analysis. Thurstone demonstrated that Spearman's one common factor method (Spearman's method yielded only a single factor) was a special case of his multiple factor analysis. Thurstone's research led him to propose a model of intelligence that included seven orthogonal (unrelated) factors (i.e., verbal comprehension, word fluency, number facility, spatial visualization, associative memory, perceptual speed and reasoning) referred to as the Primary Mental Abilities.

In a critical review of the adult testing literature, Raymond B. Cattell (1943) found that a considerable percentage of intelligence tests that purported to measure adult intellectual functioning had all of the trappings of using college students in their development. To account for differences between children/adolescents and adults, which past theory did not address, Cattell proposed two types of cognitive abilities in a revision of Spearman's concept of general intelligence. Fluid intelligence (Gf) was hypothesized as the ability to discriminate and perceive relations (e.g., analogical and syllogistic reasoning), and crystallized intelligence (Gc) was hypothesized as the ability to discriminate relations that had been established originally through Gf, but no longer required the identification of the relation (commonly assessed using information or vocabulary tests). In addition, fluid intelligence was hypothesized to increase until adolescence and then to slowly decline, and crystallized intelligence increases gradually and stays relatively stable across most of adulthood until it declines in late adulthood. With his student John L. Horn, Cattell indicated that Gf and Gc were only two among several factors manifest in intelligence tests scores under the umbrella of what became known as Gf/Gc Theory. General visualization (Gv; visual acuity, depth perception), general fluency (F, facility in recalling words), general speediness (Gs; performance on speeded, simple tasks) were among several cognitive ability factors added to Gf/Gc Theory.

J.P. Guilford (1956), sought to more fully explore the scope of the adult intellect by providing the concept of intelligence with a strong, comprehensive theoretical backing. The Structure-of-Intellect model (SI model) was designed as a cross classification system with intersections in the model providing the basis for abilities similar to Mendeleev's periodic table in chemistry. The three-dimensional cube—shaped model includes five content categories (the way in which information is presented on a test; visual, auditory, symbolic, semantic, and behavioral), six operation categories (what is done on a test; evaluation, convergent production, divergent production, memory retention, memory recording, and cognition), and six product categories (the form in which information is processed on a test; units, classes, relations, systems, transformations, and implications). The intersection of three categories provides a frame of reference for generating one or more new hypothetical factors of intelligence.

John B. Carroll (1982) re-analyzed 461 datasets in the single most comprehensive study of cognitive abilities. This analysis led him to propose the Three Stratum Theory, which is a hierarchical model of intellectual functioning. The strata represent three different levels of generality over the domain of cognitive abilities. At the bottom is the first stratum, which is represented by narrow abilities that are highly specialized (e.g., induction, spelling ability). The second stratum is represented by broad abilities that include moderate specializations in various domains.
Carroll identified eight second-stratum factors: fluid intelligence, crystallized intelligence, general memory and learning, broad visual perception, broad auditory perception, broad retrieval ability, broad cognitive speediness, and processing speed (reaction time decision speed). Carroll has noted the similarity of his second stratum abilities and the Gf/Gc factors, although the Three-Stratum Theory does not incorporate the developmental trajectories associated with Gf/Gc Theory. Carroll accepted Spearman's concept of general intelligence, for the most part, as a representation of the uppermost third stratum.

Robert Sternberg, (2000) proposed the triarchic theory of intelligence to provide a more comprehensive description of intellectual competence than traditional differential or cognitive theories of human ability. The triarchic theory describes three fundamental aspects of intelligence. Analytic intelligence comprises the mental processes through which intelligence is expressed. Creative intelligence is necessary when an individual is confronted with a challenge that is nearly, but not entirely, novel or when an individual is engaged in automatizing the performance of a task. Practical intelligence is bound in a sociocultural milieu and involves adaptation to, selection of, and shaping of the environment to maximize fit in the context. The triarchic theory does not argue against the validity of a general intelligence factor; instead, the theory posits that general intelligence is part of analytic intelligence, and only by considering all three aspects of intelligence can the full range of intellectual functioning be fully understood.

More recently, the triarchic theory has been updated and renamed the Theory of Successful Intelligence by Sternberg. Intelligence is defined as an individual's assessment of success in life by the individual's own (idiographic) standards and within the individual's socio cultural context. Success is achieved by using combinations of analytical, creative, and practical intelligence. The three aspects of intelligence are referred to as processing skills. The processing skills are applied to the pursuit of success through what were the three elements of practical intelligence: adapting to, shaping of, and selecting of one's environments. The mechanisms that employ the processing skills to achieve success include utilizing one's strengths and compensating or correcting for one's weaknesses.

Jean Piaget, (1950) was the founder of the developmental approach to the study of intelligence. According to his theory of cognitive development, intelligence is the basic mechanism of ensuring equilibrium in the relations between the person and the environment. This is achieved through the actions of the developing person on the world. At any moment in development, the environment is assimilated in the schemes of action that are already available and these schemes are transformed or accommodated to the peculiarities of the objects of the environment, if they are not completely appropriate.

Thus, the development of intelligence is a continuous process of assimilations and accommodations that lead to increasing expansion of the field of application of schemes, increasing coordination between them, increasing interiorization, and increasing abstraction. Piaget described four main periods or stages in the development towards completely equilibrated thought and problem solving. In the sensorimotor stage (0–2 years), thought is based on perceptions and external actions and their coordination. In the preoperational stage, sensorimotor schemes are internalized and thought occurs mentally rather than externally, through the manipulation of representations and symbols that stand for sensorimotor schemes and objects.

At the beginning, however, mental schemes are not coordinated. As a result, systematic logical reasoning is not possible. When mental schemes are coordinated, thinking enters the concrete operational stage. In this period, thinking is logical, but limited to the concrete aspects of the world. That is, children can grasp several important aspects of the world, such as the conservation of number, matter, length, weight, volume, etc. despite external transformation. Gradually, concrete operational schemes are coordinated with each other and cognitive development enters the final formal operational stage. In this period reality is subsumed to possibilities and reasoning becomes formal. As a result, abstract scientific concepts such as the concept of inertia, energy, algebra, and proportionality can be grasped and scientific experiments can be designed. All in all, for Piaget intelligence is not the same at different ages. It changes qualitatively, thereby allowing access to different levels of organization of the world. Research shows that Piagetian intelligence is correlated but it is not identical with psychometric intelligence and IQ.

The neo-Piagetian theories of cognitive development advanced by Case, Demetriou, Halford, and Pascual-Leone, attempted to integrate Piaget's theory with cognitive and differential theories of cognitive organization and development. Their aim was to better account for the cognitive factors of development and for intra-individual and inter-individual differences in cognitive development. They suggested that development along Piaget's stages is due to increasing processing efficiency which is defined in terms of speed of processing and working memory capacity. Moreover, Demetriou's theory ascribes an important role to hypercognitive processes of self-recording, self-monitoring, and self-regulation and it recognizes the operation of several relatively autonomous domains of thought. Overall, this approach suggests that there indeed is a general intelligence factor. This factor is geared on general processing efficiency functions that enable humans to represent and process information, that processing involves general inferential processes that are gradually constructed, and self-awareness and reflection are instrumental in this construction. The general understanding and problem solving ability associated with this factor changes qualitatively with age and this change is related to the succession of Piagetian stages. At the same time, individual differences in the state of the general efficiency factors may cause differences in the rate of intellectual development of different individuals and these differences may be reflected in psychometric measures of cognitive ability, such as the IQ tests. Moreover differences between individuals may come from differences in their predispositions or facility related to different domains of knowledge and problem solving.

Intelligence tests are widely used in educational, business, and military settings due to their efficacy in predicting behavior. g is highly correlated with many important social outcomes—individuals with low IQs are more likely to be divorced, have a child out of marriage, be incarcerated, and need long-term welfare support, while individuals with high IQs are associated with more years of education, higher status jobs and higher income. Intelligence is significantly correlated with successful training and performance outcomes, and g is the single best predictor of successful job performance.

IQ tests were originally designed to identify mentally "defective" children. The inventors of the IQ did not necessarily believe they were measuring fixed intelligence. Despite this, critics argue that intelligence tests have been used to support nativistic theories which view intelligence as a qualitative object with a relatively fixed quantity.

Critics of the psychometrics point out that intelligence is often more complex and broader in conception than what is measured by IQ tests. Furthermore, skeptics argue that even though tests of mental abilities are correlated, people still have unique strengths and weaknesses in specific areas. Consequently they argue that psychometric theorists over-emphasize g, despite the fact that g was defined so as to encompass all inter-correlated capabilities and skills. Researchers in the field of human intelligence have encountered a considerable amount of public concern and criticism—much more than scientists in other areas normally receive. A number of critics have challenged the relevance of psychometric intelligence in the context of everyday life. There have also been controversies over genetic factors in intelligence, particularly questions regarding the relationship between race and intelligence and sex and intelligence.

Despite the variety of concepts of intelligence, the approach to understanding intelligence with the most supporters and published research over the longest period of time is based on psychometric testing. Such intelligence quotient (IQ) tests include the Stanford-Binet, Raven's Progressive Matrices, the Wechsler Adult Intelligence Scale and the Kaufman Assessment Battery for Children.

There has been a lot of research related to the question of whether birth order does, in fact, have an effect on intelligence. Some individuals believe that older children in a family are more intelligent than the middle or younger siblings because the parents tend to be more overprotective with them and expose them to more "adult thinking." Others believe that parents are stricter with their firstborn and then become more lenient with the younger siblings. Perhaps this treatment would influence the intelligence levels of all the children. Finally, there are others who believe that the youngest child is favored by the parents, which would greatly enhance his/her intelligence due to the amount of time parents spend with them. Some studies have indeed found the younger siblings to be more intelligent than the older siblings (Steckel, 1930) while other studies have found just the opposite to be true (Zajonc and Markus, 1975 as cited in Cicirelli, 1995). Yet others, such as Pillai and Ayishabi (1984), have found no relationship between birth order and intelligence. In a study conducted by Pillai and Ayishabi (1984), 532 college students were placed into five groups according to their birth order and sex. Birth orders 1, 2, 3, and 4 were separate groups and 5 and above were placed together in one group. They were given the Kerala University Group Test of Intelligence for Adults to see if there would be a difference in the mean scores of intelligence between the different groups. The conclusion of this study found that birth order had no influence on intelligence.

The majority of studies that have been performed do, however, find some relationship between birth order and intelligence. Some of these studies support the premise that the lastborn child is more intelligent than the firstborn. For example, in the study performed by Steckel (1930), questionnaires were distributed to 2,712 families that contained a total of 6,790 children. Due to such a large sample, the sample obtained was completely dependent on the willingness of the parents to answer the questionnaires. The study concluded that the average intelligence of later born children was higher than that of the earlier-born children and that intelligence increases with ordinal number in a family.

On the other hand, there are studies that have found the opposite to be true. Burton (1967), in her study, found that for two, three, four, and five children families the intelligence of the oldest siblings appeared to be slightly higher than that of the younger siblings. However, the mean difference of the standardized intelligence scores between the older siblings and the younger siblings showed only a small difference. This study concluded that the difference in intelligence did not appear to be significantly large enough to account for the large differences in achievement due to birth order.

Besides birth order, many outside factors could influence how an individual develops intellectually. For instance, where an individual attended school could affect his/her intellectual performance. Another variable could be a particualar area in which one has lived. Living in a certain area could either have a negative or positive affect on the individual. Some people may have been more advantaged than others and had better access to a better education. Any of these variables could have a large impact on an individual, and may be tied to the effects of birth order on intelligence.

Based on the results mentioned above, some researchers have questioned whether there is any relationship at all between birth order and intelligence. In a review by Manaster (1993), he questioned whether birth order was defined the same way in all studies. If not, contradictory results could possibly occur. He also mentioned that many could mistake ordinal position for birth order position. Ordinal position was referred to in this study as the specific rank or order in a numerable series (such as first, second, or third). Birth order was defined as a category or type of person whose distinctive character can be made known or demonstrated (such as only, oldest, second, middle, and youngest). Another study by Rodgers, Cleveland, Oord, and Rowe (2000), supported this same idea, as cited by APA Public Communications. In this study these researchers found that many other factors, such as family size, parental IQ and genetic heritage, could also significantly influence intelligence in children, rather than just birth order alone.

Although intelligence can be influenced by factors such as family life, geographical location, social class and level of education, the main focus of this study was to determine whether or birth order had a major effect on how much one learned and how well he/she developed intellectually. The current study examined whether birth order had a significant influence on an individual's intellectual achievement. It was hypothesized that birth order would have an effect on the intelligence level of an individual. The intelligence test results taken from these school students opened a new door of opportunity and further advanced past research and helped improve ideas and attitudes of those who were interested in birth order and the effect it had on individuals

Memory is an organism's ability to store, retain, and recall information and experiences. Traditional studies of memory began in the fields of philosophy, including techniques of artificially enhancing memory. The late nineteenth and early twentieth century put memory within the paradigms of cognitive psychology.

Sensory memory corresponds approximately to the initial 200–500 milliseconds after an item is perceived. The ability to look at an item, and remember what it looked like with just a second of observation, or memorization, is an example of sensory memory. With very short presentations, participants often report that they seem to "see" more than they can actually report. The first experiments exploring this form of sensory memory were conducted by George Sperling (1960) using the "partial report paradigm". Subjects were presented with a grid of 12 letters, arranged into three rows of four. After a brief presentation, subjects were then played either a high, medium or low tone, cuing them which of the rows to report. Based on these partial report experiments, Sperling was able to show that the capacity of sensory memory was approximately 12 items, but that it degraded very quickly (within a few hundred milliseconds). Because this form of memory degrades so quickly, participants would see the display, but be unable to report all of the items (12 in the "whole report" procedure) before they decayed. This type of memory cannot be prolonged via rehearsal.

Short-term memory allows recall for a period of several seconds to a minute without rehearsal. Its capacity is also very limited: George A. Miller (1956), when working at Bell Laboratories, conducted experiments showing that the store of short-term memory was 7±2 items (the title of his famous paper, "The magical number 7±2"). Modern estimates of the capacity of short-term memory are lower, typically on the order of 4–5 items, however, memory capacity can be increased through a process called chunking. Herbert Simon showed that the ideal size for chunking letters and numbers, meaningful or not, was three. This may be reflected in some countries in the tendency to remember telephone numbers as several chunks of three numbers with the final four-number groups, generally broken down into two groups of two.

Short-term memory is believed to rely mostly on an acoustic code for storing information, and to a lesser extent a visual code. Conrad (1964) found that test subjects had more difficulty recalling collections of words that were acoustically similar.

The storage in sensory memory and short-term memory generally have a strictly limited capacity and duration, which means that information is available only for a certain period of time, but is not retained indefinitely. By contrast, long-term memory can store much larger quantities of information for potentially unlimited duration (sometimes a whole life span). Its capacity is immeasurably large. While short-term memory encodes information acoustically, long-term memory encodes it semantically. Baddeley (1966) discovered that after 20 minutes, test subjects had the most difficulty recalling a collection of words that had similar meanings (e.g. big, large, great, huge).

Short-term memory is supported by transient patterns of neuronal communication, dependent on regions of the frontal lobe (especially dorsolateral prefrontal cortex) and the parietal lobe. Long-term memories, on the other hand, are maintained by more stable and permanent changes in neural connections widely spread throughout the brain. The hippocampus is essential (for learning new information) to the consolidation of information from short-term to long-term memory, although it does not seem to store information itself. Without the hippocampus, new memories are unable to be stored into long-term memory, and there will be a very short attention span. Furthermore, it may be involved in changing neural connections for a period of three months or more after the initial learning. One of the primary functions of sleep is thought to be improving consolidation of information, as several studies have demonstrated that memory depends on getting sufficient sleep between training and test. Additionally, data obtained from neuroimaging studies have shown activation patterns in the sleeping brain which mirror those recorded during the learning of tasks from the previous day, suggesting that new memories may be solidified through such rehearsal.

From information processing perspective there are three main stages in the formation and retrieval of memory: Encoding or registration (receiving, processing and combining of received information) Storage (creation of a permanent record of the encoded information) Retrieval, *recall* or *recollection* (calling back the stored information in response to some cue for use in a process or activity)

Models of memory provide abstract representations of how memory is believed to work. Psychologists proposed several models over the years by various. There is some controversy as to whether there are several memory structures, for example, Tarnow (2005) finds that it is likely that there is only one memory structure between 6 and 600 seconds.

The multi-store model (also known as Atkinson-Shiffrin memory model) was first recognised in 1968 by Atkinson and Shiffrin. The multi-store model has been criticised for being too simplistic. For instance, long-term memory is believed to be actually made up of multiple subcomponents, such as episodic and procedural memory. It also proposes that rehearsal is the only mechanism by which information eventually reaches long-term storage, but evidence shows us capable of remembering things without rehearsal.

The model also shows all the memory stores as being a single unit whereas research into this shows differently. For example, short-term memory can be broken up into different units such as visual information and acoustic information. Patient KF proves this. Patient KF was brain damaged and had problems with his short term memory. He had problems with things such as spoken numbers, letters and words and with significant sounds (such as doorbells and cats meowing). Other parts of short term memory were unaffected, such as visual (pictures).
It also shows the sensory store as a single unit whilst we know that the sensory store is split up into several different parts such as taste, vision, and hearing.

In 1974 Baddeley and Hitch proposed a working memory model which replaced the concept of general short term memory with specific, active components. In this model, working memory consists of three basic stores: the central executive, the phonological loop and the visuo-spatial sketchpad. In 2000 this model was expanded with the multimodal episodic buffer.

The central executive essentially acts as attention. It channels information to the three component processes: the phonological loop, the visuo-spatial sketchpad, and the episodic buffer.

The phonological loop stores auditory information by silently rehearsing sounds or words in a continuous loop: the articulatory process (for example the repetition of a telephone number over and over again). Then, a short list of data is easier to remember.The visuospatial sketchpad stores visual and spatial information. It is engaged when performing spatial tasks (such as judging distances) or visual ones (such as counting the windows on a house or imagining images).

The episodic buffer is dedicated to linking information across domains to form integrated units of visual, spatial, and verbal information and chronological ordering (e.g., the memory of a story or a movie scene). The episodic buffer is also assumed to have links to long-term memory and semantical meaning.

The working memory model explains many practical observations, such as why it is easier to do two different tasks (one verbal and one visual) than two similar tasks (e.g., two visual), and the aforementioned word-length effect. However, the concept of a central executive as noted here has been criticized as inadequate and vague.

Several studies suggest that working memory and intelligence are indistinguishable (isomorphic) constructs. Kyllonen and Christal (1990) found structural coefficients of .80 through .88 between working memory and reasoning ability. Colom et al. (2004) found a correlation of .70 between a composite measure of working memory and measures of fluid intelligence. Ackerman et al. (2002) found a structural coefficient of .70 between working memory and g. In three separate studies, Colom et al. (2004) found a mean structural coefficient of .96 between general intelligence (g) and working memory. Finally, Colom and Shih (2004) reported a structural coefficient of .86 between g and working memory.

However, Ackerman, Beier, and Boyle (2005) conducted a meta-analysis examining the relationship between working memory and g, as well as between STM and g. This study was based on a literature search ranging between 1872 and 2002. The meta-analytically derived correlation between cognitive ability and working memory was .36, whereas the meta analytically derived correlation between STM and cognitive ability was .28. Further, after a SEM analysis, the correlation found between STM and g was .49, whereas the correlation between working memory and g was .50, which suggested that STM and working memory were equally related to g.

Nevertheless, there are some studies claiming that working memory is a much better predictor than STM. These studies consider the simultaneous estimation of relationships between the three constructs of interest, as opposed to examining working memory and intelligence, or STM and intelligence, in separate analyses. Engle et al. (1999) and Conway, Cowan, Bunting, Therriault and Minkoff (2002) reported that when those relations are estimated simultaneously, the correlation between working memory and intelligence is large and significant, whereas the correlation between STM and intelligence is negligible.

However, Ackerman et al. (2005) indicate that these studies are relatively limited in their assessment of the constructs of interest. For example, only two tests were used as indicators of intelligence. Furthermore, the indicators for working memory and STM were also limited (Beier & Ackerman, 2004). This would be seen with some reservations, because the relations among the constructs being studied could be misrepresented. A better approach for sampling the construct space would be to include heterogeneous tasks to control for the effect of unwanted variance. Although the results of these previous studies are suggestive, they may not constitute the best evidence for examining the relations among the constructs of interest (Beier & Ackerman, 2004).

Recently, Kane et al. (2004) take a latent variable approach that resembles the study to be reported in the present article. Several measures of verbal and visuo-spatial working memory and STM span were employed, as well as several diverse cognitive ability measures. Four main results can be highlighted. First, the correlation among working memory and STM latent factors across content domains ranged from .63 to .89. Although those researchers did not report the results of a model where STM and working memory were represented as two correlated higher order factors, we did this analysis after their correlation matrix and the resulting correlation was almost perfect (r =.99). Second, STM was found more domain-specific than working memory. The correlation between STM-Verbal and STM-Spatial was .63, whereas the correlation between working memory-Verbal and working memory-Spatial was .83. Testing the structure of working memory, those researchers found that a single factor model did not provide a good fit to the data, whereas a two-factor model distinguishing working memory-Verbal and working memory-Spatial did.

Nevertheless, they treated working memory as a unitary latent factor, while they preferred to treat the STM construct distinguishing verbal and spatial short-term storage. Third, the general structural model relating STM, working memory and reasoning suffered from the well-known multicollinearity problem. Nevertheless, the primary interest was to test for the relation between what is shared among working memory tasks and what is shared among reasoning tasks. working memory span tasks were thought to be multiple determined by both domain-general executive attention processes and domain-specific coding and storage (STM) processes. Therefore, Kane R. Colom et al. (2005) addressed the relative contribution of working memory, verbal STM, and visuo-spatial STM processes to the relation between memory span and reasoning. The factor model consisted of an executive attention factor (working memory), with loadings from all memory variables, reflecting the domain-general, executive variance shared by all the working memory and STM span tasks. The model also consisted of domain-specific factors, with loadings from the verbal and spatial tasks on the storage- V and storage-S factors, respectively. Kane et al. presumed that the common variance among span tasks reflects executive rather than storage processes. This is surprising, because in two key previous studies, Engle et al. (1999) and Conway et al. (2002) proposed that the common variance between working memory and STM reflect primarily storage and the residual working memory variance reflects primarily executive control processes. Furthermore, it seems risky to assume that a latent factor clearly mixing storage-plus-processing can be seen primarily as a clear-cut representation of the central executive (see below). Finally, Kane et al. found that fluid intelligence was predicted by the executive attention factor (.52) and by the STM spatial factor (.54). Especially noteworthy is that the contribution of the STM-S latent factor was independent of the contribution of the executive attention factor, a fact that questions the likelihood of the view that executive attention processes drive primarily the predictive utility of memory span measures (Conway et al., 2002; Engle et al., 1999).

Studies have shown that working memory span can predict higher-order cognitive functioning. These studies examined working memory span and various cognitive functions, such as sensing and picking up on discrepancies, thematic processing, reading goals on comprehension, sensing syntactic ambiguity, making inferences, context changes, and memory load. Some studies show that people with a low working memory span have difficulty with some higher order cognitive functions. One such study conducted by Daneman and Carpenter (1983), examined the individual differences in the way readers incorporate consecutive words in their existing account of a text. They found that people with a low working memory span were not as likely as people with a high working memory span to pick up on the correct explanation when the understandable phrase had some discrepancies. They also found that high-span readers were better able to pick up on misinterpretations than low-span readers. This finding reinforces that reading comprehension performance is strongly correlated with individual differences in working memory.

Another study, conducted by Budd, Whitney, and Turley (1995), examined if readers with different working memory spans put comparable emphasis on thematic processing and if the information that is learned during reading is dependent on the strategy that is used for working memory management. They found that high- and low-span readers employed similar working memory management strategies when the materials were easier to process, which produced comparable accuracy for both topic and detail information. However, when the materials were more difficult and thematic processing was more difficult, differences in performance were noted. Comprehension of details was not as strong for low-span readers because a tradeoff occurred in working memory when they had to perform two kinds of item-specific processes. This finding supports the assumption that coordination and management of information is driven by working memory.

Lee-Sammons and Whitney (1991) conducted a study to examine the effects of working memory span and reading goals on reader's comprehension of a text. The participants read a passage and then had to recall the text from either a perspective they were given while reading or a different perspective. They found that low-span readers had difficulty remembering information when they were asked to recall it from a perspective that was not the one given during reading. High span readers recalled about the same amount of information regardless of the perspective they were given during reading. Lee-Sammons and Whitney concluded that there was an inverse relationship between working memory span and the amount that readers used the perspective to guide their comprehension process.

Another difference between working memory span levels was found by Just and Carpenter (1992) and MacDonald, Just, and Carpenter (1992). They found that readers with a high working memory span could preserve two potential explanations of a syntactic ambiguity easier than readers with a low working memory span. They also found that low-span readers were less able to use semantic information to help with syntactic processing of information compared to high-span readers.

Whitney, Ritchie, and Clark (1991) found individual differences in working memory span with regard to the type of inferences readers made when reading a complicated and unclear passage. They found that readers with a low working memory span made more concrete explanations of the text than readers with a high working memory span. Also, high-span readers made their elaborations later in the passage than low-span readers. They concluded that low-span readers made their elaborations early in the text because they were not capable of waiting until towards the end of the passage when they had enough information to make correct inferences.

The term memory span refers to the maximum length of a sequence of items that can be reproduced from memory following a single presentation.

Memory span could vary among individuals; In addition to that, memory span varies for a given individual according to a considerable number of factors. For example, span can be increased by presenting the items at an irregular rate, so that they appear temporally grouped. Also, span for verbal items tends to be slightly greater with auditory presentation than with visual presentation. Of particular interest is the effect of the nature of the list item. The most common kind of item, especially in mental abilities testing, is the digit. Digit span is roughly one item greater than letter span, which in turn is roughly one item greater than word span. Also used as list items have been nonsense syllables, geometric designs, and pictures of objects. Experimental research into children's working memory span has shown that retention duration contributes substantially to span performance, while processing efficiency need not be related to concurrent memory load (Towse, Hitch, & Hutton, 1998).

Considerable contemporary interest resides in the notion of working memory (e.g., Baddeley, 1986), often thought of as a dynamic system with separable components. Part of the enthusiasm for working memory arises from the idea that retention is an integral part of mental activities (Baddeley & Hitch, 1974; Hitch & Baddeley, 1976). This view has been supported by empirical evidence that on-line memory processes are closely tied to successful cognitive performance. Baddeley and Hitch (Experiment 3), for example, found that a substantial concurrent memory load impaired the speed of reasoning processes, with the degree of impairment varying as a function of the difficulty of the reasoning involved.

Daneman and Carpenter (1983) have argued that working memory performance shapes the ability to understand ambiguity in texts (see also Miyake, Just, & Carpenter, 1994; Tirre & Peña, 1992), while Adams and Hitch (1997) examined how children's arithmetic is shaped by the memory requirements of carry operations.

To capture the postulated interdependence between processing and storage activities, a series of working memory span tasks have been developed. These include counting span (Case, Kurland, & Goldberg, 1982), reading span (Daneman & Carpenter, 1980), and operation span (Turner & Engle, 1989), where individuals perform a series of mental activities and attempt to retain a component of each problem. Thus, in counting span, the participant might enumerate a series of arrays and subsequently recall their totals. These types of tasks are taken to measure working memory capacity, which is argued to reflect the balance of mental "resources" divided between processing and retention of information. Memory functions are thought to be compromised by computationally intensive concurrent processing. Likewise, individuals with low processing efficiency are thought to supply fewer resources for memory.

Evidence that working memory span, compared with standard digit or word span, affords a good predictor of cognitive performance (Daneman & Carpenter, 1980; Engle, Tuholski, Laughlin, & Conway, 1999; Kyllonen & Christal, 1991) is seen as additional confirmation of how working memory reflects an architecture distinct from that of short-term memory (Daneman,1995).

Concepts are the basic units of thought that underlie human intelligence and communication. Concept formation refers to the development of the ability to respond to common features of categories of objects or events. Concepts are mental categories for objects, events, or ideas that have a common set of features. Concepts allow classifying objects and events. In learning a concept, one must focus on the relevant features and ignore those that are irrelevant (Bourne & colleagues, 1986). Most concepts, however, cannot be identified on the basis of a single critical feature. Most of the words we use refer to concepts and not to particular things. In learning some of their first concepts, children commonly focus not on names but on the functions of objects. For example, a spoon is something to eat with, and a pan is something to cook in. Other early concepts are based on groupings of objects that are similar in some respect.

A concept is a generalization that helps to organize information into categories. For example, the concept "square" is used to describe those things that have four equal sides and four right angles. Thus, the concepts categorize things whose properties meet the set requirements. The way young children learn concepts has been studied in experimental situations using so-called artificial concepts such as "square." In contrast, real-life, or natural, concepts have characteristic rather than defining features. For example, a robin would be a prototypical or "good" example of the concept "bird." A penguin lacks an important defining feature of this category—flight, and thus is not as strong an example of a "bird." Similarly, for many children the concept "house" represents a squarish structure with walls, windows, and a chimney that provides shelter. In later development, the child's concept of house would be expanded to include nontypical examples, such as "teepee" or "igloo," both of which have some but not all of the prototypical characteristics that the children have learned for this concept.

Natural concepts are often learned through the use of prototypes, highly typical examples of a category— like the robin cited above. The other major method of concept learning is through the trial-and-error method of testing hypotheses. People will guess or assume that a certain item is an instance of a particular concept; they then learn more about the concept when they see whether their hypothesis is correct or not.

People learn simple concepts more readily than complex ones. For example, the easiest concept to learn is one with only a single defining feature. The next easiest is one with multiple features, all of which must be present in every case, known as the conjunctive concept. In conjunctive concepts, *and* links all the required attributes. For example, the concept square is defined by four sides *and* four 90-degree angles. It is more difficult to master a so-called disjunctive concept, when either one feature or another must be present.

Possibly the most important role of concepts is cognitive economy (Rosch, 1978). If there were no concepts we would have to learn and recall the word that represents each individual entity in our world. For example, each type of table, automobile, or tree would need its own name in order for us to learn and communicate about it in any meaningful way. The size of our mental vocabulary would be so large that communication would be nearly, if not outright, impossible (Smith, 1988).
Concepts come in at least five forms: Concrete concepts, abstract concepts, verbal concepts, and non-verbal concepts. Concrete concepts can be seen, touched, or heard. In other words they have some direct sensory input. Examples of concrete concepts include furniture, transportation, and dog. In contrast, abstract concepts are thought to have no direct sensory input unless by metaphor or analogy. The concepts of metaphor and analogy can be thought of abstract concepts.

Verbal concepts are often thought of as classes of ideas or objects that are best understood and used using language. Examples include friendship and irony. These examples may also be classified as abstract concepts. Therefore, types of concepts may overlap.

Nonverbal concepts are often thought to be best understood making mental pictures to represent their critical attributes. The process of painting mental pictures to aid learning and production is often referred to as visualization. Examples of nonverbal concepts include perimeter, area, volume, and mass.

The first step in concept formation, called differentiation, is to isolate two or more things as belonging together, as units of the same class. Where many theories of concept formation hold that such isolation begins by noticing degrees of similarity, Objectivism holds that it starts by noticing degrees of differences. At the perceptual level, everything is different; however, some things are more different from others. The difference between two tables, for instance, is less than the difference between a table and a chair. Because two tables are less different from one another when contrasted against a third objects, we group them together as units, as members of a group of similar objects. Similarity may be defined as: the relationship between two or more existents which possess the same characteristic(s), but in different measure or degree. Similarity is a matter of measurement. Going back to the table versus chair example, the difference between tables is a quantitative one-we can easily stretch one table into another, so we call them similar. The difference between tables and chairs, on the other hand, is qualitative, so we distinguish between these as belonging to another group. Of course, at a broader level, even the difference between tables and chairs is quantitative-with enough stretching and pulling one could turn a chair into a table as well. However, the point is that the table-to-table stretching is much less than the table-to-chair stretching, so we consider one quantitative and the other qualitative.
The second step of concept formation, integration, is based on a process called measurement omission. In this step, we combine or integrate the units into a new, single mental unit by eliding the quantitative differences between the two units. We retain the characteristics of the units, but we elide the particular measurements-on the principle that these measurements must exist in some quantity, but may exist in any quantity. For example, when forming the concept table we retain the distinguishing

characteristics-a flat, level surface and supports-but omit the particular measurements of those features.

Based on this two step process, concepts are also defined as: a mental integration of two or more units possessing the same distinguishing characteristics, with their particular measurements omitted.

Concept maps may also prove to be an invaluable aid in concept formation. Concept maps (sometimes referred to as concept webs or semantic maps) are diagrams that illustrate the critical attributes of concepts. For example, the name of a concept could be written in the center of a blank page with a circle around it. The five critical attributes of that concept could each be written in smaller circles around the concept, connected by a line. Students would then have a mental image that concept to carry into any discussion or test. Other strategies for enhancing concept formation include: Providing students with concrete experiences, using metaphors or analogies, or multiple pathways to learn concepts such as videos, audiotapes, hands-on experiences.

Higher order cognition represents a multi-faceted and complex network of processes that enhance the processing and production of information. Two important components of higher order cognition are concept formation and problem solving. Although presented separate from each other these areas are interrelated and interdependent. Fortunately, the formation of concepts and problem solving may be enhanced by a thoughtful mix of demystification of these functions, direct instruction in strategies that promote concept formation and problem solving, modeling, and use of accommodations such as concept maps.

Concept or category formation refers to the ability to organize the perception and classification of experiences by the construction of functionally relevant categories. The response to a specific stimulus (i.e., a cat) is determined not by the specific instance but by classification into the category and by association of knowledge with that category (Medlin & Ross, 1992). The ability to learn concepts has been shown to depend upon the complexity of the category in representational space, and by the relationship of variations among exemplars of concepts to fundamental and accessible dimensions of representation (Ashby, 2000). Certain concepts largely reflect similarity structures, but others may reflect function, or conceptual theories of use (Medlin, 1989). Computational models have been developed based on aggregation of instance representations, similarity structures and general recognition models, and by conceptual theories (Barsalou, 2003).

Concept formation is the process of integrating a series of features that group together to form a class of ideas or objects. Developmentally, a younger child might define a bird as any object that flies in the air. The first time this child sees an airplane in flight may point to the sky and say, “Bird!” The observant parent or caregiver might correct the child by saying, “No that’s an airplane. Birds fly but they have feathers. Airplanes fly but they don’t have feathers.”
The goal of human concept formation is to arrive at a conceptual system that partitions the encountered objects and events in a way that enables us to effectively deal with our environment. As such, the task of concept formation can be split up into two subtasks, concept aggregation and concept characterization. Concept aggregation is the decision about which entities are to be grouped together into a concept, concept characterization means finding an intensional description of the proposed concept based on its extension. The latter task is often called concept learning.

Consequently, what separates concept formation from concept learning is the difficult question of deciding which objects to aggregate, i.e., how to carve up the world into different concepts. Most operational models of concept formation, most notably conceptual clustering systems (Kolodner, 1983; Lebowitz, 1987; Fisher, 1987; Gennari et al., 1989) base their answer to this question on an assumption that was nicely formulated by Rosch and her colleagues (1976; 1978): The "correlated feature" view assumes that features in the world occur as clusters, and that the best concepts are those that maximize intra-concept correlations, and minimize inter-concept correlations, i.e. reflect the presumed cluster structure of the world. There is a significant amount of empirical evidence that people detect and use feature correlations (Medin et al., 1982; Younger and Cohen, 1984), and the existing clustering systems based on the correlated feature principle and extensions thereof have been very successful, both in modeling psychological data (Fisher, 1987), and in solving application problems.

Several theories have been proposed to explain how we learn concepts. The stimulus-response association theory was proposed by Clark Hull (1920). He argued that we learn to associate a particular response (the concept) with a variety of stimuli that define the concept. For instance, we associate the concept "dog" with all of the characteristics of dogs (four legs, fur, tail, and so on) and are able to generalize the concept to unfamiliar dogs. The hypothesis testing theory was proposed by Jerome Bruner and his colleagues (1956). Bruner believed that we develop a strategy of testing our hypotheses about a concept by making guesses about which attributes are essential for defining the concept. Eleanor Rosch (1978) suggested that the natural concepts in everyday life are learned through examples rather than abstract rules. Her exemplar theory proposes that we learn the concept of "dog" by seeing a wide variety of dogs and developing a prototype of what the typical dog is like. Busemeyer and Myung (1988) studied prototype learning in college students by presenting a series of exemplars and asking the subjects to reproduce the prototype.

Vygotsky (1978) regarded all higher human mental functions as products of mediated activity. The role of the mediator is played by a psychological tool or sign, such as words, graphs, algebra symbols, or a physical tool. These forms of mediation, which are themselves products of the socio-historical context, do not just facilitate activity; they define and shape inner processes. Thus Vygotsky saw action mediated by signs as the fundamental mechanism which links the external social world to internal human mental processes and he argued that it is by mastering semiotically mediated processes and categories in social interaction that human consciousness is formed in the individual (Wertsch and Stone, 1985: 166).

Allied to this, concept formation is only possible because the word or mathematical object can be expressed and communicated via a word or sign whose meaning is already established in the social world.

Vygotsky further elaborated his theory by detailing the stages in the formation of a concept. He claimed that the formation of a concept entails different preconceptual stages (heaps, complexes and potential concepts). During the syncretic heap stage, the child groups together objects or ideas which are objectively unrelated. This grouping takes place according to chance, circumstance or subjective impressions in the child's mind. In the mathematical domain, a student is using heap thinking if she associates one mathematical sign with another because of, say, the layout of the page. The syncretic heap stage gives way to the complex stage. In this stage, ideas are linked in the child's mind by associations or common attributes which exist objectively between the ideas.

Complex thinking is crucial to the formation of concepts in that it allows the learner to think in coherent terms and to communicate via words and symbols about a mental entity. And, as I have argued above, it is this communication with more knowledgeable others which enables the development of a personally meaningful concept whose use is congruent with its use by the wider mathematical community. Complexes corresponding to word meanings are not spontaneously developed by the child: The lines along which a complex develops are predetermined by the meaning a given word already has in the language of adults (Vygotsky, 1986).

Chapter II

STATEMENT OF THE PROBLEM

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The study endeavors to determine the impact of Birth order on intellectual capacity, memory span and concept formation among the mizo children. Birth order might not be defined the same way in all studies, which could lead to contradictory results; many could mistake ordinal position for birth order position (Manaster, 1993). Ordinal position was not referred to in this study as the specific rank or order in a numerable series (such as first, second, or third). Birth order was defined in this study as a category or type of person whose distinctive character can be made known or demonstrated (such as First, middle, and Last). Study by Rodgers, Cleveland, Oord, and Rowe (2000), supported this same idea.

There is no previous study on the effect of birth order among the Mizo children or adult. However there is a common presumption in the Mizo society that the first born are more responsible and are more dependable in decision making. First child is the only child for a period of time and they used to being center of attention. They gain and hold superiority over other children. The middle child often seems to have the most negative impressions of his lot in life. They are the youngest to the older sibling and the oldest to the younger sibling. Therefore they are both a big brother/sister and a little brother/sister. They have neither rights of oldest nor privileges of youngest. They feel unloved, left out, "squeezed." doesn't have place in family (Don Dinkmeyer 1978).

Besides the many studies focusing on the impact of birth order on intellectual ability and personality, a considerable number of studies examined the impact of birth order on parents' attitudes toward their children (e.g., Chalfant, 1994; Kiracofe and Kiracofe, 1990). For example, Toman (1993) claimed that parents tend to have higher expectations of the older child than they do of younger siblings. These expectations are often accompanied by investment of more parental time and attention in socializing the firstborn. The lastborn position is also unique, but for different reasons. For the lastborn, standards and expectations are relaxed, and paternal attention is directed toward greater enjoyment of the last child the “baby of the family” (Kindwell, 1982). These views are generally accepted in the Mizo culture in the present situation. And often, middle children feel neglected because of lack of a unique status in the family (Kindwell, 1982; Rugla and Nystul, 1998). On the basis of these claims, it can be assumed that the strongest congruence exists between the attitudes of parents and their firstborn children. When the middle child is born, parents often have less strength and energy to invest in socialization and transmission of attitudes. Thus, by the time the youngest child is born, the parental influence is weakest, owing to a tendency to acquiesce to the demands of the youngest child.

There has been a lot of research related to the question of whether birth order does, in fact, have an effect on intelligence. Some individuals believe that older children in a family are more intelligent than the middle or younger siblings because the parents tend to be more overprotective with them and expose them to more "adult thinking." Others believe that parents are stricter with their firstborn and then become more lenient with the younger siblings. Perhaps this treatment would influence the intelligence levels of all the children. Finally, there are others who believe that the youngest child is favored by the parents, which would greatly enhance his/her intelligence due to the amount of time parents spend with them. Some studies have indeed found the younger siblings to be more intelligent than the older siblings (Steckel, 1930) while other studies have found just the opposite to be true (Zajonc and Markus, 1975 as cited in Cicirelli, 1995). Yet others, such as Pillai and Ayishabi (1984), have found no relationship between birth order and intelligence. In a study conducted by Pillai and Ayishabi (1984), 532 college students were placed into five groups according to their birth order and sex. Birth orders 1, 2, 3, and 4 were separate groups and 5 and above were placed together in one group. They were given the Kerala University Group Test of Intelligence for Adults to see if there would be a difference in the mean scores of intelligence between the different groups. The conclusion of this study found that birth order had no influence on intelligence.

The majority of studies that have been performed find some relationship between birth order and intelligence. Some of these studies support the premise that the lastborn child is more intelligent than the firstborn. For example, in the study performed by Steckel (1930), questionnaires were distributed to 2,712 families that contained a total of 6,790 children. Due to such a large sample, the sample obtained was completely dependent on the willingness of the parents to answer the questionnaires. The study concluded that the average intelligence of later born children was higher than that of the earlier-born children and that intelligence increases with ordinal number in a family.

On the other hand, there are studies that have found the opposite to be true. Burton (1967), in her study, found that for two, three, four, and five children families the intelligence of the oldest siblings appeared to be slightly higher than that of the younger siblings. However, the mean difference of the standardized intelligence scores between the older siblings and the younger siblings showed only a small difference.

Ordinal position (the birth rank of the child) and sibling status (ordinal position and the sex of each sibling) have long been a determinant of social rewards and opportunities across cultures (Rosenblatt & Skoogberg, 1974; Sutton-Smith & Rosenberg, 1970). In a sample of 39 cultures around the world, Rosenblatt and Skoogberg found consistent differential treatment by parents according to birth order, largely favoring the first born. First-borns of either sex were more likely to have greater authority, receive more respect, and be subjected to elaborate birthing ceremonies.

Additionally, primogeniture, the practice in which first born males receive all parental inheritances is quite common across cultures. However, special treatment is not limited to first-borns, as the practice of ultimogeniture (last-borns inherit), secundogeniture (second-borns inherit), and tertiogentiture (third-borns inherit) is also present in various cultures. Furthermore, in the Balinese culture children are given names in accordance with their birth order (Zajonc, 2001). Rosenblatt and Skoogberg

concluded that birth order is much more salient in non-western cultures due to environmental demands, such as caretaking responsibilities, but regardless of this cultural difference, birth order is a powerful component of western societies as well.
Traditionally, researchers believed that parents were responsible for the variation in their children's cognitive pattern. However, Sutton-Smith and Rosenberg adopted a wider perspective and asserted that siblings, as well as parents, are responsible for making each other different. The researchers explained that siblings have been shown to directly affect one another in regards to sex-role preferences, game and play interests, intellectual abilities, and sibling interactions.

Zajonc (2001) is one of the leading researchers who believe that birth order does impact a person's intelligence. He has developed what has been termed the confluence model with the idea being that the intellectual growth of every member is dependent on the others in the family. The model shows that each successive sibling is born into a weaker intellectual environment and that intellectual performance increases with decreasing family size. When the gaps are short children who are born early in sibship (number of Siblings in the family) perform better on intelligence tests that do later children (Zajonc, Markus & Markus, 1979).

The reasoning behind this is that firstborns are able to gain an intellectual advantage through the teaching effect or becoming tutors and mentors to the younger siblings. Many times parents call on the older siblings to help the younger siblings by answering questions, giving explanations and offering meanings of words all of which helps explain why firstborns gain more verbal fluency quicker (Zajonc, 2001). Last-born and only children do not have they opportunity to become tutors and therefore suffer from a "last-born handicap" (Retherford and Sewell, 1991).
The debate on the two sides of the issue of whether or not birth order impacts intelligence is far from being over.

The entry of a new child into the family necessarily causes a shift in the family organization (Zajonc, 2001). The new child not only enters an existing family environment, but his or her presence also influences the family environment socially, economically, and intellectually. Zajonc believes that this change in the family environment causes parents to adjust accordingly, as caring for two children is a much different experience than caring for one. Initially developed to explain associations between birth order and intelligence, the confluence model (Zajonc & Markus, 1975) and the resource dilution model (Downey, 2001) provide evidence for how birth order and sibling relations may influence development. The confluence model focuses on environmental changes that occur on the sibling level with the addition of new children to the family, recognizing the family as a dynamic system. The resource dilution model considers variations in parental capabilities or resources and how these resources change across time, and across the number of children in a family. Although the primary focus of the confluence model and the dilution model was on birth order and intelligence, both maintained that birth order has influences beyond intelligence into all aspects of development. Though there are numerous aspects of the family experience that can contribute to personality development, birth order has been one of the most frequently studied.

Although psychological inquiry regarding birth order began with Sir Francis Galton’s (1874) description of British scientists, birth order wasn’t popular among researchers until Alfred Adler (1927) proposed a theory based on his clinical observations. Through client reconstructions of past experiences, Adler (the second child of five) constructed a birth order typology for first-born, middle-born, last-born, and only children. He placed considerable emphasis on perspective, claiming that the concept of family is different for every member in it. In other words, Adler believed that individuals’ unique position within the family contributed to their understanding of the world, and therefore influenced all social interactions in their lives. In brief, Adler theorized that first born enjoy the luxury of being an only child, receiving all of their parents’ attention, until they are “dethroned” by their younger sibling, an experience from which Adler contends first borns never fully recover. The act of dethronement can produce both positive and negative effects by motivating the first-born child to succeed in order to maintain parental favor, or by causing them to give up, slipping into a life of bitterness and despair. Middle borns never have their parents to themselves, but they do always have someone ahead of them, motivating them to strive and achieve superiority over their older sibling. Last born never experience a feeling of dethronement, and therefore relish in the spotlight and seek a casual lifestyle. Finally, only children are accustomed to receiving full parental investment, resulting in a selfish personality, expecting the world to recognize and appreciate their uniqueness.

Adler's (1927) psychoanalytically based theory of birth order is largely structured around the presumption that sibling conflict is a product of a power differential. That is, birth order affects personality in that a unique system of power is created within each family. From an Adlerian perspective, the achievement of power over other siblings influences how children differentiate themselves from their siblings, that is, how they develop their personality. Accordingly, the power struggles faced between young siblings shape individuals' motivation to strive for success and superiority throughout their lives. This is the process by which Adler believed the stable traits of personality developed.

Sutton-Smith and Rosenberg (1970) also acknowledged that power struggles were an important element in shaping personality. Nevertheless, through a series of careful studies they arrived at a more holistic approach, suggesting that power struggles between siblings are but one element of the complex nature of sibling interactions. Additionally, they determined that sibling-sibling interactions play a significant role in personality development independent of parental treatment or parental characteristics. The emergence of a dominance hierarchy, in which first-borns employed more power tactics and second-borns adopted more defensive, counter dominance tactics, was one such sibling-sibling interaction consistently observed. This type of interaction suggests that later borns do not necessarily struggle for power over first borns, but rather accept that the earlier born child is more powerful and therefore develops adaptive methods of dealing with it.

Although much of Adler's theory on birth order effects has not been consistently supported empirically (Ernst & Angst, 1983), he did propose a general framework and opened up a new area of research, one that continues to seek answers to the enigmatic question of how birth position influences development. Major limitations of Adler's work include the fact that he did not consider the sex of the child, nor number of children in the family. Perhaps the most glaring limitation is that his theory is based on a clinical sample. Not only did Adler develop his ideas about the typical characteristics for each birth position using his patients, but he largely drew from his clients' reconstructions of their past experiences, specifically their childhood. Indeed, he did not actually observe or even treat children or siblings in the development of his theory.

Besides the high achievement orientation that typifies firstborn children, research on human birth order has focused on characteristics such as the need for affiliation (Arrowood and Amoroso, 1965; Schachter, 1954), and the tendency toward conformity (Craig, 1983). Regarding the need for affiliation, it has been argued that more firstborns choose to join fraternities, sororities, or other social organizations than children of other birth order. By affiliating themselves with a group, firstborns try to fill the void caused by parental deprivation with the addition ofnew siblings (Ewen, 1984). As for conformity, Ansbacher and Ansbacher (1956) followed Adler's approach, which suggests that the firstborn child often seeks to maintain the status quo in his social environment. This orientation toward conformity is expressed by the firstborn children's emphasis on the importance of rules, law, and discipline when they grow up (Craig, 1983).

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There are a number of additional variables associated with birth order that must be considered when investigating its effects on cognitive functioning. The first theory to formally address these additional variables was family constellation theory, which emerged from an Adlerian psychoanalytic perspective. Family constellation incorporates ordinal birth position, sex of each sibling, years between children, and the total number of children in the family to predict mate selection (Toman, 1959). Toman posited that when seeking out a romantic partner, individuals seek out a similar relationship to the one they experienced within their family. Children were socialized into the world within a particular context, namely family, and as such they view all subsequent relationships from the orientation that they are accustomed. An example of a suitable fit under Toman's theory would be the older brother of sisters to be involved with the younger sister of brothers. In this situation, both individuals extend their previous family relationship into their own. Contrarily, the poorest fit would be if two only children were to attempt a relationship, as neither is adept at interacting with similar age mates. Although he examined a very specific aspect of personality (i.e., how we choose a mate), Toman (1959, 1970) made an important contribution by acknowledging the situational nature of sibling relationships. He was the first researcher to stress that there are many different combinations of sibship patterns (the structure of siblings within the family) that can produce dramatically different developmental courses. Ironically, much of Toman's research, as well as his disciples' (e.g., Friedman, Jackson, & Nogas, 1978; Gold & Dobson, 1988), failed to examine all of the family constellation variables (e.g., sibship size and sex of sibling, but not age-spacing) when conducting their investigations (Ernst & Angst, 1983).

It is also considered that females are less likely than males to show deficits in intellectual development, particularly if those siblings are younger brothers and sisters. A sex difference emerges with respect to the impact of number of younger siblings. Traditionally, girls have been encouraged to conform, whereas boys are expected to be active and dominant risk-takers (Block, 1983). Furthermore, Davis and Rimm (1989) acknowledge that most boys are provided with toys that enhance their visual-spatial abilities, while Lever (1976) notes that the games of girls are often highly structured requiring turn-taking and rules. In addition, characteristic traits such as non assertiveness (Florey & Tafoya,1988), group conformity (Bradley, 1989), and the need for modeling (Garrison, 1989) may further impact existent gender differences, in view of these, gender is considered as ancillary variables with other demographic profiles as a covariate.

As mentioned earlier, Birth order has been used as a variable in numerous empirical studies worldwide. However, the term "birth order" is vague and has not been thoughtfully operationalized. Studies claiming to investigate birth order effects have done so in a myriad of different ways. Some studies compared first borns with later borns (Fakouri, Hafner, & Chaney,1988), an ambiguous category that includes any birth position except first born. Others limited sibship size to two (Goebel, 1985; Minnet, Vandell, & Santrock, 1983), or lumped only children together with first borns (Zweigenhaft & Von Ammon, 2000). A tendency exists for birth order researchers to examine first borns versus later borns and to combine first borns and only children. Doing so dichotomizes the birth order variable, and converts a daunting statistical task into a routine analysis.

Dichotomizing data is commonplace in social science research, presumably due to the conveniences it affords. However, whenever data are reduced, the potential for obscuration arises. Indeed, there are instances when dichotomizing data is appropriate, but birth order research is not one of them. The tendency to dichotomize the birth order variable raises numerous issues.

Firstly, it is problematic to combine first borns with only children. Only children are particularly problematic in research on birth order effects (Phillips, Bedeian, Mossholder, & Touliatos, 1988). While they are often combined with the first-born group, only children share similar experiences with both first-borns and youngest children. Only children receive full parental attention and resources, just as first-borns do for a time, until their younger sibling is born. However, only children, as with youngest children, never experience feelings of superiority over a younger sibling, nor are they faced with the opportunity to engage in teaching behaviors with a younger sibling (Zajonc & Markus, 1975).

Although the first few years of life are similar for first-borns and only children, the family environment is radically altered with the addition of a second child, thereby creating distinct experiences for each child. Furthermore, there is no theoretical or empirical basis for combining the two positions. Adler (1927) formulated distinct characteristics of personality for both first borns and only children, characteristics that reflected the unique family context that the individual was raised in. It seems that the researchers' motivation for combining the two birth positions is a matter of convenience.

The second main concern with dichotomization is similar to the first. Much of the birth order literature has focused on the experience of the first born child (Stewart & Stewart, 1995). Later born children have largely been used as a basis for comparison from which to glean information about first borns. Categorizing all individuals born after the first born as later borns does little to provide insight on later born individuals. Once again, there is no theoretical framework or empirical evidence to suggest that this is an appropriate practice. Implicit in this tendency is that the experience of a middle child in a sibship of three is no different from the youngest of five or the second of four.

Additionally, inherent in researchers' practice of comparing first borns with later borns is that information on the experience of the first born child is of more interest or value than information on the experience of later borns. Researchers could just as easily compare youngest children with earlier borns, but they do not. The reason they do not could be heir way of acknowledging the methodological complexities of investigating birth order effects.

A first born is the oldest child, no matter how many come after it (except in the case of only children). However, a youngest child could be second born, third born, fourth born, and so on. Further difficulties arise when investigating middle children. In a sibship of three, the middle child is obvious, but in sibships of four or more there are multiple middle children, each with a distinct family experience. Accounting for all of these varying compositions requires both more advanced data analyses and a much larger sample than is required when dichotomizing birth order and examining the first born child. Therefore in the present study, Birth order was defined in this study as a category or type of person whose distinctive character can be made known or demonstrated (such as First, middle, and Last).

In view of the foregoing theoretical and empirical considerations this study is designed with the objectives to elucidate the effects of Birth order (first-born, middle-born and last-born) on:

(1) The Intellectual Capacity (Standard Progressive Matrices: Ravens, 1992)
(2) Memory Span (Immediate Memory Span: Jacobs, 1887)
(3) Concept Formation (Hanffman Kasanin, 1937)

Gender (male and female) as well as other demographic variables are considered as ancillary variables in view of the differing ability of males and females in arithmetic and verbal behavior.

The findings of the present study on the above objectives envisioned would not only meet the academic pursuit and theoretical interest, but would also invite further researches and serves as an empirical foundations for educators to understand the individual students in the school system, and is expected to help the caregivers in better understanding of their children according to their ordinal positions among the siblings.

Birth order can also be another factor to consider when analyzing human personality. One must realize that birth order may be only one influence among many, as is true with intelligence. The ways parents treat their children as well as the atmosphere in which they live affect human personality also. Birth order information does not give the total psychological picture for any child. There is no system of personality development that is capable of that. Birth order statistics and characteristics provide indicators that combine with psychological, mental, and emotional factors to give the bigger picture. Birth order principles do not automatically solve problems or change personalities overnight.

However, knowledge of birth order differences would be useful in school settings to explain why certain children perform as they do in the classroom. Additionally, birth order could be used in a therapist/patient setting where difficult problems related to family adjustment, sibling rivalry, and parental relationships are a factor.

Theories explaining birth order and its relationship to intelligence and personality have inherent strengths and weaknesses. Only through more thorough research can accurate conclusions be drawn. Therefore the purpose of this study is to help generate new ideas and to add to the body of research. The main focus was to determine whether Birth order had a significant impact on children's Cognitive functioning. It was theorized that birth order would have an effect on the Cognitive functioning of an individual. The test results taken from these large subjects will open a new opportunity and further advanced past research and helped improve ideas and attitudes of those who were interested in birth order and the effect it had on individuals.

In view of the foregoing account the study would venture to test the following hypotheses:

1. First-born will show significantly greater mean scores as compared to middle born children on total score of intellectual capacity, memory span, and concept formation.
2. Middle born will show significantly greater mean scores as compared to Last-born children on total score of intellectual capacity, memory span, and concept formation.
3. It is expected that the effect of birth order on intellectual capacity, memory span, and concept formation will be reduced with the inclusion of the demographic profiles as the covariate.
4. Males and females are expected to manifest significantly different mean scores on intellectual capacity, memory span, and concept formation.

The methods and procedure as adopted to achieve the objectives of the study are presented in the following chapter.

Chapter III

METHODS AND PROCEDURE

Chapter - III

METHODS AND PROCEDURE

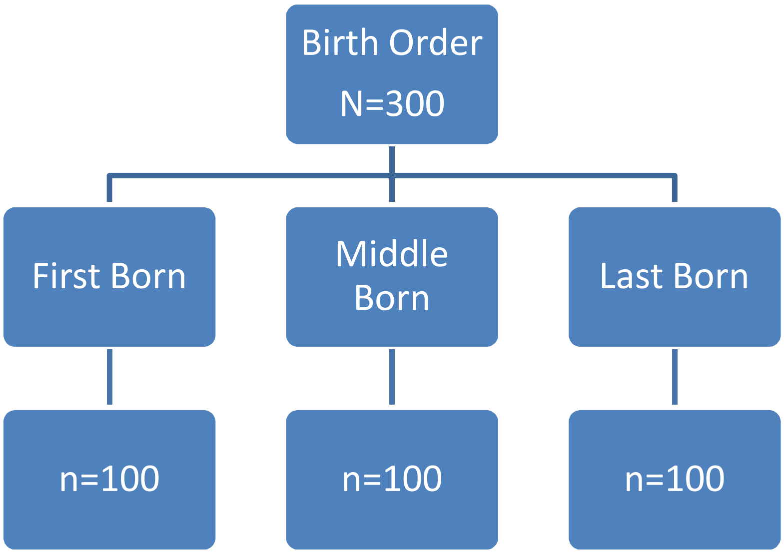
Sample:

Three hundred Mizo children with equal proportion of male and female between the age group of 13-15 years from rural and urban high schools of Mizoram are randomly selected with consideration of 'gender' (male and female) and 'birth order' (first-born, middle-born and last-born). The subjects were randomly selected from different part of Mizoram to cover the whole area of the state with due care of extraneous variable to identify true representation.

In order to Control variables such as family size, spacing between siblings, and sex of siblings, immense care has been taken to identify subjects who are in the same status of parental age, number of siblings, socioeconomic background. Ages ranging 13 – 15 are selected due to appropriateness for the experimental task especially the concept formation and they are keen to accomplish the experimental task assign to them without preconceived ideas or biasness and moreover, Before the age of 11, a child's ability to form comparisons and reason by analogy is often too recent an intellectual achievement for it to be exercised with a consistent degree of efficiency (Chauffard, Benassy, 1949). And to avoid dichotomize the birth order variable It is worthwhile to mention that, inclusion as participant requires odd numbered siblings in consideration of 'birth order' (first-born, middle-born and last-born) variable. In the final count hundred (100) participants under each cell of the main design is sampled for the study.

Initially, huge number of subjects were given Demographics information sheets where their family status, age, number of siblings, economic status etc. based on the common demographics profiles the participants were then selected and conducted the experiments. After deletion of incomplete and unsatisfactory responses, equal proportions of mizo children who are first-born, middle-born and last born were included for the study.

Figure-1: *Sample characteristic of separate group design for the study of effects of Birth order on intellectual capacity, memory span, and concept formation among Mizo children.*



Design of the study:

Methodological refinements, to attain the objectives of the study incorporate separate group design to illustrate the effect of Birth order (first-born, middle-born and last-born) on dependent measures (Intellectual Capacity, Memory Span and Concept Formation). Gender (Male and female) as well as other demographic variables are considered as covariates in the analytical plan. Thus, separate group design for the effect of birth order is employed to be highlighted on the intellectual capacity, memory span and concept formation among mizo children.

In addition, the independent effects of Birth order (first-born, middle-born and last-born) on dependent variables (intellectual capacity, memory span and concept formation) are examined to observe variances due to the demographic profile on the dependent variables.

Psychological tools and procedure:

The Psychological measures tapping the cognitive functioning and culture free test such as Standard Progressive Matrices (RSPM: Ravens, 1992) to measure the intellectual capacity, Immediate Memory Span (Digit Span) introduced by Jacobs (1887) to measure memory span, and Concept formation test (Hanfmann and Kasanin, 1937) were incorporated to achieve the target objectives of the study.

1) Standard Progressive Matrices (RSPM: Ravens 1992):

The Standard Progressive Matrices (RSPM) was designed to measure a person's ability to form perceptual relations and to reason by analogy independent of language and formal schooling, and may be used with persons ranging in age from 6 years to adult. The RSPM is a valid and reliable measure for cognitive ability (Raven, 1989, 2000).

The scale consist of 60 problems divided into five sets (A, B, C, D and E), each made up of 12 problems. In each Set the first problem is as nearly as possible self-evident. The problems which follow build on the argument of those that have gone before and become progressively more difficult. Each item contains a figure with a missing piece. Below the figure are either six (sets A & B) or eight (sets C through E) alternative pieces to complete the figure, only one of which is correct. Each set involves a different principle or "theme" for obtaining the missing piece, and within a set the items are roughly arranged in increasing order of difficulty. The order of the items provides the standard training in the method of working. The five sets provide five opportunities to grasp the method of thought required to solve the problems and five progressive assessment of a person's capacity for intellectual activity.

The test has an internal consistency studies using either the split-half method corrected for length or KR20 estimates result in values ranging from .60 to .98, with a median of .90. Test-retest correlations range from a low of .46 for an eleven-year interval to a high of .97 for a two-day interval. The median test-retest value is approximately .82. Coefficients close to this median value have been obtained with time intervals of a week to several weeks, with longer intervals associated with smaller values. Raven provided test-retest coefficients for several age groups: .88 (13 yrs. plus), .93 (under 30 yrs.), .88 (30-39 yrs.), .87 (40-49 yrs.), .83 (50 yrs. and over).

Spearman considered the SPM to be the best measure of g. When evaluated by factor analytic methods which were used to define g initially, the SPM comes as close to measuring it as one might expect. The majority of studies which have factor analyzed the SPM along with other cognitive measures in Western cultures report loadings higher than .75 on a general factor. Concurrent validity coefficients between the SPM and the Stanford- Binet and Weschler scales range between .54 and .88, with the majority in the .70s and .80s.

The participants were given the same series of problem in the same order and asked to work at their own speed, without interruption, from the beginning to the end of the set. The total scores and time taken are considered as an index of intellectual capacity.

2) Immediate Memory Span (Digit Span: Jacobs, 1887)

Introduced by Jacobs (1887), described as 'prehension', the ability to hold items in STM/Working Memory. Participants were presented sequences of numbers, and asked to repeat them in the correct order. Digit increased in length to a point at which the subject consistently failed to repeat the sequence correctly. A person's digit span is the point at which they can recall sequences of a certain length (e.g. seven items) correctly 50% of the time. Jacobs found a digit span of 9.3 on average - when letters were used, the average was 7.3 items. Age differences were also found, with digit span increasing through childhood. Span is used in intelligence tests and predicts performance in a variety of comprehension and problem-solving situations (Dempster, 1985).

The task of the experimenter was to observe how large a quantity of a given sort of material can be reproduced perfectly after one presentation. For the said purposes ten sets of cards containing randomly selected 4-15 digits are presented with tachistoscope. The subjects were given one practice trial followed by experimental task.

3) Concept Formation Test (Hanfmann and Kasanin, 1937).

The test measured abstract concept of an individual age 10 and above. There are 22 blocks which are of five different colours, six shapes, two heights and two surface sizes. The task of the subject was to divide the blocks into five meaningful groups. On the hidden under side of each block there is printed three-letter nonsense syllable. The solutions are in terms of double dichotomy that requires in the abstract thinking. The subject must find the common factor in the blocks, and sort them according to this principle. The subject has to divide the block into 4 groups according to the conceptual schemes that he must discover. The blocks are of 5 colors, 6 shapes, 2 heights and 2 sizes of base area.

Subject is given one clue at the start and every time he reaches an incorrect solution, or gives up another clue is given to him. The clues are nonsense syllables LAG, BIK, MUR and CEV printed on the base of the block. The problem is to classify the blocks in four groups so that all the blocks in any one group have common properties which equivocally mark them off as members of that group and as non members of any group. The criteria attributes for correct grouping are cross sectional area and height. The nonsense syllables relate to the criteria attributes and may in fact be considered as names of the concept exemplified by the blocks. Thus, the LAG blocks are tall and fat, the BIK blocks are small and flat, the CEF blocks are small and thin, and the MUR blocks are tall and thin. There is no other consistent way of making four groups of the groups. Successful of all of the four blocks constitute one trial counter-balancing order is used for the successive trials. The actual time taken and errors committed are noted in the data sheet. Rest period were given to the subject between the tests to control variable like attention, fatigue etc.

Procedure:

The participants who fulfilled the criteria to become the subjects after filling up of the Demographics information sheets are tested on the cognitive measures of (a) Standard progressive matrices, (Ravens, 1992) (b) Digit span to measure the span of Memory, (Jacobs, 1887) (c) Hanfmann and Kasanin Concept formation test, (Hanfmann and Kasanin, 1937).

After taking the consent of the subject to participate in the tests, the researcher ensured that seats were arranged appropriately and good rapport was established with the subject. Then they were given careful instructions which are required for conducting the test and request them to respond and cooperate at the fullest throughout the assigned task.

Firstly, Standard Progressive Matrices (RSPM) was administered. Pen and answer sheets were distributed. The subjects were asked to fill in particulars about themselves on the answer sheet. When this has been done the test books was given out. Then the test book was opened to the first page and told "At the top it says Set A and you have a column here, on your answer sheet, for set A. this is A1. You see what it is. The upper part is a pattern which a piece cut out of it. Each of these pieces is the right shape to fit the space, but only one of them is the right pattern". If the subject taking the test select the correct piece, the experimenter proceed, the subject wanted to revise the decision it is accepted. As each problem is presented the same instruction as long as it serves a useful purpose. And respondents' answers were recorded on the appropriate place on the answer sheet.

After rest period of 5 minutes, the second test of digit span was administered. Starting with a detailed instruction and participants were presented 4 digit of random number and followed by the increasing sequences of digits, and asked to repeat them in the correct order. The sequences are initially short, and gradually increase in length one digit at a time. The subjects' digit span was taken at the point which they can recall sequences of a certain length correctly 50% of the time.

Short period of rest was again given before the starting of the third test. Hanfmann and Kasanin concept formation test was then administered. The subjects were comfortably seated in front of the experimenter. The experimenter took out all the twenty blocks from the box and keeps them on the table in mixed order in front of the subjects. The experimenter carefully saw that the names printed at the bottom of the blocks are not visible to subjects. Experimenter kept the blocks with their bottom down. The subject has to think out and construct the appropriate concept combining two factors ignoring the other two factors color and shape which are in fact only distractor.

The experimenter begins the task by turning over a block to show to subject the name of the group printed at the bottom of the block. Experimenter then asked the subjects to select from among all the blocks, the ones which go with the sample block shown to them. Suppose the sample shown to subjects was the white hexagonal block, the subject has to respond on concrete basis, they might select either another white block or hexagonal block. Whichever block it was experimenter turns up and shown that it does not belong to the proper group. Subjects were prompted whenever they made a mistake. This procedure is followed in an effort to get the subjects to learn the proper grouping of each block. This could be achieve only when subjects disregards single concept properties of blocks such as color and shape and create a concept combining two properties ie size and height.

When subjects succeeded in selecting all the blocks of a group experimenter mixed these blocks with the remaining 17 blocks and shows a sample block of another group, say MUR and asked him to find out those blocks which fall on that group. If the subjects made mistake they were prompted as by showing the name of the group printed at the bottom of the blocks. This process is continued till subjects were able to sort out all the five blocks of group MUR. The same process was followed by experimenter for the remaining two groups ie BIK and CEV.

Experimenter used stop watch for measuring actual time taken for sorting out blocks of each group and marked a tally whenever subjects made mistake. Successful sorting of all the four blocks constitute one trial. During the second trial order of presentation a group sample is changed in order to adopt counter balancing order.

After completion of the experimental task, the researcher carefully checked the scoring sheets and ensures the all required response is complete. Following the same procedure, the researcher conducted the experiments to more than 450 subjects, But for the final count, after filtering out the incomplete and unsatisfactory responses 300 (Three hundred) 150 male and 150 female were sampled for the analyses.

Statistical Analyses:

Firstly, the psychometric adequacy of scores on the series of various measures was analyzed by employing Descriptive Statistics, Cronbach Alpha for Reliability indices, and Item analyses based on – Item total coefficient of correlation. And statistical assumptions were checked with necessary transformation.

- Bivariate Correlation were worked out between the Birth Order, Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income)
- Levenes test was employed to determine the homogeneity of variance
- One way Analysis of Variances (K=3) was employed for the effect of Birth order on Dependent variables (RSPM, Digit span, Concept formation)
- Post hoc Analysis of variance for the effect of Birth Order on the standardized scores of the behavioral measures was computed for the whole samples.
- Analysis of Covariance (K = 3) with Demographics variables as the Covariate was employed to determine the independent and interaction effects of Birth order on the dependent measures
- Post hoc multiple mean comparisons (Bonferoni) was employed to highlight the instances of multiple mean difference for the significant independent effect of Birth order on dependent measures.
- t-test to highlight the significant mean differences of gender on the dependent measures was analyzed for the whole samples.

The responses of the subjects were computerized and analyzed employing statistical software by following the objectives set forth for this study. The outcomes and overall analyses are presented in the following chapters.

Chapter IV

RESULTS AND DISCUSSION

Chapter - IV

RESULTS AND DISCUSSION

300 (three hundred) Mizo children between 13 (thirteen) to 15 (Fifteen) years of age served as participant in the present study. The purposive random sampling technique was adopted in subject selection and equal proportions of gender (150 males and 150 females) were selected. Subject wise scores on the specific items of behavioral measures of: (a) Raven's Standard Progressive Matrices (Ravens, 1992), (b) Immediate Memory Span (Jacobs, 1887), and (c) Concept Formation Test (Hanfmann and Kasanin, 1937) were arranged for statistical analyses. The statistical analyses of the tests were presented sequentially as under:

<u>Preliminary Psychometric Analyses on the Behavioral Measures:</u>

The parametric statistical analyses of Descriptive Statistics, Cronbach Alpha for Reliability indices, and Item analyses based on – Item total coefficient of correlation were checked with an objective to justify the appropriate statistical treatment for further analyses of the research data. In the analysis of specific item, missing responses, outliers and those responses outside the sampling frame as well as extremely deviated responses from the distributed data are excluded for statistical analyses.

In the preliminary item analysis on the scores of Raven's Standard Progressive Matrices (RSPM: Ravens, 1992), a total of 14 items, (B score: item 7, 9, 10, 11 and 12; C score: item 6 and 8; D score item 3, 8 1, 10 and 11; E score 2 and 6) were excluded as the item-total coefficient were below the criteria ($r > .10$). In the item analysis of Concept formation test scores, a total of 6 items, (score items of: trial 2 BIK and CEV; trial 3 LAG; trial 4 MUR, LAG and BIK) were excluded in the preliminary psychometric check for further analyses of the data.

The mean and standard deviation and reliability indices (Cronbach-alpha) of RSPM sub-scales (A,B,C,D, and E), Digit Span, and Concept formation of the whole sample were put together in Table-.1

Table - 1: *Mean, Standard Deviation and Reliability Coefficient of RSPM, Digit Span and Concept Formation for the whole samples.*

Sources of Variance	Mean	Standard Deviation	N of Cases	Cronbach Alpha
RSPM (A scores)	8.86	3.00	300	.82
RSPM (B scores)	4.93	1.95	300	.72
RSPM (C scores)	7.35	2.37	300	.73
RSPM (D scores)	3.19	1.80	300	.70
RSPM (E scores)	3.93	2.41	300	.68
Digit Span	6.95	1.42	300	-
Concept Formation	204.00	13.17	300	.74

Reliability indices emerged to be robust at each level of analysis (for the whole sample). Cronbach Alpha for the internal reliability of the Ravens Standard Progressive Matrices (RSPM) ranged from 0.68 to 0.82; Raw scores of Digit span was taken for analysis since it was an experimental task scores; and Concept formation showed the reliability of .74. Thus, the scales/ and sub scales of the tests portrayed the trustworthiness of the test scales for measurement purposes in the projected population.

Results (Table-1) shows the preliminary psychometric check of the behavioral measures of the present study, and revealed considerable consistency over the level of analyses that determined applicability of the scales of the behavioral measures: (i) Standard Progressive Matrices (Ravens, 1992); (ii) Digit Span (Jacobs, 1887); and (iii) Concept Formation (Hanffman Kasanin, 1937). The comprehensive scores on RSPM, Digit Span and Concept Formation (time score) were taken for further statistical analyses.

In sum, the analyses for the preliminary checking of the psychometric properties highlighted the applicability of the selected scale/subscale of the behavioral measures for the present study. The scale constructed and validated for measurement of theoretical construct for a given population are need to be check again its reliability and validity as it might be no more reliable and valid to another cultural setting (Berry, 1974; Eysenck & Eysenck, 1983; Witkin & Berry, 1975) as the cultural practices and norms are different according to derived-etic approach assumption (Pootinga, 1989), due to the influence of differential social desirability and response (Van de Vjver & Leung, 1997).

<u>Relationships of the Behavioral Measures:</u>

After determining that the data generally met the requirements, the Bivariate Correlation were worked out between the Birth Order, Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income), and the scores on the behavioural measures (RSPM, Digit span and ,Concept formation) which was presented in Table - 2.

Table – 2 : *Bivariate Correlation between Birth Order, Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) and the scores on the behavioural measures (RSPM, Digit Span and Concept Formation) for the whole samples.*

VARIABLES	BIRTH ORDER	GEN-DER	AGE	PARENT STRUCT	INCOME SOURCE	MONTH INCOME	RSPM (Zscore)	DIGIT SPAN (Zscore)	CONCEP FORMA (Z score)
BIRTH ORDER	1.00	0.00	-0.02	-0.10	-0.03	0.03	-0.75**	-0.60**	-0.88**
GENDER		1.00	0.09	-0.06	0.06	0.03	-0.21**	-0.45**	-0.28**
AGE			1.00	0.00	-0.02	0.02	-0.03	-0.03	-0.02
PARENTAL STRUCTURE				1.00	0.03	0.34**	0.08	0.13*	0.12*
INCOME SOURCE					1.00	0.07	0.04	-0.02	0.03
MONTLY INCOME						1.00	-0.04	-0.01	-0.04
RSPM							1.00	0.59**	0.87**
DIGIT SPAN								1.00	0.68**
CONCEPT FORMATION									1.00

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Result of the Bivariate correlation between the independent variable (Birth order) and scales of the behavioural measures with Demographics variables, and inter-correlation between the dependent measures were presented in Table – 2, that revealed:

Birth Order (First born, Middle born and last born) had significant negative relationship at .01 level with the behavioral measures of Raven's Standard Progressive Matrices (r = - 0.75**), Digit span (r = - 0.60**), and Concept Formation (r = - 0.88**).

The result (Table – 2) clearly revealed that as the Birth order among the sibling increases, the performance of the subject decreased on the dependent measures which indicated that in the RSPM, Digit span and Concept formation test, First born scored highest than other Birth order, Middle born scored lower than the First born whereas the Last born scored lowest among the three Birth orders. The result supported the longitudinal study, to estimate the impact of family composition and birth order on educational attainment up to age 23, the study revealed a statistically significant negative correlation with educational attainments has been found. (Iacovou 2001)

Negative associations between Birth order and intelligence has been found in numerous studies (eg. Kristensen & Bjerkedal, 2007) The same result has been shown on several earlier studies; one group of studies presents evidence of birth order effects based on cross-sectional data, using cross-tabulations or simple correlation, they reported negative association between rank in the birth order and cognitive ability, there was a gradient of declining scores with rising birth order, so that first born scored better than middle born, who in turn scored better than third born, and so forth (Belmont and Marolla 1973; Blake 1981; Zajonc 2001).

Explanations consistent with the negative birth order coefficients are provided by the Quantity Dilution Hypothesis (Blake 1981; Leibovitz 1977; Becker 1965; Becker and Lewis 1973) as well as the Quality Dilution Hypothesis (Zajonc and Markus 1975; Zajonc 2001). Dilution models suggest that being early in the birth order is beneficial for attainment since a child that is early in the birth order may receive a larger share of the family resource or the services received are of better quality compared to a later-born sibling who faces more competition.

Birth order does not show the significant relationship with the demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income). This result has been found ensuing that Birth Order was not positively significant in correlation with age, gender, ecology, educational standard, academic achievement, father's occupation, mother's occupation, and nature of family (Lalthlangliana, 2010) in the same population under study. And the present result support the earlier studies on Birth order and personality, where no significant Birth Order and gender interactions were found when birth order was dichotomized (Syed, Moin U., 2004).

The score of Raven's Standard Progressive Matrices was positively correlated with the score of Digit span (r = 0.59**) and Concept formation (r = 0.87**). Which clearly shown that the subjects who scored high in RSPM also scored better in Concept formation test.

The intercorrelation matrix (Table – 2) revealed that correlation between RSPM and Digit Span Task were in the positive direction, the same has been found in the study of the relationship between intelligence and reaction time as a function of task and person variables (Agrawal, Rita; Kumar, Amrita, 1993).

Digit span shown positive relationship at .01 level with the Concept formation (r = 0.68**). This also revealed that the subjects who scored high in Digit span also scored better in Concept formation test than the low scorer of concept formation.

The result of the correlation between Digit span and Concept formation found in the present study conformed the earlier empirical studies that Digit span along with digit symbol/coding are the most sensitive subtest for determining brain damage, intellectual impairments, and learning disabilities. Persons who score well on digit backwards generally reflect persons who are flexible, have considerable concentration skills, and tolerate stress well. Wielkiewicz (1990) has suggested that the low scores on working memory can reflect not only poor concentration, memory and sequencing but also difficulties with concentration.

Gender (Male and Female) showed significant negative relationship with the behavioral measures of Raven's Standard Progressive Matrices (r = -0.21**), Digit span (r = - 0.45**) and Concept Formation (r = - 0.28**).

Considerable amount of studies emphasizes gender differences and suggested that Females are less likely than males to show deficits in intellectual development, normally associated with larger numbers of siblings. Sex difference emerges with respect to the impact of number of younger siblings as males showed lower scores with increasing numbers of younger siblings. But for females, increasing numbers of younger siblings are associated with higher scores (Paulhus & Shaffer, 1981). First born are higher than later born in creativity among males, and reversed for females that later born are the highest (Eisenman, 1967, 1968).

Gender does not shown significant level of correlation with other demographic variables (age, parental structure, source of income and monthly income).

In an earlier study using a sample from the family and child fixed effects regression models to test the effect of changes in the family size and gender on cognitive outcomes. The findings suggested that there is no causal effect of the gender and demographics variables like number of siblings during childhood on intellectual development (Guo and VanWey, 1999).

This result conformed the finding in the study of youth problems in Mizoram where no significant correlation has been shown with age, birth order, siblings, ecology, educational standard, academic achievement, father's occupation, mother's occupation, family size and nature of family (Lalthlangliana, 2010) in the same population under study.

Parental Structure (No parents, Single parents and Both parents) indicated positive significant relationship at .01 level with the Monthly income of the family (r

= 0.34**); and had significant positive relationship with Digit span (r = 0.13*) and Concept formation (r = 0.12*) at .01 level of significance.

No significant relationship has been found in the other demographics variables of Age, Income Source and Monthly Income with all the rest of the dependent and independent measures.

The relationship of the parental structure with monthly income of the family indicated that the subjects who were having both parents had relatively higher monthly income than the subjects with single parents and no parents. It also denoted that score of the subjects who were with both parents, shown relatively similar score in Digit span and concept formation test. And the score of the subjects who are with single parent and no parent were also in relationship. The parental structure could entail the family size and socioeconomic status of the subjects which influence the scores on the dependent measures (Rodgers et al. 2000; Steelman, 1985; Sulloway, 1996). Additionally, most of the researches in this area indicated that birth order effects are inextricably related to family size, with stronger effects appearing in larger families (Heer, 1985; Sputa and Paulson, 1995).

One way Analysis of Variances (K=3) for the effect of Birth order on Dependent variables (RSPM, Digit span, Concept formation):

For the One way Analysis of Variance (K=3) Levene's test of equality of error variances for the independent effect of Birth Order on the behavioral measures was employed. The analyses on Digit span showed heterogeneity of variance between the groups under comparison. Hence, Square root transformation was done with the raw score on the Digit span. Finally, the scores on Raven's Standard Progressive Matrices, Digit span (square root transformation) and Concept Formation Test were also transformed into z scores. Results (Table - 3a) revealed the equality of error variances for the independent effect of Birth Order on the behavioral measures.

Table – 3a: *Levene's test of equality of error variances for the independent effect of Birth Order on the behavioral measures for the whole samples.*

	F	df1	df2	Sig.
RSPM	1.40	2.00	297.00	.25
Digit Span (Sqrt)	.24	2.00	297.00	.79
Concept Formation	1.45	2.00	297.00	.24

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Levene's test of equality of error variances for the independent effect of Birth Order on the behavioral measures were not significant in all levels of analysis on the behavioural measures showing the fulfillment of parametric statistical assumptions for further analyses. Thus, One way Analysis of variance for the effect of Birth Order on the dependent measures was employed on the dependent measures for the whole samples under study.

Table – 3b: *Mean and Standard Deviation for the different Birth Order on the standardized scores of the behavioral measures for the whole samples.*

	Birth Order	Means	SD
RSPM	First Born	.87	.62
	Middle Born	.08	.73
	Last Born	-.97	.64
Digit Span	First Born	.84	.82
	Middle Born	-.24	.76
	Last Born	-.61	.79
Concept Formation	First Born	1.08	.50
	Middle Born	-.01	.42
	Last Born	-1.09	.48

The result of One-way ANOVA on the behavioural measures (RSPM, Digit Span and Concept formation) were systematically analyzed and presented subsequently in the Table-3b and 3c, and figures - 2 to 4.

Table - 3c: *One way Analysis of Variance for the effect of Birth Order on the Standardized scores of the behavioral measures for the whole samples.*

Dependent Variable	Sources of Variation	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
RSPM (Z scores)	Birth Order	169.32	2	84.66	193.88	.00	.57
Digit Span (Z scores)	Birth Order	114.27	2	57.13	91.86	.00	.38
Concept Formation (Z scores)	Birth Order	233.46	2	116.73	528.97	.00	.78

Results (Table – 3c) revealed significant independent effects of 'Birth order' in all the analyses for test scores on (i) Ravens Standard Progressive Matrices (Ravens, 1992) with effect size of 57% ($p>.01$), (ii) Digit Span (Jacobs, 1887) with effect size of 38% ($p>.01$) (iii) Concept Formation (Hanffman Kasanin, 1937) with effect size of 78% ($p>.01$).

The result of the present study (Table - 3c) conformed to the earlier studies which revealed the effect of Birth order in cognitive functioning, personality and achievements. Cross-sectional studies generally find that the higher the birth order, the lower the IQ (Zajonc, 1976; De Lint, 1966). And the result supported the findings that, within each family size first born always scored better on the Raven Progressive Matrices than did later born; and with few inconsistencies, there was a gradient of declining scores with rising birth order, so that first born scored better than second born, who in turn scored better than third born and so forth (Belmont & Marolla1973).

Psychologists have conducted more than two thousand studies on the subject of birth order since Adler set forth his own theories on the subject. Critics of this literature have rightly argued that the findings are conflicting and that most studies are inadequately controlled for social class, sibling size, and other background influences that, because they correlate with birth order, can lead to false conclusions. Nevertheless, meta-analysis—a technique for aggregating findings from different studies in order to increase statistical power and reliability—suggests that these differences are robust. (Sulloway 1995, 1996, in press-a).

Perhaps the most compelling evidence supporting the existence of birth-order effects outside the family of origin comes from a metaanalytic review of the birth-order literature. More than two thousand published studies on birth order, most of which have been conducted outside the family of origin; have consistently shown small but significant effects (Sulloway, 1995, 1996, in press-a). What is most noteworthy about these collective findings is how closely they resemble the basic pattern of birth-order effects that has been presented in Table – 3c, using within-family data. The correlation between the birth-order effect sizes in Table – 3c and the proportion of significant results found in the overall birth-order literature reflects many meta-analytic outcomes and several individual findings.

Table - 3d: *Post hoc Analysis of variance for the effect of Birth Order on the standardized scores of the behavioral measures for the whole samples.*

RSPM	**Birth Order**	**Means**	.87	.08	-.97
	First Born	.87	X	.78**	1.84**
	Middle Born	.08		X	1.05**
	Last Born	-.97			X
Digit Span	**Birth Order**	**Means**	.84	-.24	-.61
	First Born	.84	X	1.08**	1.45**
	Middle Born	-.24		X	-.37**
	Last Born	-.61			X
Concept Formation	**Birth Order**	**Means**	1.08	-.01	-1.09
	First Born	1.08	X	1.09**	2.16**
	Middle Born	-.01		X	1.07**
	Last Born	-1.09			X

** The mean difference is significant at the .01 level.

The observed independent effect size of ‘Birth order’ on RSPM was 57% ($p>.01$). Results of Post hoc Analysis of variance revealed that the First born ($M=.87$) significantly score higher than Middle born ($M=.08$) and last born ($M= -.97$). at .01 level ($M1 - M2 = .78$; $M1 – M3 = 1.84$; $p>.01$).

Middle born ($M=.08$) also showed higher mean rank than last born ($M= -.97$) which was significant at .01 level ($M2-M3 = 1.84$; $p>.01$).

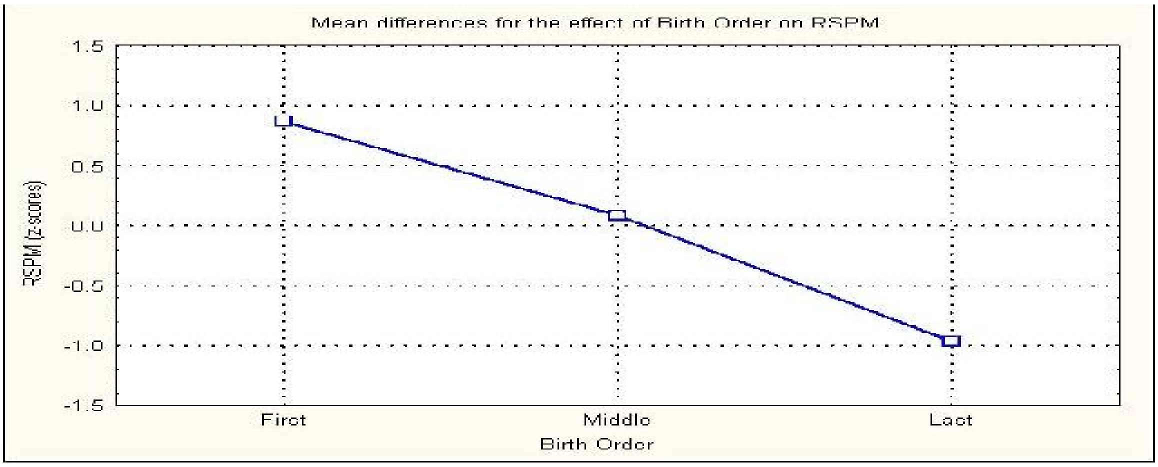
The results clearly depicted that, First born were far better in their performance scores of RSPM than the Middle born, and better scores was found in Middle born as compared to Last born, which supported the theoretical assumptions of the present study.

The results was in line with, “first born always scored better on the Ravens Standard Progressive Matrices than did later born; and there was a gradient of declining scores with rising birth order, so that first born scored better than middle born, who in turn scored better than third born, and so forth” (Belmont, & Marolla, 1973).

First-borns frequently score higher on intelligence tests than other children because firstborns mainly have adult influences around them in their early years; they spent their initial years of life interacting in a highly intellectual family environment. This further suggested that firstborns were more intelligent than only children, because the latter will not benefit from the "tutor effect" or teaching younger siblings (Zajonc, R.B., & Markus, G. 1975; Zajonc, R.B. 2001) Last-born children do not have the opportunity to become tutors and therefore suffer from a “last-born handicap” (Retherford and Sewell, 1991).

To illustrate the mean differences for the significant independent effect of Birth order on the dependent measures (RSPM scores) was presented in the following figure – 2.

Figure -2: *Mean differences for the significant independent effect of Birth Order on the RSPM scores for the whole samples.*



The significant independent effect of 'Birth order' on Digit span was observed with effect size of 38% (p>.01). And the result of post hoc Analysis revealed that First born (M=.84) had significantly higher mean rank than Middle born (M= -.24) and Last born (M = -.61) at .01 level (M1 - M2 = 1.08; M1 – M3 = 1.45; p>.01).

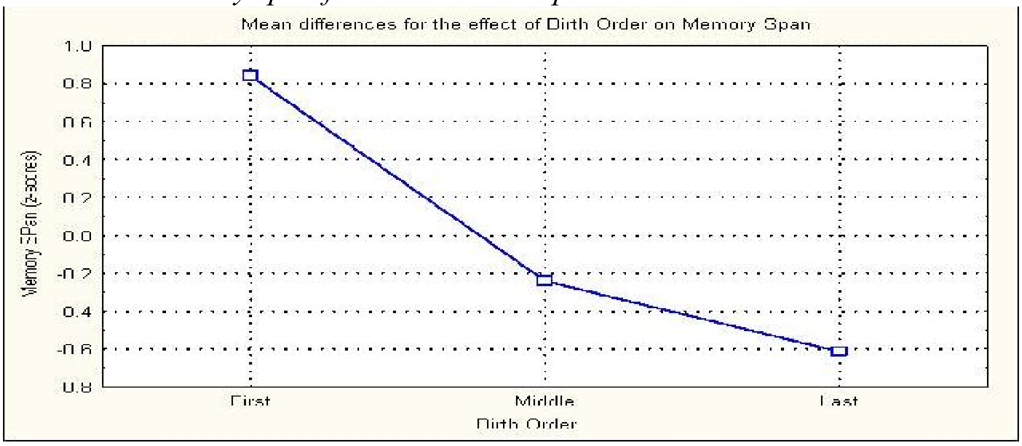
The mean difference of Middle born (M=.84) and last born (M= -.61) was also significant at .01 level (M2-M3 = 1.84; p>.01).

As expected, effects of birth order were generally strong in recall tasks. This result is quite similar with common findings in studies of recall and recognition in adults and the elderly (Nyberg et al. 2003; Nilsson et al.1988). However, the size of the effects of birth order found in this study is comparable to what is reported in studies on children and adolescents (Rodgers 1984)

The results attested the same theoretical assumptions that first born scored better than middle born, who in turn scored better than third born. But the pattern of mean differences was quite different from the other mean differences on RSPM and concept formation; the first born scored far higher than the middle and last born. The findings were consistent with our hypothesis and majority of the literature found by Zajonc (2001) and several other researchers.

To illustrate the mean differences for the significant independent effect of Birth order on the dependent measures (Digit span score) was presented in the following figure – 3.

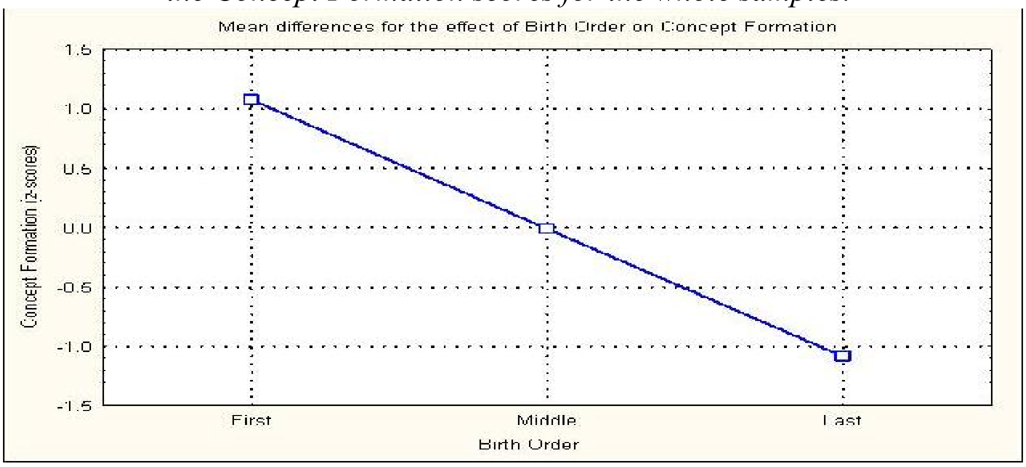
Figure -3: *Mean differences for the significant independent effect of Birth Order on Memory span for the whole samples.*



The significant independent effect of 'Birth order' on Concept formation was observed with effect size of 78% (p>.01). And the result of post hoc Analysis revealed that First born (M=1.08) had higher mean rank than Middle born (M= -.01) and Last born (M = -1.09) which was significant at .01 level (M1 - M2 = 1.09; M1 – M3 = 2.16; p>.01).

The results exemplified the same trend of declining scores with rising birth order; the first born showed the highest mean score, followed by the middle born then last born. The mean difference of Middle born (M= - .01) and last born (M= -1.09) was also significant at .01 level (M2-M3 = 1.84; p>.01).

Figure - 4: *Mean differences for the significant independent effect of Birth Order on the Concept Formation scores for the whole samples.*



Analysis of Covariance (K = 3) with Demographics variables as the Covariate:

Analysis of covariance for the effect of Birth Order on the behavioral measures were computed to determine whether the effect of birth order on the behavioural measures were reduced with the inclusion of the Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) as the covariate for the whole samples. But, before proceeding to further analyses Levene's test was conducted to show the homogeneity of the dependent variables.

Table - 4a: *Levene's test of equality of error variances for the independent effect of Birth Order on the behavioral measures with demographics variables (Gender, Age, Parental structure, Income source and Monthly income) as covariate for the whole samples.*

Dependent Measures	**F**	**df1**	**df2**	**Sig.**
RSPM	2.81	2.00	297.00	.06
Digit Span (Sqrt)	1.20	2.00	297.00	.30
Concept Formation	.06	2.00	297.00	.94

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Levene's test of equality of error variances for the independent effect of Birth Order on the behavioral measures with demographics variables (Gender, Age, Parental structure, Income source and Monthly income) as covariate were not significant in all levels of analysis on the behavioral measures showing the fulfillment of parametric statistical assumptions for further analyses.

Table - 4b: *Result of the Analysis of covariance for the effect of Birth Order on RSPM (Z scores) with Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) as the covariate for the whole samples.*

Dependent Variables	Sources of Variation	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
RSPM (Z scores)	**Gender**	13.10	1.00	13.10	33.12	.00	.10
	Age	.35	1.00	.35	.89	.35	.00
	Parental structure	.01	1.00	.01	.02	.88	.00
	Income source	.22	1.00	.22	.56	.45	.00
	Monthly Income	.00	1.00	.00	.01	.92	.00
	Birth Order	166.53	2.00	83.27	210.52	.00	.59
	Error	115.49	292.00	.40			

Table - 4c: *Result of the Analysis of covariance for the effect of Birth Order on Dig*it Span (Z scores) *with Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) as the covariate for the whole samples.*

Dependent Variables	Sources of Variation	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
DIGIT SPAN (Z scores)	**Gender**	59.46	1.00	59.46	140.21	.00	.32
	Age	.02	1.00	.02	.06	.81	.00
	Parental structure	.08	1.00	.08	.19	.66	.00
	Income source	.01	1.00	.01	.02	.90	.00
	Monthly Income	.07	1.00	.07	.18	.68	.00
	Birth Order	110.56	2.00	55.28	130.36	.00	.47
	Error	123.82	292.00	.42			

Table - 4d: *Result of the Analysis of covariance for the effect of Birth Order on* Concept Formation (Z scores) *with Demographics variables (Gender, Age, Parental Structure, Income Source, Monthly Income) as the covariate for the whole samples.*

Dependent Variables	Sources of Variation	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
CONCEPT FORMATION (Z scores)	**Gender**	22.14	1.00	22.14	152.83	.00	.34
	Age	.10	1.00	.10	.71	.40	.00
	Parental structure	.08	1.00	.08	.55	.46	.00
	Income source	.15	1.00	.15	1.00	.32	.00
	Monthly Income	.05	1.00	.05	.35	.55	.00
	Birth Order	228.49	2.00	114.24	788.51	.00	.84
	Error	42.31	292.00	.14			

The Result of Analysis of covariance (Table – 4b – d) for the effect of Birth Order on Concept Formation (Z scores) with Demographics variables (Gender, Age, Parental Structure, Income Source, Monthly Income) as the covariance manifested that:

Birth order shown significant effect size on: RSPM = 59% (p>.01); Digit Span =47% (p>.01); and Concept formation test = 84% (p>.01).

Gender also highlighted the significant effect size on: RSPM = 10% (p>.01); Digit Span =32% (p>.01); and Concept formation test = 34% (p>.01).

The Result of Analysis of covariance (Table – 4b – d) for the effect of Birth Order on Concept Formation (Z scores) with Demographics variables (Gender, Age, Parental Structure, Income Source, Monthly Income) as the covariance does not support the third hypothesis of the present study that, *"The effect of birth order on intellectual capacity, memory span, and concept formation will be reduced with the inclusion of the demographic profiles as the covariate"* at the expected level.

Table – 4e: *Result highlighting the differences in Effect size of Birth order on the dependent measures. Before inclusion of demographics Variable and After inclusion of demographics variables as the covariate.*

Dependent Measures	**Birth order Effect size without Demographics Variables**	**Birth order Effect size with Demographics Variables**
RSPM	57% (p>.01)	59% (p>.01)
Digit Span	38% (p>.01)	47% (p>.01)
Concept Formation	78% (p>.01)	84% (p>.01)

The observed independent effect size of 'Birth order' on RSPM without Demographics Variables as the covariate was 57% (p>.01), after inclusion of demographics variables as the covariate, the effect size increased to 59% (p>.01). In Digit span, the independent effect size of 'Birth order' without Demographics Variables as the covariate was 38% (p>.01); after inclusion of demographics variables as the covariate the effect size increased to 47% (p>.01). And the significant independent effect of 'Birth order' on Concept formation without Demographics Variables as the covariate was observed with effect size of 78% (p>.01); after inclusion of demographics variables as the covariate the effect size increased to 84% (p>.01).

The result (Table – 4e) clearly evidenced the inconsequential role of demographics variables as the covariate, the effect size of Birth order (First born, Middle born and last born) on the dependent measures were larger after the inclusion of demographics variable which shown the minor interaction effect of demographics variables the third hypothesis "The effect of birth order on intellectual capacity, memory span, and concept formation will be reduced with the inclusion of the demographic profiles as the covariate" is not supported by the result of the present study. On the other hand, it clearly revealed the robust effect of Birth order on the behavioral measures; it has defended the other hypothesis of the present study in the other way round.

Mizo being a close knit society and the homogeneity of the people in general could be one of the reasons why the demographics variables did not reduced the birth order effect. The classless society with no class distinction and no discrimination on grounds of sex, financial position and the civil society might have tremendous influence; Mizos put much emphasis on teaching the child to develop a sense of group cooperation and Christian values. The status in the family or the sibling position is acknowledged by the society and there is no extensive gap between the family life and social life.

However, several studies referred the significant role of demographics variables in the study of Birth order effect (Page and Grandon, 1979; Kristensen and Bjerkendal, 2007; Berbaum and Moreland, 1986). But there were also studies which found the same results with no significant interaction effect of demographics variables on the dependent measures (Wan Salina, Nizam, and Naing, 2007).

Table – 4f: *Post hoc multiple mean comparison for the significant effect of Birth Order on the dependent measures with demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) as the covariate for the whole samples.*

	Birth Order	**Means**	**.87**	**.08**	**-.97**
RSPM	First Born	**.87**	X	.78**	1.83**
	Middle Born	**.08**		X	1.05**
	Last Born	**-.97**			
Digit Span	Birth Order	**Means**	.84	-.24	-.61
	First Born	**.84**	X	1.07**	1.44**
	Middle Born	**-.24**		X	-.37**
	Last Born	**-.61**			X
Concept Formation	Birth Order	**Means**	1.08	-.01	-1.09
	First Born	**1.08**	X	1.08**	2.15**
	Middle Born	**-.01**		X	1.07**
	Last Born	**-1.09**			X

** The mean difference is significant at the .01 level.

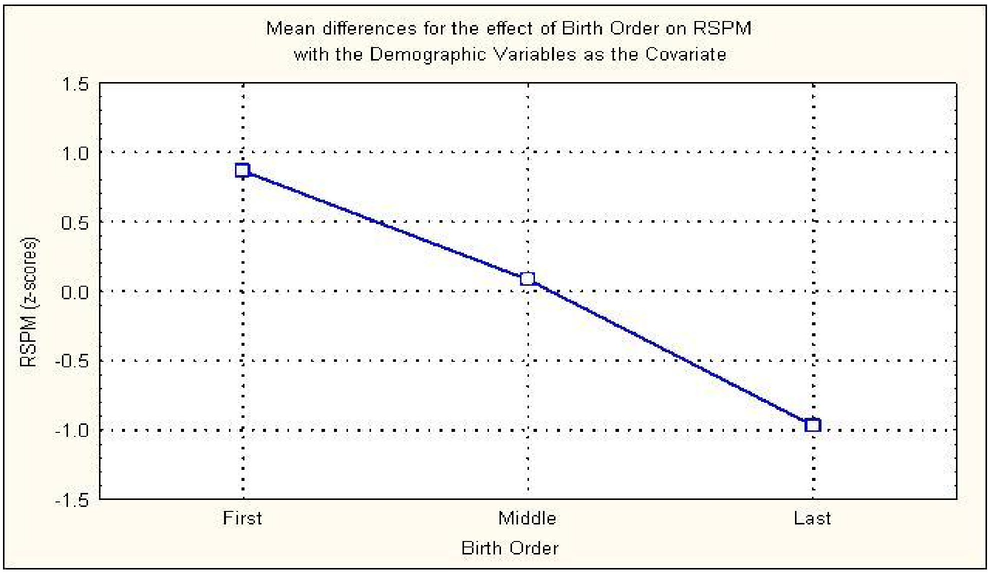
The result (Table – 4f) of post hoc Multiple mean comparison revealed significantly mean score for first born as compared to middle born, the later indicating significantly greater mean score as compared to last born:

In RSPM, the First born (M=.87) significantly score higher than Middle born (M=.08) and last born (M= -.97) = (M1 - M2 = .78; M1 – M3 = 1.83; p>.01). And Middle born (M=.08) also shown higher mean rank than last born (M= -.97) = (M2-M3 = 1.05; p>.01).

The results supported the findings that "the eldest children in families tend to develop higher IQs than their younger siblings." This could be a consequence of parents spending more quality time with their first-born children than with subsequent children (Carey, 2009). First-borns, only children, and children with one other sibling score higher on tests of verbal ability than later born and children with multiple siblings (Polit and Falbo, 1988). **The results clearly evidenced the earlier cross-sectional studies** generally find that the higher the birth order, the lower the IQ (Zajonc, 1976; De Lint, 1966).

To accentuate the results of multiple mean comparisons for the significant effect of Birth Order on the RSPM z scores with demographics variables as the covariate *we*re presented in the following figure – 5.

Figure - 5: *Mean differences for the significant effect of Birth Order on the RSPM scores with demographics variables as the covariate for the whole samples.*

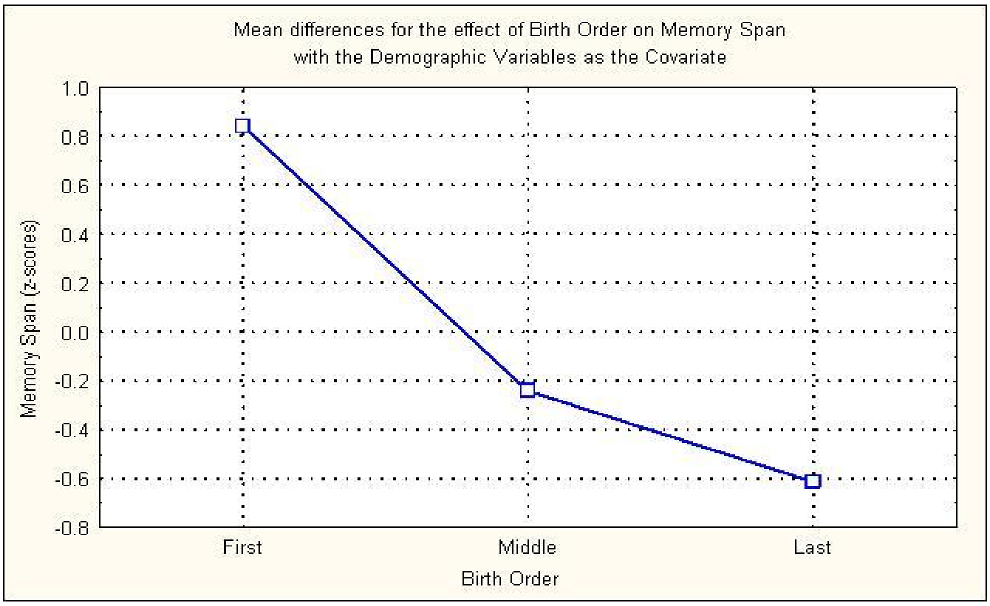


In Digit Span First born (M=.84) had significantly higher mean rank than Middle born (M= -.24) and Last born (M = -.61) at .01 level (M1 - M2 = 1.07; M1 – M3 = 1.44; p>.01). And Middle born (M=.84) shown higher than last born (M= -.61) = (M2-M3 = -.37; p>.01).

The result conformed to the finding that, sibship size and birth order are factors that affect episodic memory performance through the life span. In various tasks measuring recall and recognition it was found that the larger sibship size a participant belongs to, the more is the memory performance impaired. In a similar vein, later-born siblings perform not as well as first-born siblings. Generally, for sibship size, as well as for birth order, the impairment is increasing in a monotonous fashion (Holmgren, Sara, Molander, Bo & Nilsson L.G, 2007).

To illustrate the results of multiple mean comparisons for the significant effect of Birth Order on the Digit span z score with demographics variables as the covariate *we*re presented in the following figure – 6.

Figure - 6: *Mean differences for the significant effect of Birth Order on the Digit span with demographics variables as the covariate for the whole samples.*

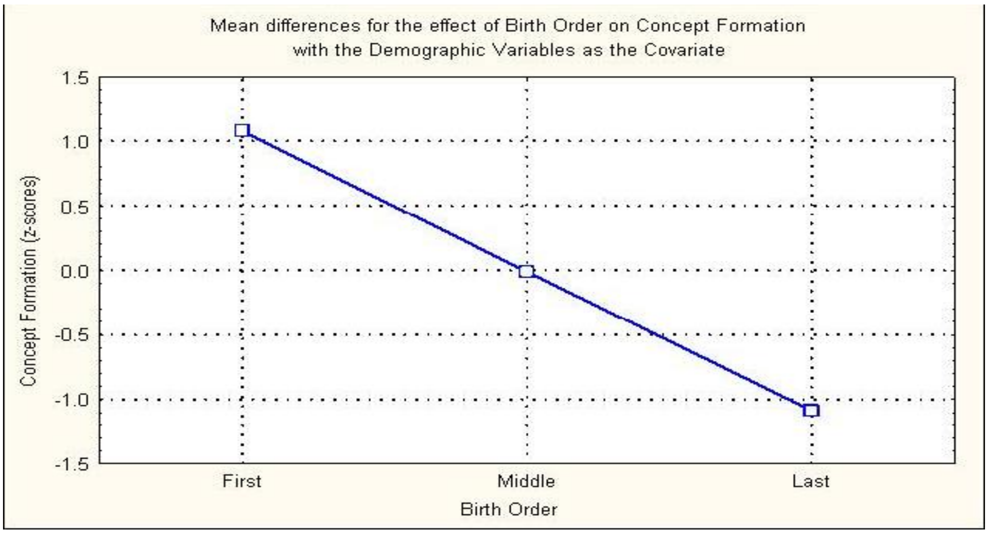


In Concept Formation test First born (M=1.08) had higher mean rank than Middle born (M= -.01) and Last born (M = -1.09) = (M1 - M2 = 1.08; M1 – M3 = 2.15; p>.01). And Middle born (M= - .01) shown higher than last born (M= -1.09) = (M2-M3 = 1.07; p>.01).

The results supported the study of Boling and Boling (1993) examining gender differences in creativity, conducted using the survey measuring creative attitudes, Concept formation; polygons, differing in complexity-simplicity; and an Unusual Uses measure. They found first-born males and later born females demonstrated the greatest creativity and concept formation.

To highlight the results of multiple mean comparisons for the significant effect of Birth Order on the Concept formation test z score, with demographics variables as the covariate *we*re presented in the following figure –7.

Figure - 7: *Mean differences for the significant effect of Birth Order on the Concept Formation scores with demographics variables as the covariate for the whole samples.*



The results of Post hoc multiple mean comparison (Table - 4e) exemplified the same trend as shown in Post hoc analysis of Variance (Table - 3d) of declining scores with rising birth order; the first born showed the highest mean score, followed by the middle born then last born.

The Results of Analysis of Variance and Analysis of Covariance strongly supported the hypotheses that:

First born shown significantly greater mean scores as compared to middle born children on total score of intellectual capacity, memory span, and concept formation.

Middle born had shown significantly greater mean scores as compared to Last-born children on total score of intellectual capacity, memory span, and concept formation.

The findings of the present study conforms the earlier studies on effect of Birth order, first born experience an environment that is intellectually richer than the one experienced by later born, who progressively dilute this environment with their own relative lack of intellectual ability (Zajonc & Mullally, 1997; Zajonc, 2001; and Downey, 2001). Considerable evidence both developmental and cross-cultural appears to support the validity of this hypothesis in samples fully controlled for social class and sibling size. And there was a gradient of declining scores with rising birth order, so that first born scored better than second born, who in turn scored better than third born and so forth (Belmont & Marolla1973).

Among the numerous causative factor for declining scores with rising birth order, the work by Dunn suggested that having a younger sibling may sharpen the social awareness of the older child (Dunn, 1989), and that the mother can improve the older child’s ability as a caregiver by discussing the younger sibling’s needs with him (Dunn and Kendrick 1982). Stewart and Marvin (1984) suggest that older siblings often assume care-giving responsibility and younger siblings seek attachment to older siblings with care-giving qualities in the absence of a parent.

Predictability of the test scores from 'Gender'

Before examining the mean difference of Gender on the dependent variables (t-test), Levene's test of equality of error variances for the independent effect of Birth order on the behavioral measures was employed over again. The result revealed the homogeneity for the independent effect of Birth Order on the behavioral measures (a) Raven's Standard Progressive Matrices, (Ravens 1992). (b) Immediate memory span (Jacobs 1887), and (c) Concept formation test, (Hanfmann and Kasanin 1937). Therefore analysis of t-test was conducted to elucidate the differences between the mean score of Gender (Male and Female) on the dependent measure.

In the Result of Tables - 4b to 4d, Gender was found having significant effect size on: RSPM = 10% ($p>.01$); Digit Span =32% ($p>.01$); and Concept formation test = 34% ($p>.01$) in the Analysis of covariance. Therefore, t-test was employed to elucidate the difference between the mean scores of Gender (Male and Female) on the dependent measures of (a) Raven's Standard Progressive Matrices (b) Digit span, and (c) Concept formation test scores.

Table - 5a: *Mean and Standard Deviation to show the Gender (Male and female) differences on the standardized scores of dependent measures for the whole samples.*

	GENDER	Mean	Std. Deviation	Std. Error Mean
RSPM Zscore	Male	0.21	0.95	0.08
	Female	-0.21	1.00	0.08
Digit span Zscore	Male	0.45	0.88	0.07
	Female	-0.45	0.91	0.07
Concept Formation Zscore	Male	0.27	0.99	0.08
	Female	-0.28	0.93	0.08

Table - 5b: *t-test to elucidate the differences between the mean score of Male and Female on the dependent measures for the whole samples.*

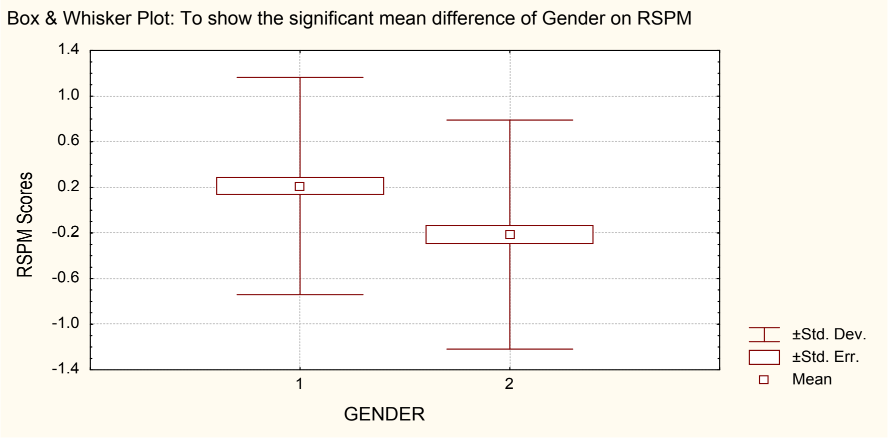
	Levene's Test for Equality of Variances		***t-test for Equality of Means***		
	F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**
RSPM Zscore	3.22	0.07	3.76	298	0.00
Digit span Zscore	0.17	0.68	8.74	298	0.00
Concept Formation Zscore	1.02	0.31	4.97	298	0.00

The Result (Table 5b) showed that the Significant (2-Tailed) difference values between Male and Female in the dependent measures of (a) Raven's Standard Progressive Matrices (b) Immediate Memory Span, and (c) Concept Formation Test, are statistically significant at .01 level. This again conformed to gradient declining scores with rising birth order, so that first born scored better than second born, who in turn scored better than third born and so forth (Belmont & Marolla, 1973)

Group Statistics (Table - 5a) of Mean and Standard Deviation to elucidate the Gender (Male and female) differences on the standardized scores of dependent measures revealed the robust differences between Males and Females; that the Male subjects were performed significantly better in the dependent measures of (a) Raven's Standard Progressive Matrices, (b) Immediate Memory Span and (c) Concept Formation Test, than Female subjects. To elucidate the significant mean differences of Male and Female the following Figures – 8 to 10 were plotted.

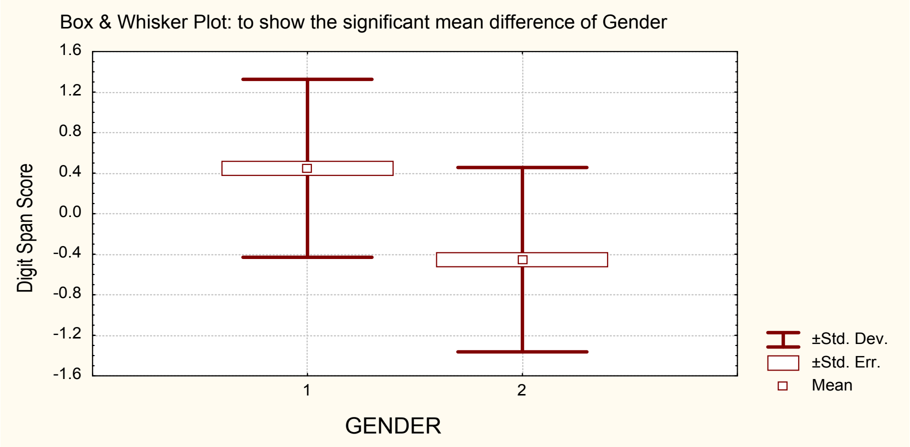
In the scores on RSPM, the Mean score of Male (0.21) shown greater Mean score than of Females (-0.21).

Figure - 8: *Plot of Means to show the significant mean difference of Gender (Male and Female) on RSPM scores for the whole samples.*



In the dependent measures (Digit Span), the Mean score of Male (0.45) showed greater Mean score than of Females (-0.45).

Figure - 9: *Plot of Means to show the significant mean difference of Gender (Male and Female) on Digit span for the whole samples.*

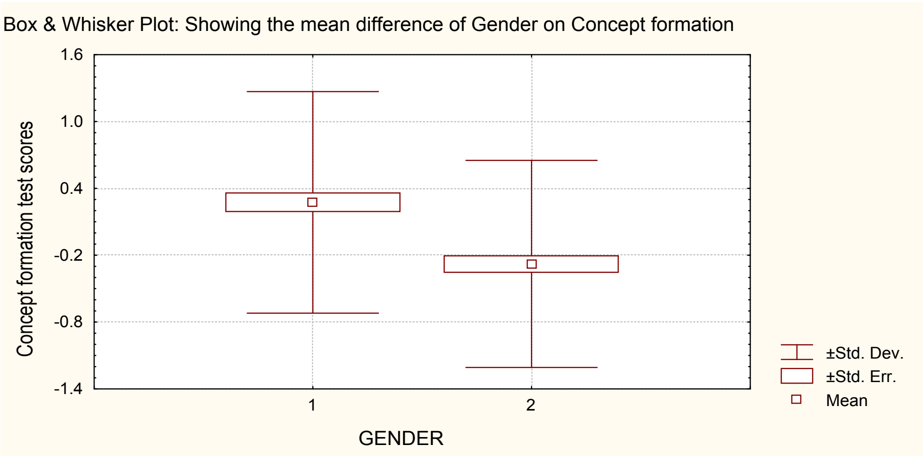


The same trend as the present study has been reported by Flaherty (1989) in an investigation on the effects of a multimodal program on self-concept and cognitive and affective creativity on students of different Birth order in third grade. Three paper and pencil instruments were administered: The Torrance Test of Creative Thinking

(TTCT, Torrance, 1974), the Piers-Harris Children's Self Concept Scale (Piers-Harris, 1969), and the Creative Assessment Packet (Williams, 1980). The results indicated that there were significantly gender differences in overall creativity scores.

In the dependent measures (Concept Formation), Male shown greater Mean score of (0.27) as compared to the Mean score of Females (-0.28).

Figure - 10: *Plot of Means to show the significant mean difference of Gender (Male and Female) on Concept formation scores for the whole samples.*



Considerable amount of studies highlighted gender differences and often significant difference in arithmetic performances tend to favour boys (Geary, 2007; Olszewski-Kubilius & Turner 2002). Boys tend to perform better than girls, especially when it comes to solving word problems, to fast and accurate arithmetic facts retrieval from Memory, and to mental representation, abstraction, estimation and spatial-mechanical skills (Casey, Nuttall, & Pezaris, 2001; Voyer & Sullivan, 2003).

Traditionally, girls in Mizo society have been encouraged to conform, whereas boys are expected to be active and dominant risk-takers, this may further impact existent gender differences in cognitive functioning, and was confirmed in a study conducted in different culture by Block, (1983). Furthermore, Davis and Rimm (1989) acknowledge that most boys are provided with toys that enhance their visual-spatial abilities, such as trucks, Legos, and models, while Lever (1976) notes that the games of girls are often highly structured requiring turn-taking and rules. In addition, characteristic traits such as nonassertiveness (Florey & Tafoya, 1988), group conformity (Bradley, 1989), and the need for modeling (Garrison, 1989).

The result of the t-test to elucidate the difference of mean score for gender is found to be consistent with the earlier studies suggested that Females are less likely than males to show deficits in intellectual development, normally associated with larger numbers of siblings. Sex difference emerges with respect to the impact of number of younger siblings as males showed lower scores with increasing numbers of younger siblings. But for females, increasing numbers of younger siblings are associated with higher scores (Paulhus & Shaffer, 1981). First born are higher than later born in creativity among males, and reversed for females that later born are the highest (Eisenman, 1967, 1968).

Although, explaining and finding of the cause of Birth order difference was not the purview or objective of the present study, however, there could be a number of variables which causes the Birth order effect on the cognitive functioning of the Mizo children, and there could be several reasons and answers, out of which might be based on:

1. Francis Galton (1874) theory on:
    (i) Firstborn sons among the Mizos may be more likely to have the financial resources to continue their education.
    (ii) Firstborns might have the advantage of being treated more as companions by parents. This means that they also undertake more responsibility than their younger siblings.
    (iii) Firstborn children would get more attention and better nourishment in families with limited financial resources.

2. The Resource Dilution hypothesis, (Blake 1981; Downey 2001):
    (i) Parental resources are finite. Resources include money, personal attention and cultural objects such as books. Parents do have discretion as to how they use their resources, but they cannot necessarily create more when they are needed.

(ii) Additional siblings reduce the share of parental resources received by any one child. Parents can devote 100% of their resources to an only child or a firstborn whose siblings have not yet arrived. Parents with more than one child must divide their resources accordingly.

(iii) Parental resources have an important effect on children's educational success. It is assumed that the relative richness of the environment affects cognitive development. (Schachter, 1963).

3. The Confluence Model (Zajonc ,1976, 2001& Markus,1975):

(i) Firstborns do not have to share their parents' attention, so they benefited from their parents' complete absorption in the new responsibility. Later born children never experience this advantage. Moreover, additional siblings automatically limit the amount of attention any of the siblings get-and this includes the firstborn.

(ii) Firstborns (and older siblings in general) often have to answer questions and explain things to their younger siblings. It is believed that the act of tutoring helps the older children to cognitively process information. Further, teaching others might improve their verbal abilities. Except in very rare cases, youngest siblings do not get the opportunity to tutor their brothers and sisters. This tutoring function explains why only children do not tend to have higher IQs than firstborns.

To sum up, the whole findings of the study conforming to the theoretical expectations as set forth for conduction of the study, and provided empirical background pertaining to the effects of Birth order on measures of the dependent variables, The whole results revealed First born scored significantly greater mean score as compared to Middle born, the later indicating significantly greater mean score as compared to Last born. And significant differences have been clearly highlighted between the mean scores of male and female for the whole sample.

Chapter – V

SUMMARY AND CONCLUSIONS

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The present study was designed to reveal the impact of birth order on Intellectual capacity, memory span, and Concept formation among Mizo Children. Keeping in view of the objectives of the study, 300 subjects age between 13 – 15 years were randomly selected for the conduct of the study. It may be mentioned that during the first stage of sampling procedure the various groups were matched on a number of extraneous variables like, class, socio-economic status mother and father's age, employment status of their parents, the family structure, number of siblings and size of the family, to obtain a very homogeneous and truly representative sample of the population. The subjects from rural and urban of male and female were listed. At the stage of the sampling procedure, at least 100 (hundred) subjects for each of the 3 (three) independent groups were included, the responses of large number of the subjects were screened out and in the final count, 300 subjects were randomly picked from various parts of Mizoram and matched again on the extraneous variables to meet the objectives on the sampling of various groups to serve as subjects for the conduct of the study.

The rural subjects were randomly selected from the areas of. Aizawl city, Saiha district, Kolasib district, Mamit district, Champhai district and with equal number of males and females of school children, that is, 100 in each group of First born, Middle born and Last born with due consideration to equal number of male and females of children.

Preliminary Psychometric Analyses on the Behavioral Measures:

The parametric statistical analyses of Descriptive Statistics, Cronbach Alpha for Reliability indices, and Item analyses based on – Item total coefficient of correlation were checked with an objective to decide the appropriate statistical treatment for further analyses of the raw data. In the analysis of specific item, missing responses, outliers and those responses outside the sampling frame as well as extremely deviated responses from the distributed data are excluded for statistical analyses.

The subject–wise scores on the specific items of the behavioral measures of: (a) Standard progressive matrices, (Ravens 1992) (b) Digit span to measure the span of Memory, (Jacobs 1887) (c) Hanfmann and Kasanin Concept formation test, (Hanfmann and Kasanin 1937) were prepared separately for First born, Middle born, Last born and analyzed in step-wise manner for each cell of the design (n=100).

Results (Tables -1) showed the mean and standard deviation and reliability indices (Cronbach-alpha) of the scale/subscales of the behavioural measures, and the mean, standard deviation and the reliability analyses, computed for birth order revealed considerable consistency over the level of analyses that determined applicability of the scales/subscales of all the behavioral measures.

Relationships of the Behavioral Measures:

Bivariate Correlation between Birth Order, Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) and the scores on the behavioural measures (RSPM, Digit Span and Concept Formation) for the whole samples were computed and are presented in Table - 2. The bivariate correlation matrix (Table - 2) indicated the relationships among the scales/sub-scales of the behavioural measures accounting for samples of the Mizo children.

One way Analysis of Variances (K=3) for the effect of Birth order on Dependent variables (RSPM, Digit span, Concept formation):

Levene's test of equality of error variances (Table – 3a) for the independent effect of Birth Order on the behavioral measures were worked out to ascertain the homogeneity of the scores on dependent variables, the effect of Birth Order on the behavioral measures were not significant in all levels of analysis, then One way analysis of variance was computed.

One way Analysis of Variance computed for the effect of Birth Order on the standardized scores of the behavioral measures Presented in Table – 3c uniformly manifested significant F-ratios at each level and the effect size of Birth order was observed on: RSPM 57% (p>.01); Digit span 38% (p>.01) and Concept formation 78% (p>.01).

The Post hoc Analysis of variance:

The Post hoc Analysis of variance (Table – 3d) for the effect of Birth Order on the standardized scores of the behavioral measures revealed the independent effect size of 'Results of Post hoc Analysis of variance revealed that the First born (M=.87) significantly score higher than Middle born (M=.08) and last born (M= -.97). (M1 - M2 = .78; M1 – M3 = 1.84; p>.01).

Middle born (M=.08) also shown higher mean rank than last born (M= -.97) which was significant at .01 level (M2-M3 = 1.84; p>.01).

Mean differences for the significant independent effect of Birth Order on the dependent variables were illustrated in Figure 2 – 4.

Analysis of Covariance (K = 3) with Demographics variables as the Covariate:

Levene's test of equality of error variances (Table - 4a)for the independent effect of Birth Order on the behavioral measures with demographics variables as covariate was computed and the result was not significant; thus the analyses proceed to Analysis of Covariance.

The Analysis of covariance (Table – 4b to 4e) for the effect of Birth Order on Dependent measures with Demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) as the covariate clearly evidenced the insignificant role of demographics variables as the covariate, the effect size of Birth order on the dependent measures were larger after the inclusion of demographics variable the third hypothesis "The effect of birth order on intellectual capacity, memory span, and concept formation will be reduced with the inclusion of the demographic profiles as the covariate" is not supported by the result of the present study.

Post hoc multiple mean comparison

Post hoc multiple mean comparison (Table – 4f) for the significant effect of Birth Order on the dependent measures with demographics variables (Gender, Age, Parental Structure, Income Source and Monthly Income) as the covariate strongly supported the Result of One way Analysis of Variance by showing the exactly same mean value. In RSPM, the First born (M=.87) significantly score higher than Middle born (M=.08) and last born (M= -.97) = (M1 - M2 = .78; M1 – M3 = 1.83; p>.01). And Middle born (M=.08) also shown higher mean rank than last born (M= -.97) = (M2-M3 = 1.05; p>.01).

In Digit Span First born (M=.84) had significantly higher mean rank than Middle born (M= -.24) and Last born (M = -.61) at .01 level (M1 - M2 = 1.07; M1 – M3 = 1.44; p>.01). And Middle born (M=.84) shown higher than last born (M= -.61) = (M2-M3 = -.37; p>.01).

In Concept Formation test First born (M=1.08) had higher mean rank than Middle born (M= -.01) and Last born (M = -1.09) = (M1 - M2 = 1.08; M1 – M3 = 2.15; p>.01). And Middle born (M= - .01) shown higher than last born (M= -1.09) = (M2-M3 = 1.07; p>.01).

The results clearly depicted that, First born were far better in their mean scores of the dependent variables than the Middle born, and Middle born showed significantly greater mean scores as compared to Last born, which supported the theoretical assumptions of the present study.

Mean differences for the significant effect of Birth Order on the Dependent variables with demographics variables as the covariate for the whole sample were presented in Figure – 5 to 7.

Predictability of the test scores from 'Gender'

Levene's test of equality of error variances for the independent effect of Birth order on the behavioral measures was employed before proceeding to analysis by t-test, and permitted to proceed for t-test to elucidate the differences between the mean score of male and female on the dependent measures.

The Result of t-test (Table – 5b) revealed the statistically significant (2-Tailed) difference values between Male and Female in the dependent measures of (a) Raven's Standard Progressive Matrices. (b) Immediate Memory Span, and (c) Concept Formation Test, at .01 level.

In conclusion of the overall results of analyses incorporated in the present study to determine the Impact of Birth order on RSPM, Digit span and Concept formation among Mizo children conformed to the empirical basis sufficiently. Substantial Item analyses based on – Item total coefficient of correlation and the relationships of the specific items of the specific scale, reliability index (Cronbach alpha) and the relationship between the scales/subscales of behavioural measures. The results of One way Analysis of Variance (ANOVA) and the Analysis of Variance (ANCOVA) uniformly manifested that, Birth order has a strong impact on the cognitive functioning among Mizo children; and shown evidently that First-born had shown significantly greater mean scores as compared to middle born children. And Middle born indicated significantly greater mean scores as compared to Last-born children. And t-test manifested the Significant (2-Tailed) difference values between Male and Female on the mean score of RSPM, memory span, and concept formation.

Limitations and suggestions for further Research:

Although, the present study revealed robust results, but it was not free from limitations:

a) The behavioural measures employed in this study were experimental task and it consumed a lengthy time to obtain the sample, due to that the sample size was limited to lesser size, and to obtain homogenous group and to control the extraneous variables children of only 13 to 15 years of age were taken (not the other age group) therefore it may not be deemed purely representation of the whole Mizo children.

b) The demographics variables were limited to fewer variables; different results might be obtained if larger demographics variables were accounted in the study.

Keeping the above limitations in mind, further extended studies to illustrate the effects and causes of Birth order differences on: Cognition, Personality and Achievements were suggestible to be conducted. And incorporating larger sample size, inclusion of "only or single child" in the birth order, and more measures of behavioural measures were desirable to be replicated in support of the findings.

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DEMOGRAPHICS INFORMATON SHEET

I Personal Information:

1. Name : ______________________________
2. Date of birth : Date___ Month____ Year___ Age___ as on ______
3. Gender : Male / Female
4. Present Address : ______________________________
5. Permanent Address : ______________________________
5. Name of School : ______________________________
6. Educational Standard /Class: ______________________________
7. School Address : ______________________________

II Family:

1. Structure : Nuclear / Joint
2. Number of family members : ______
3. Number of Siblings : ______
4. Birth Order (from the eldest) : ______
5. Mother's age : ______
6. Father's age : ______
7. Parental structure : Intact / Single / step-parents

III Income:

1. ***Source:***
   a. Father ☐
   b. Mother ☐
   c. Others ☐
2. ***Total monthly income of family:***
   a. Below Rs. 10000 ☐
   b. Rs. 10000 – Rs. 20000 ☐
   c. Above Rs. 20000 ☐

SET A

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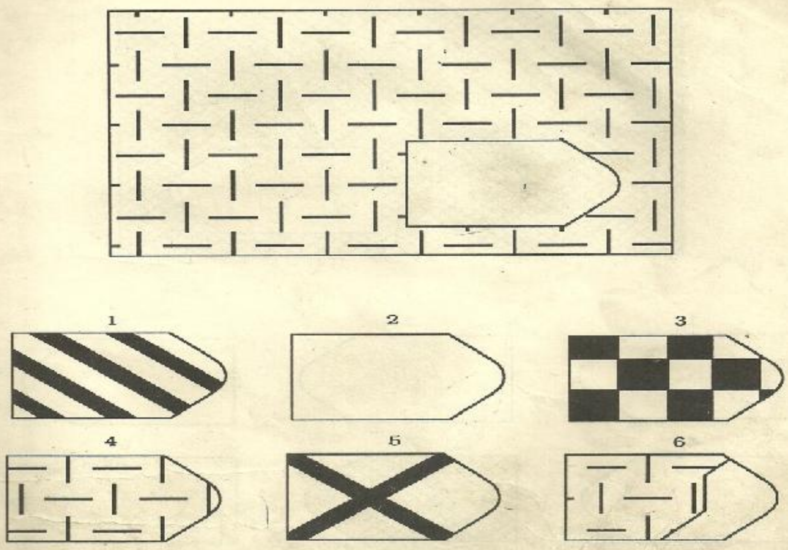

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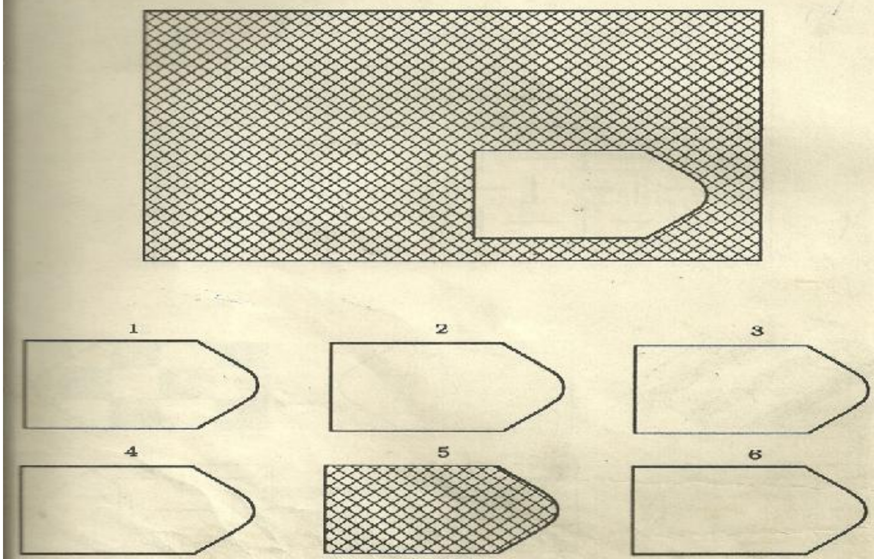

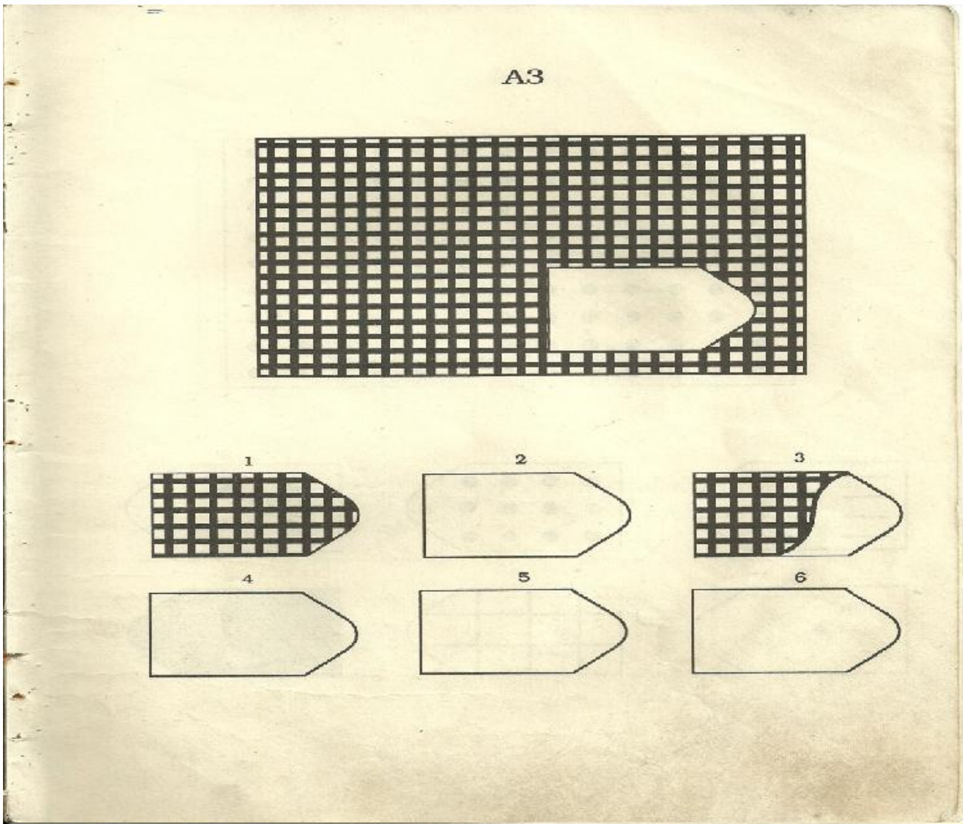
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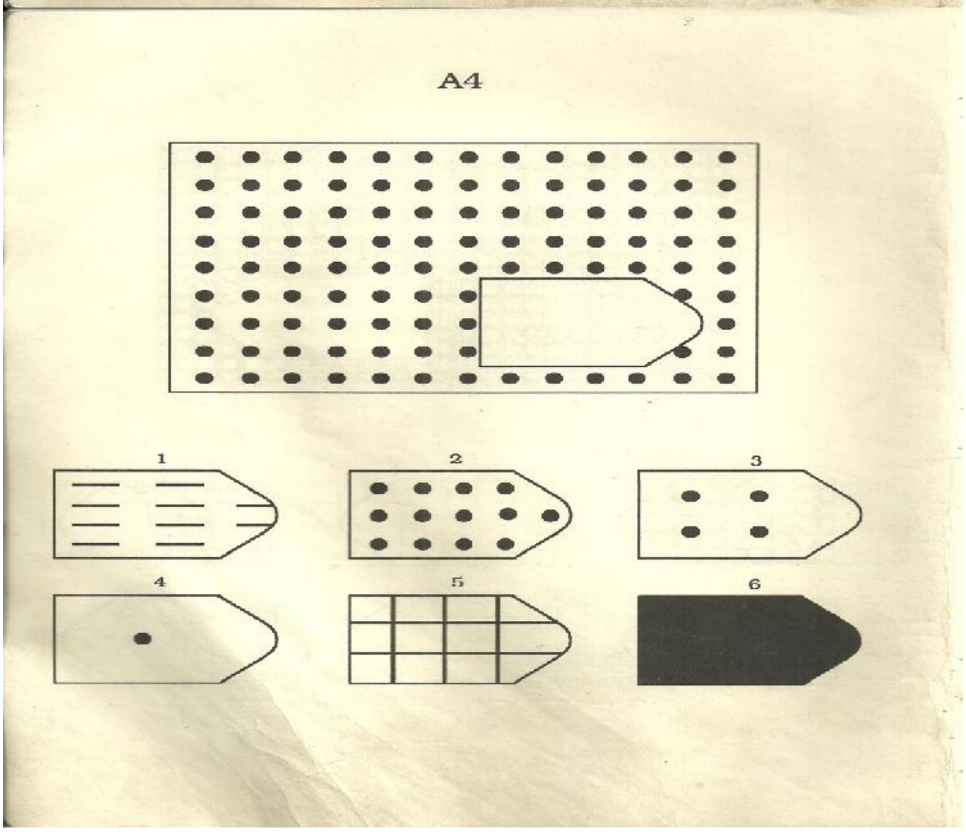
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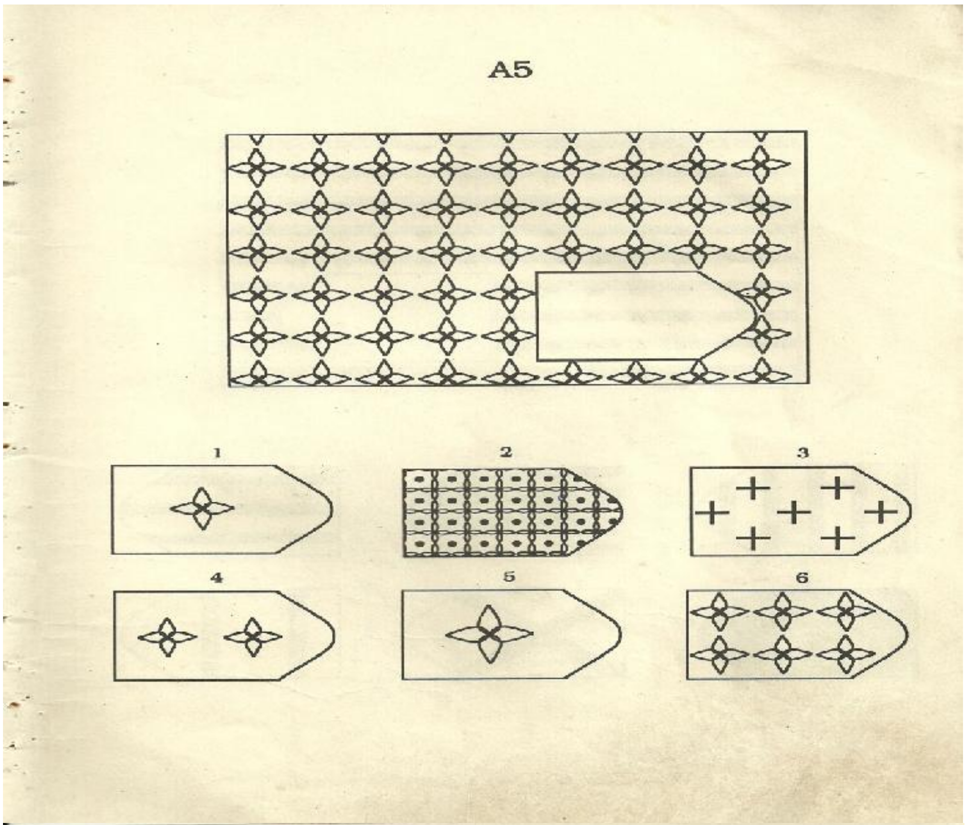
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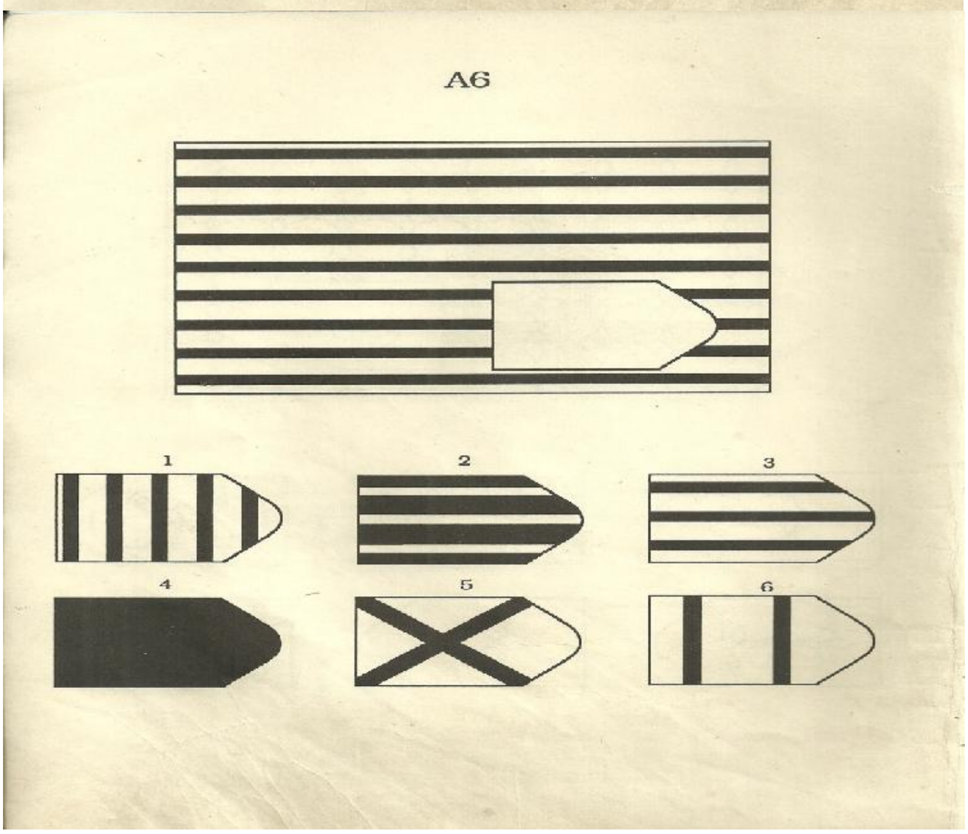
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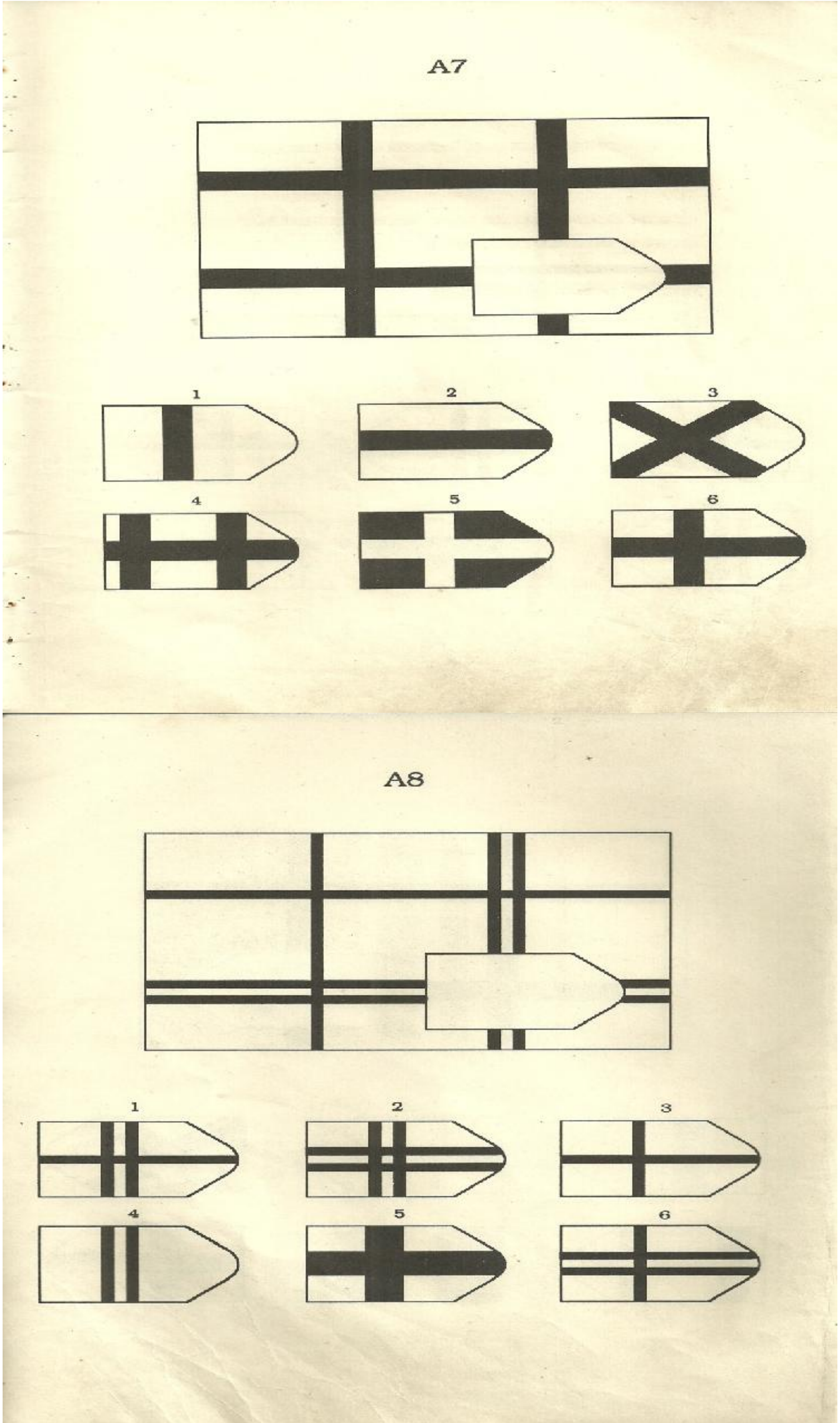
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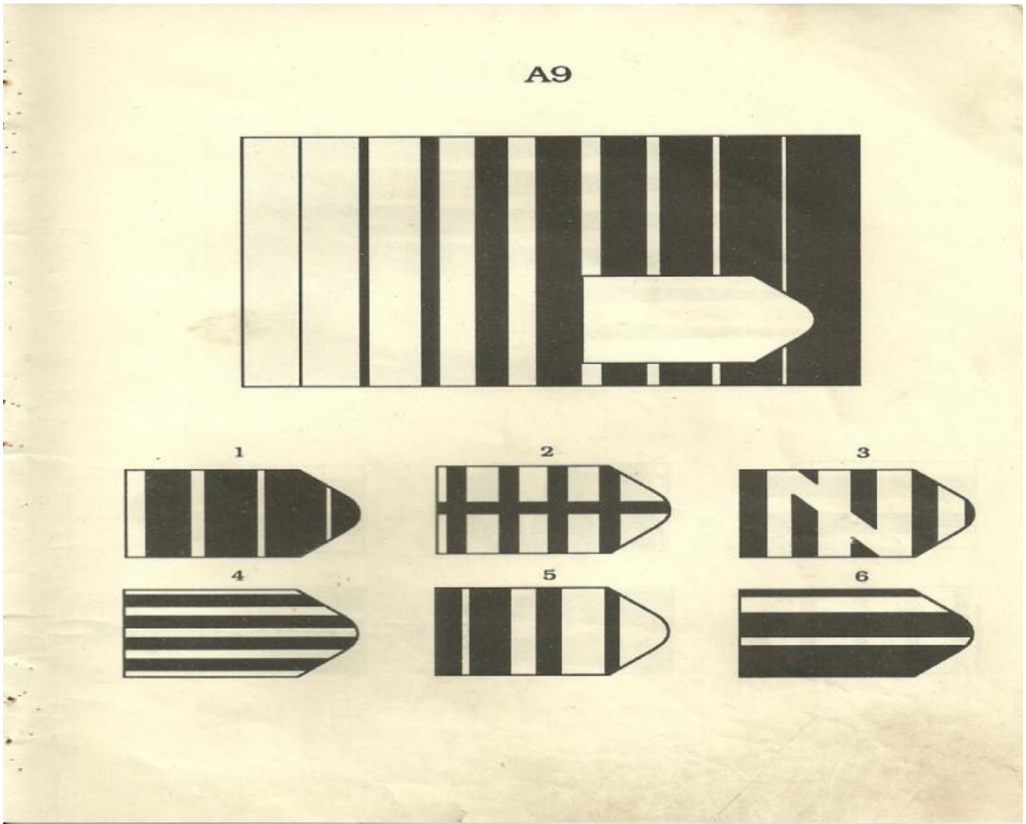
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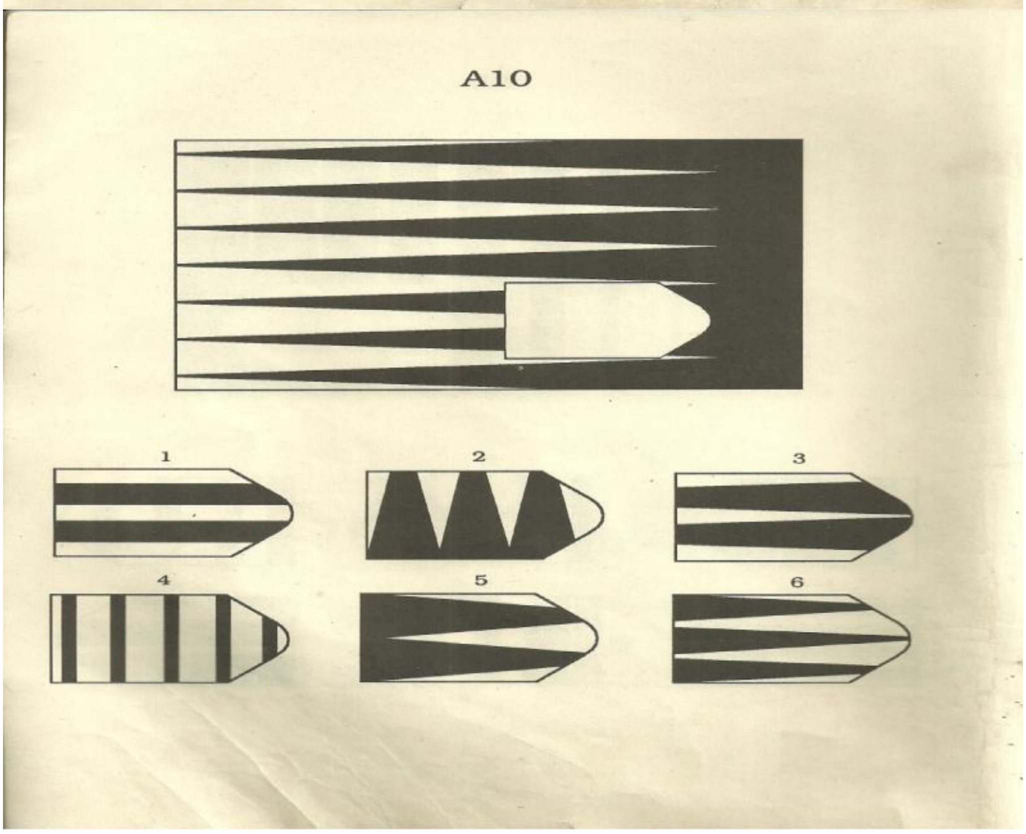
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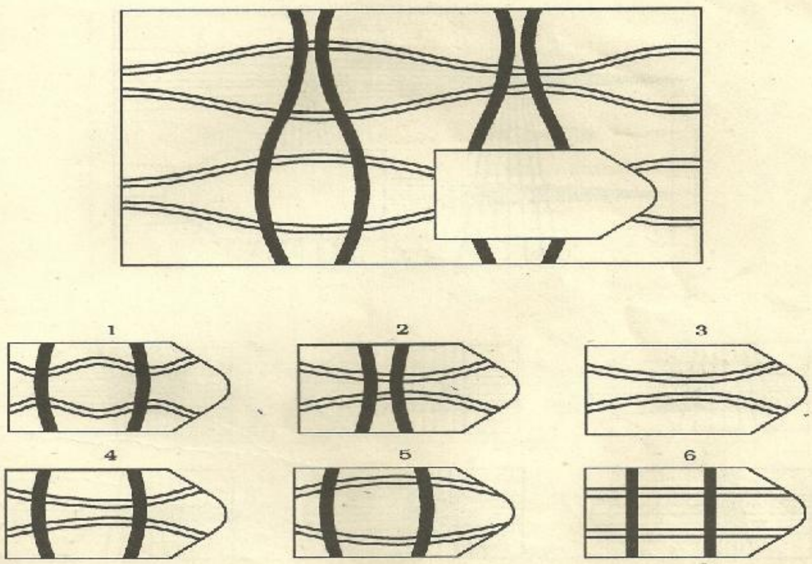

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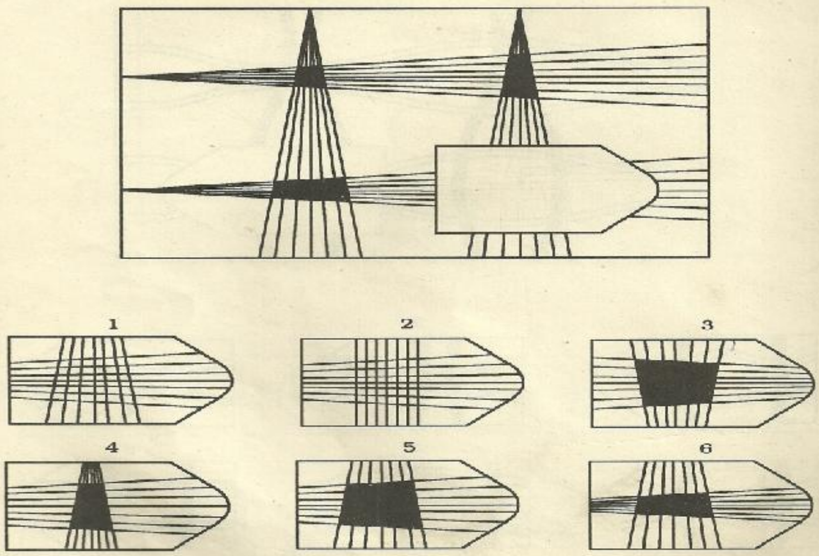

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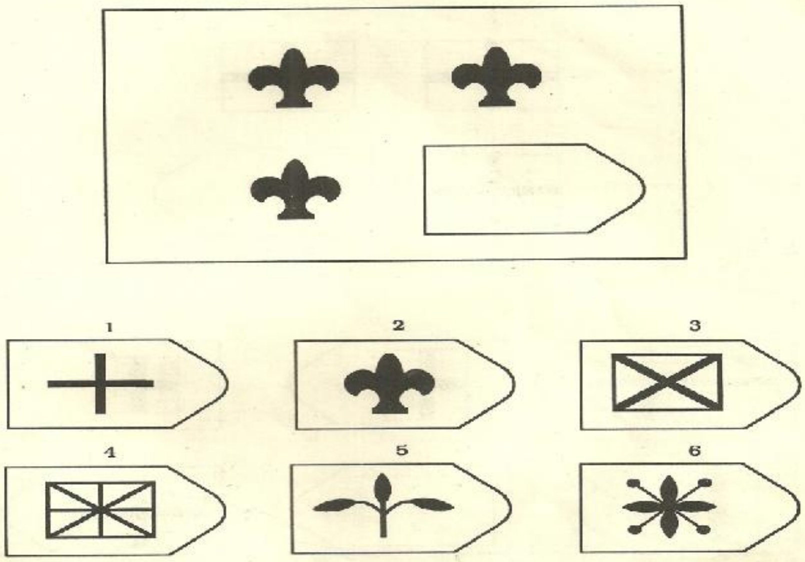

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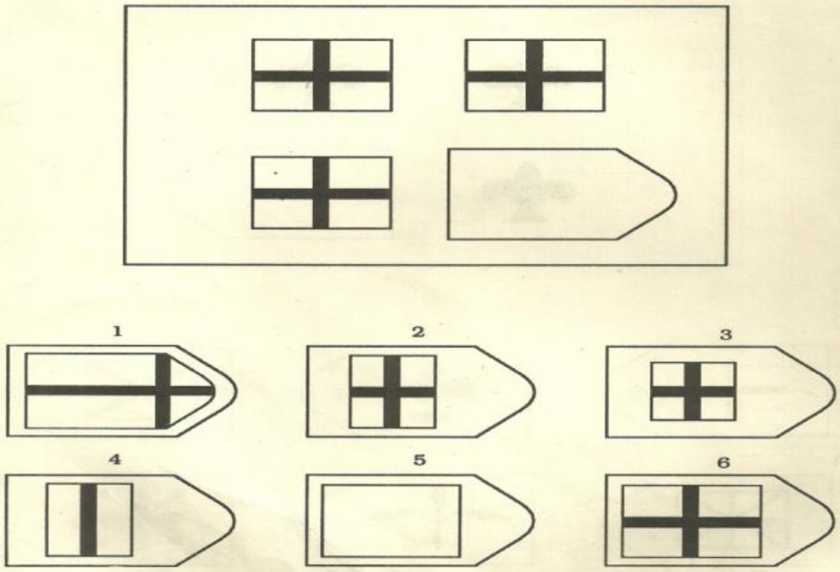

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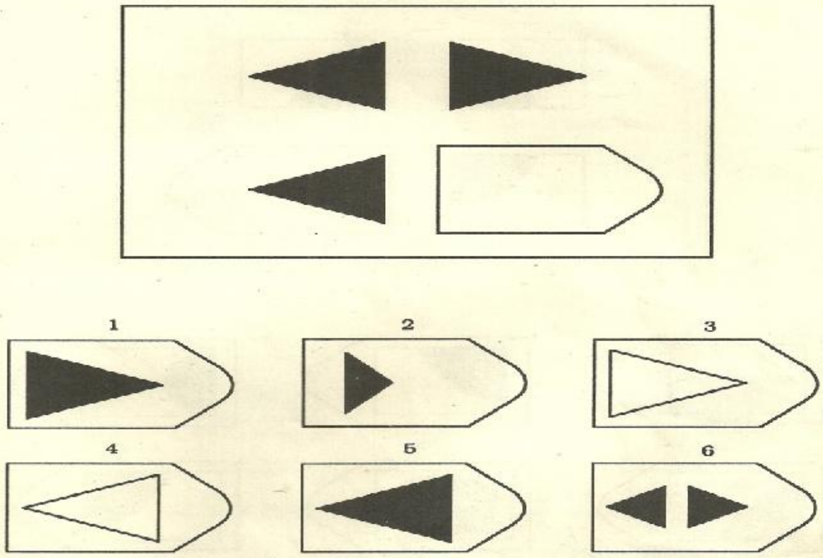

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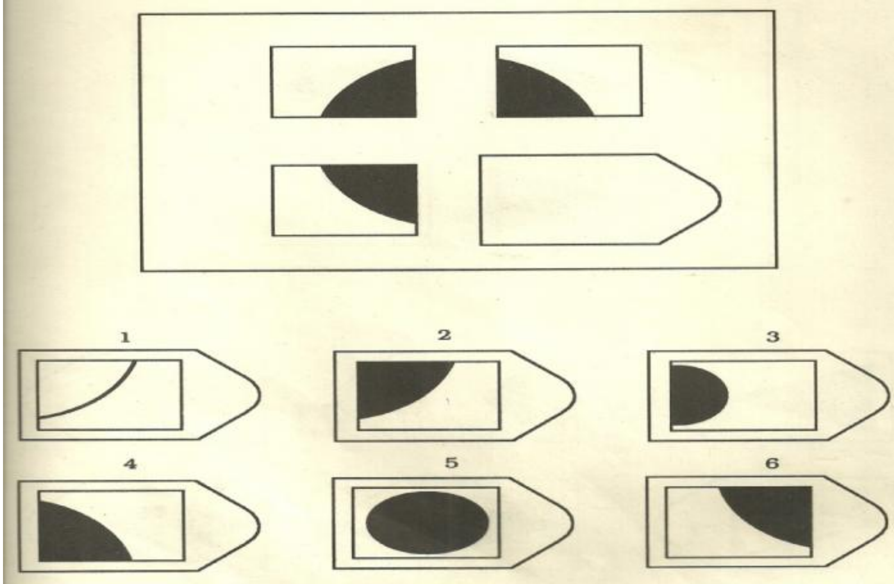

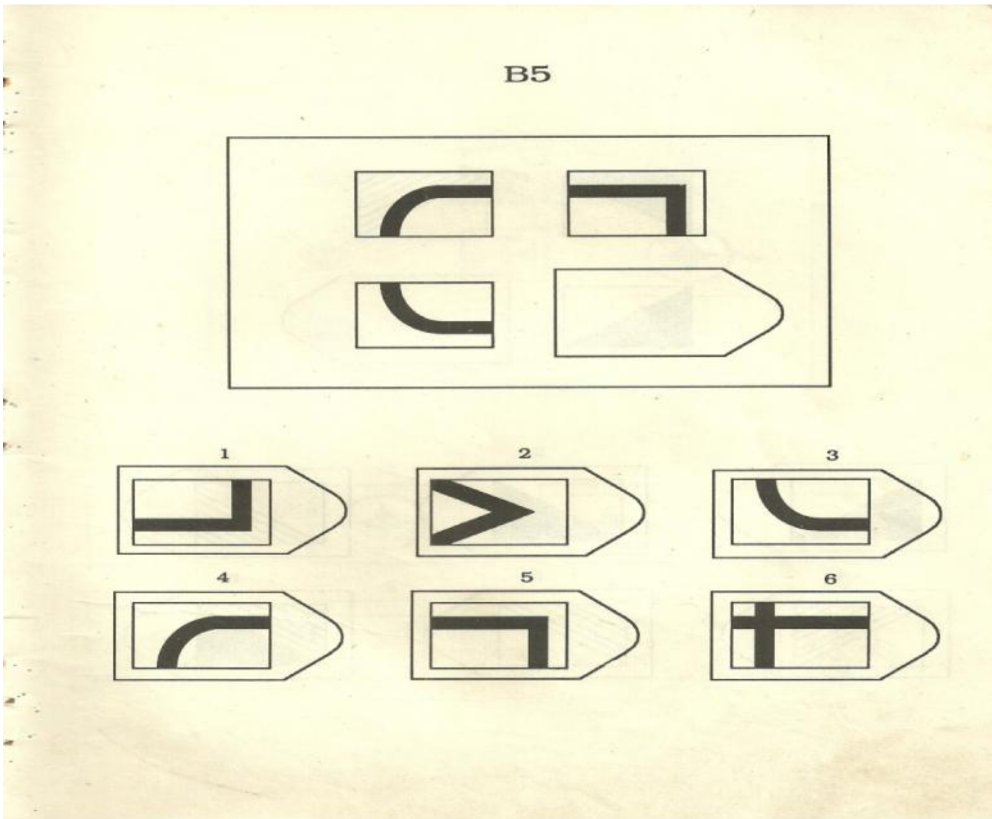
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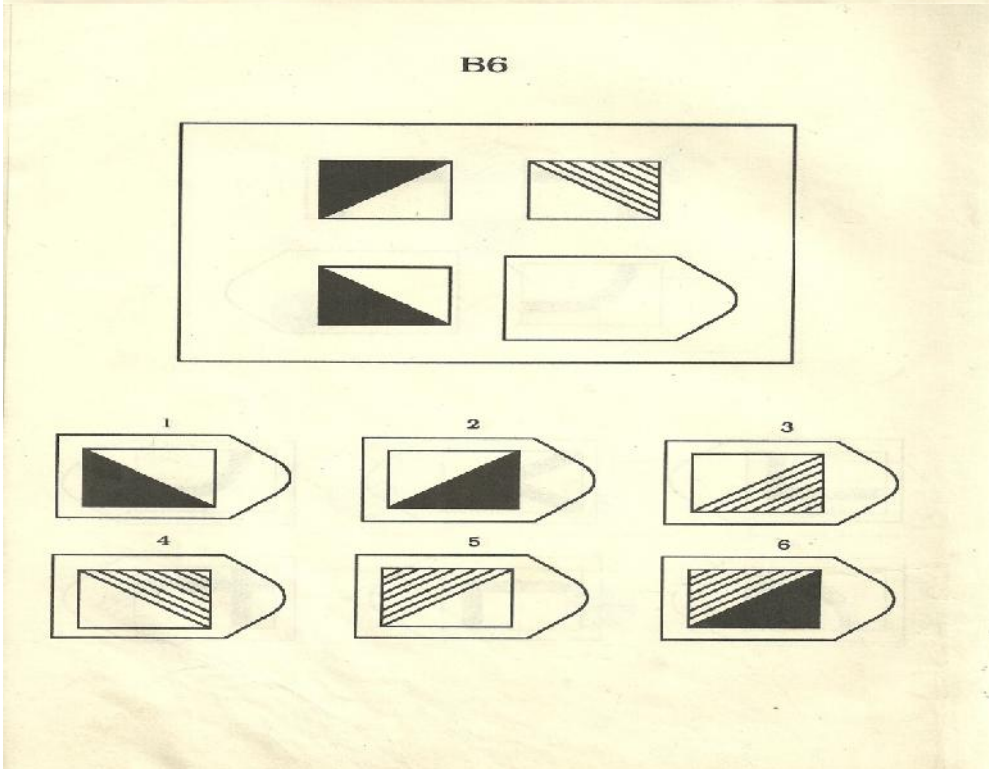
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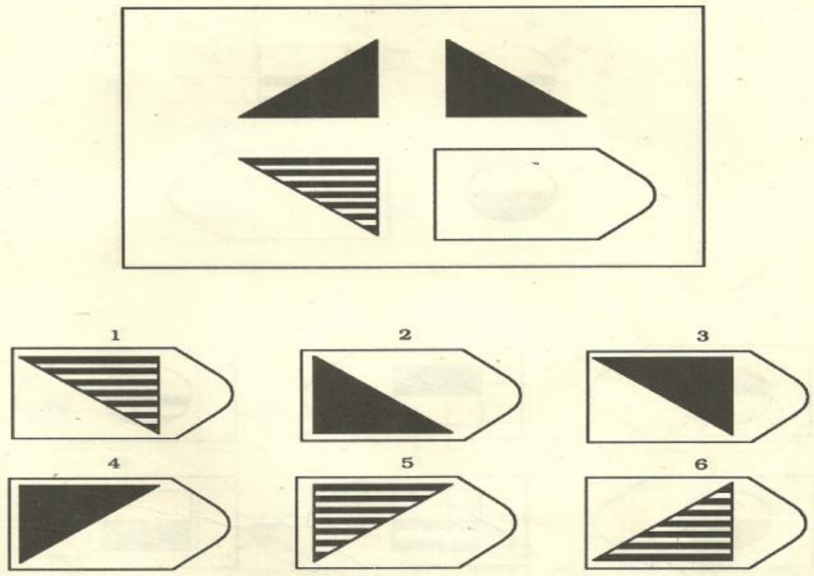

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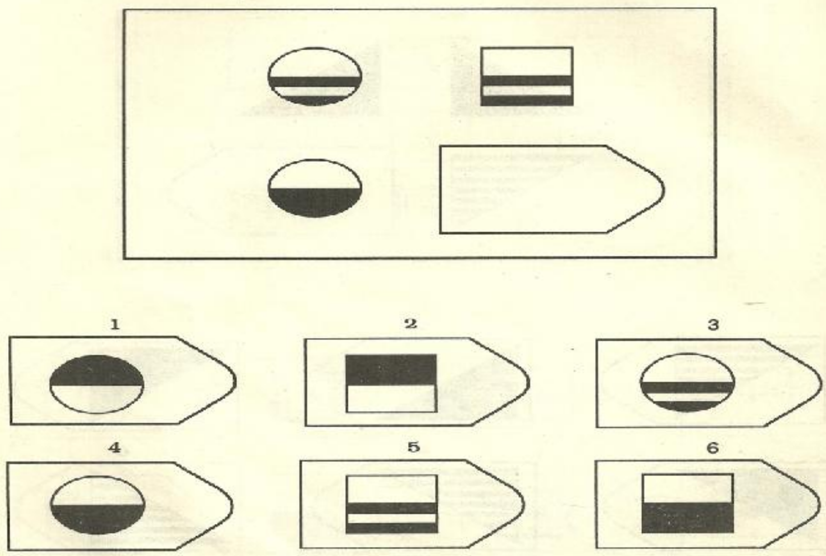

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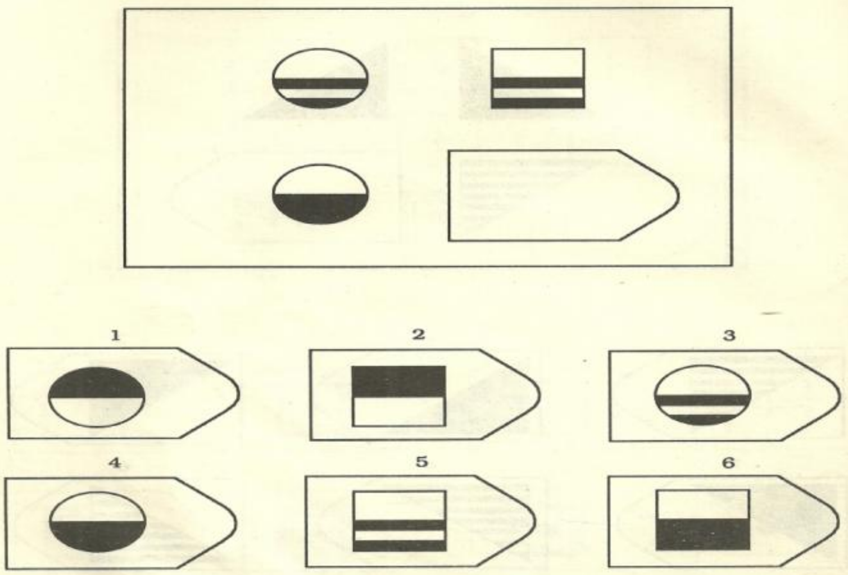

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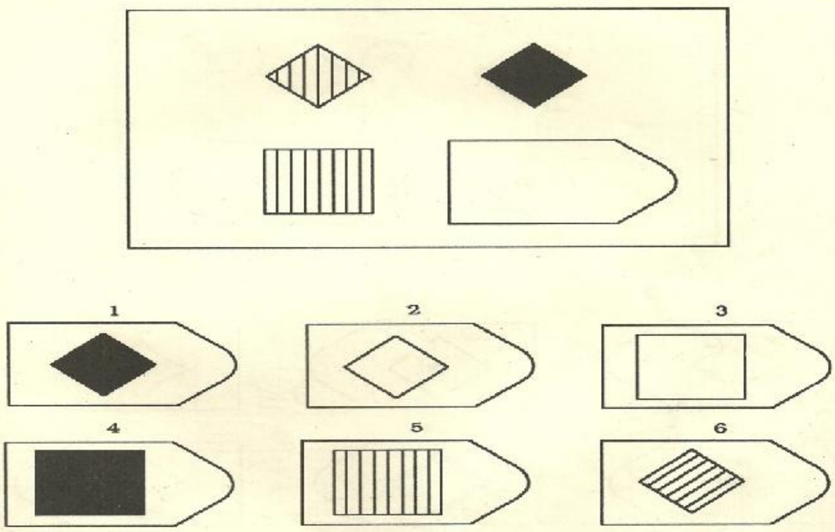

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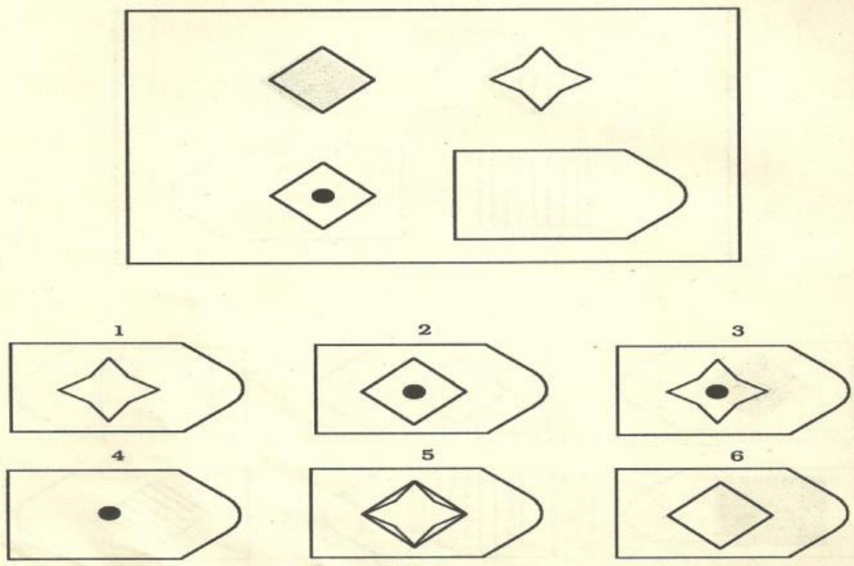

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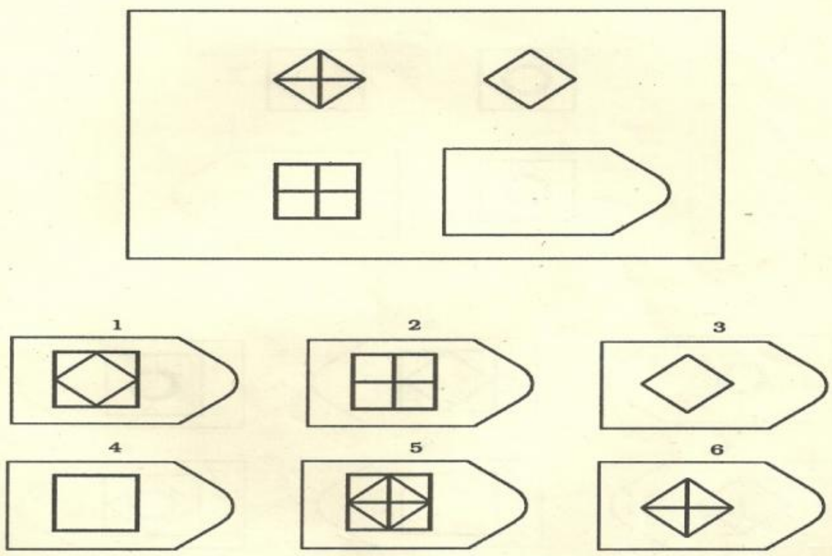

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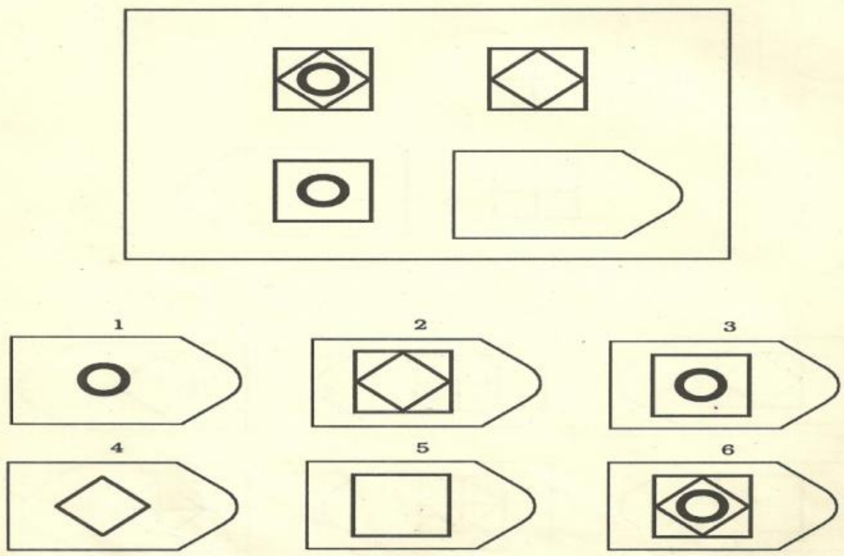

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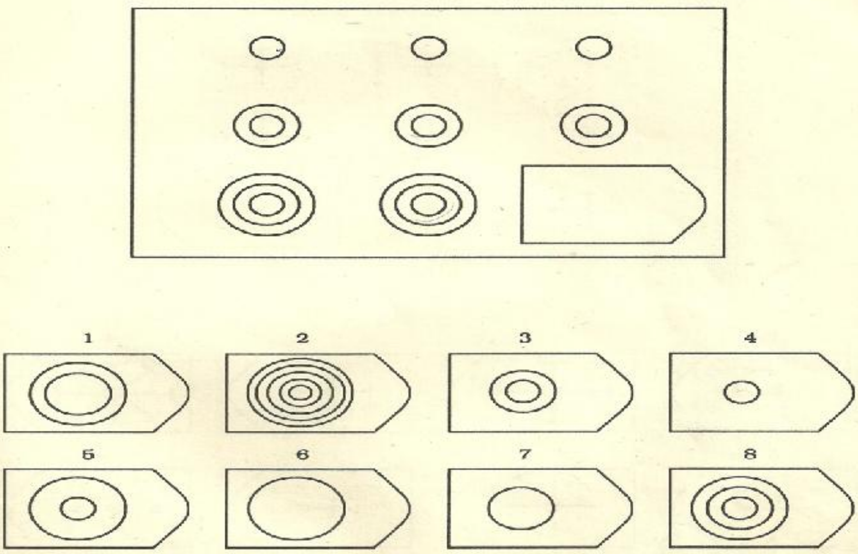

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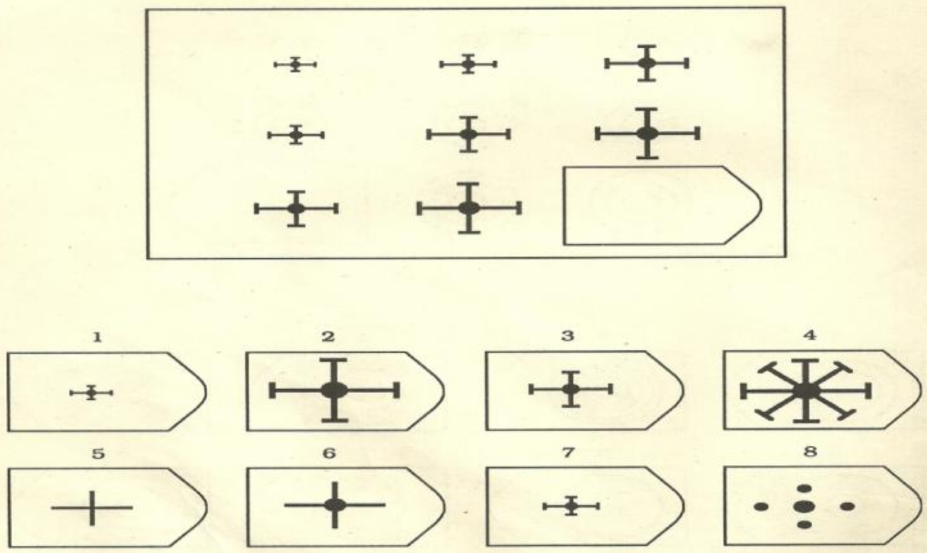

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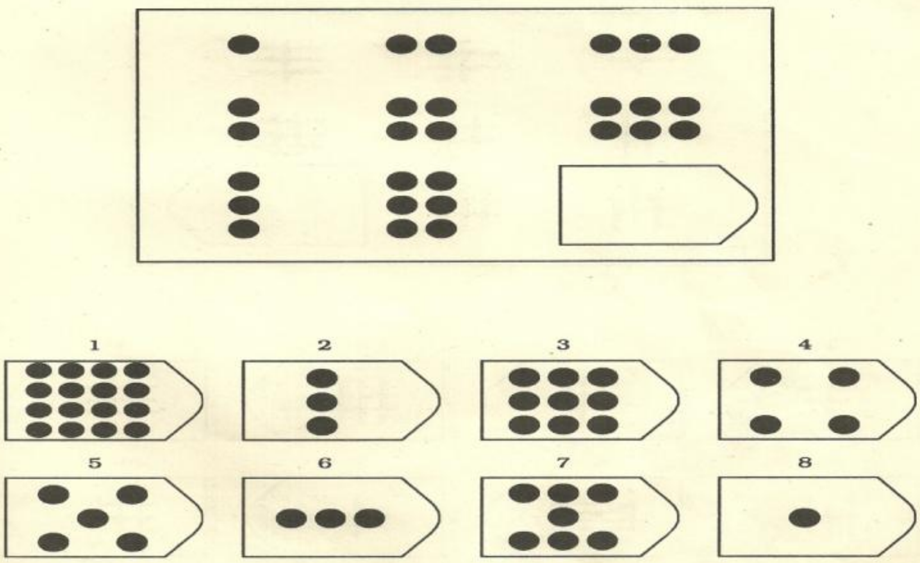

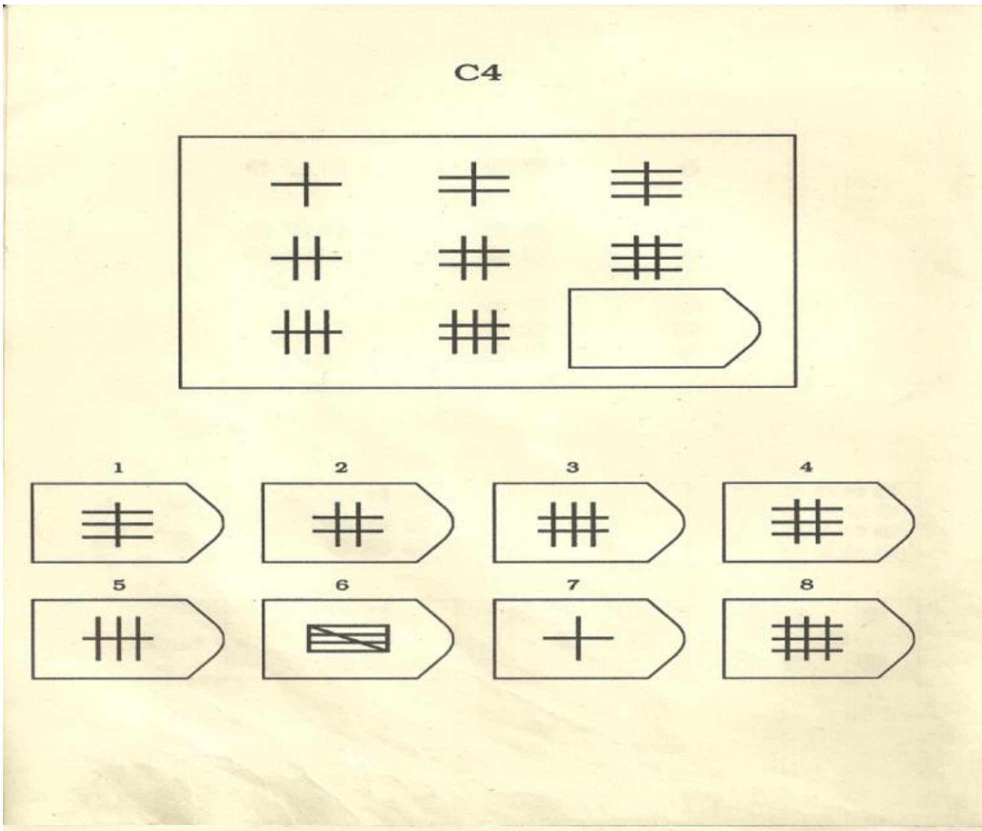
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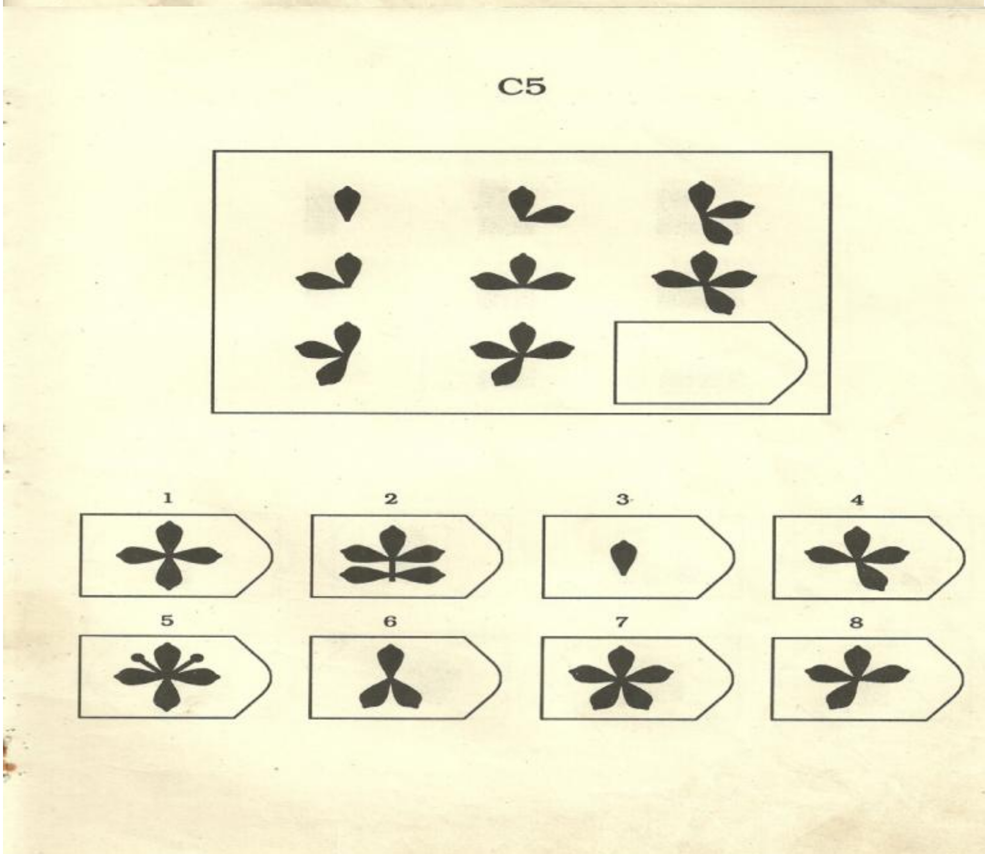
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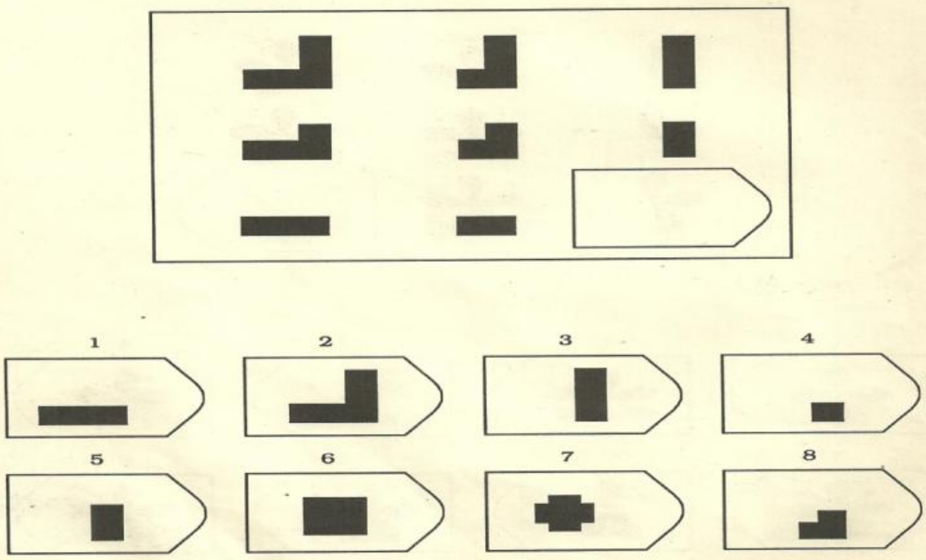

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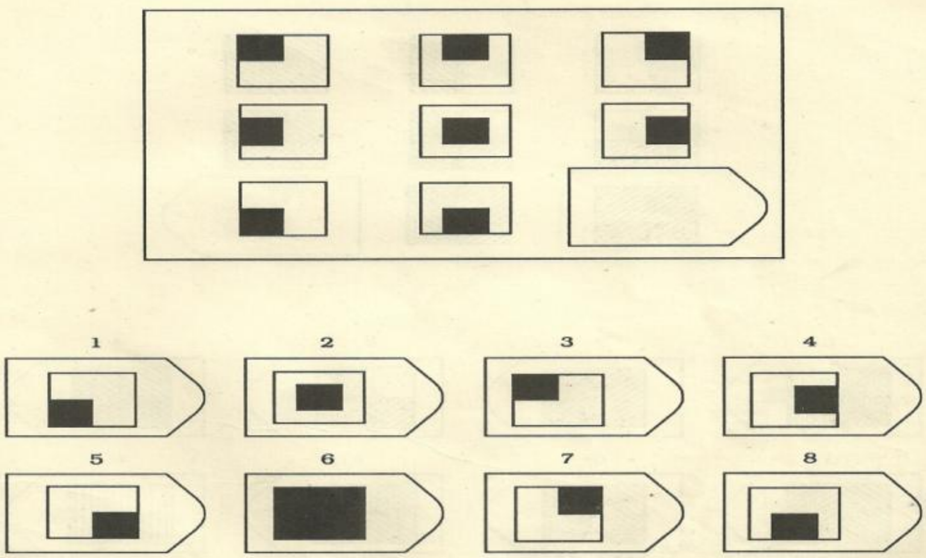

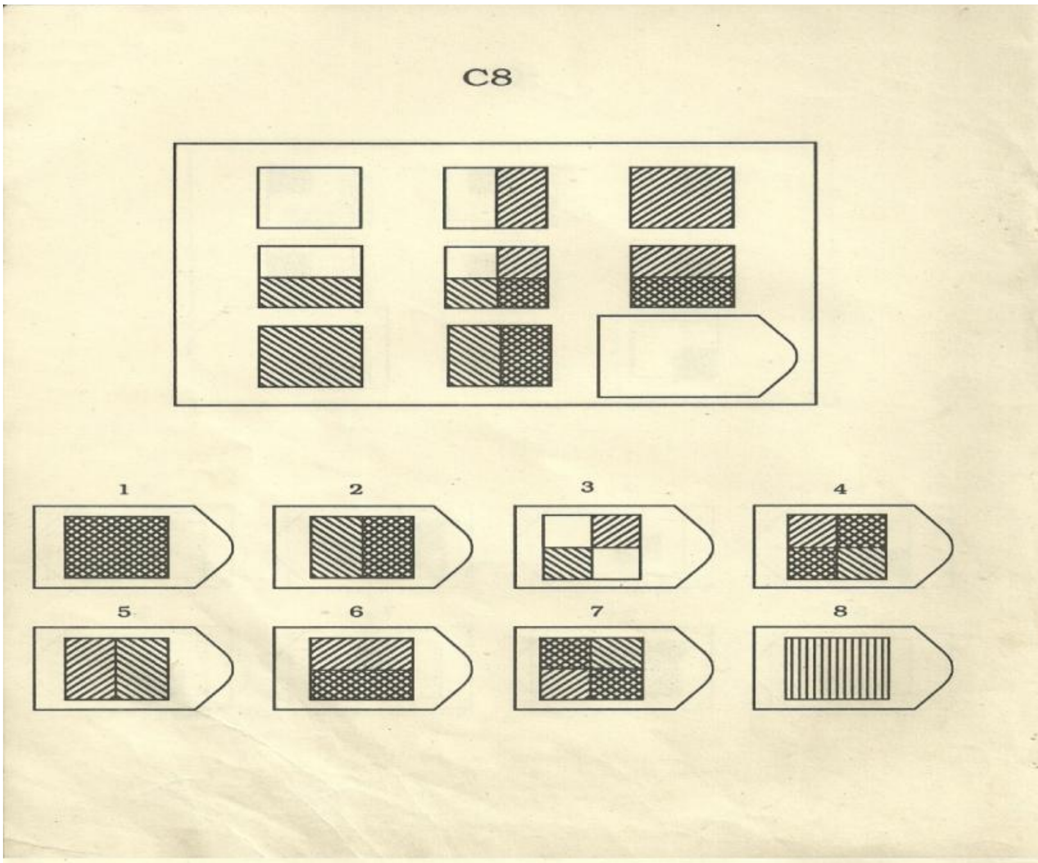
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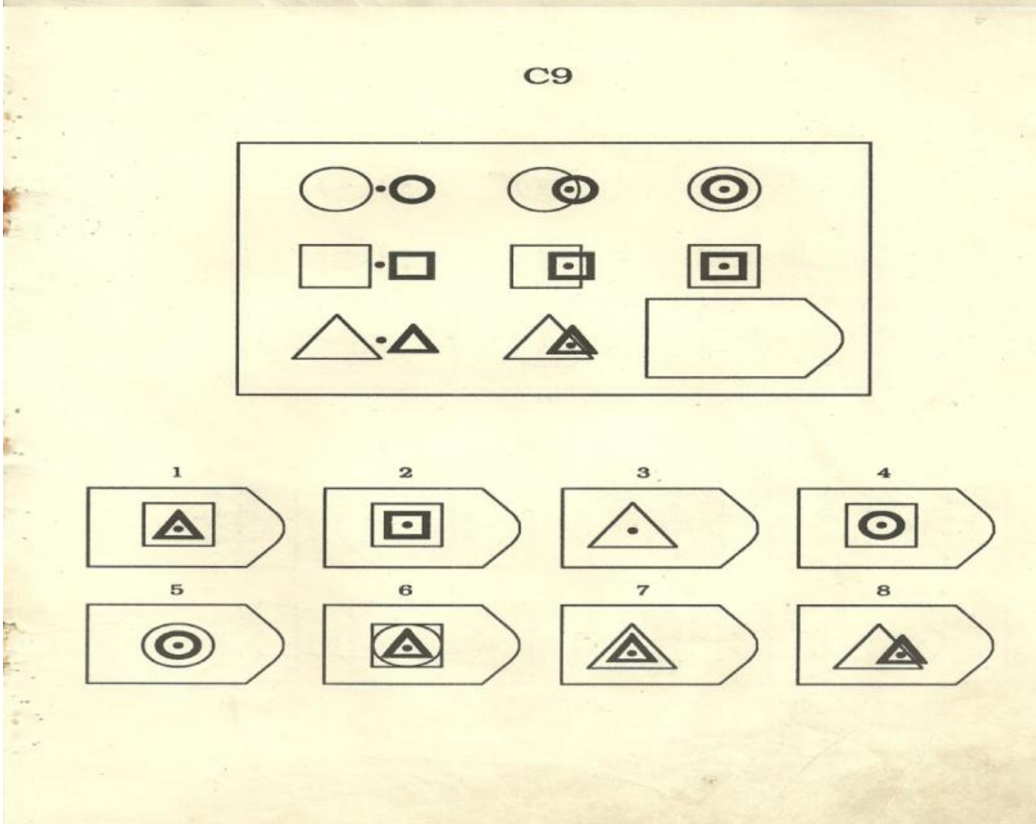
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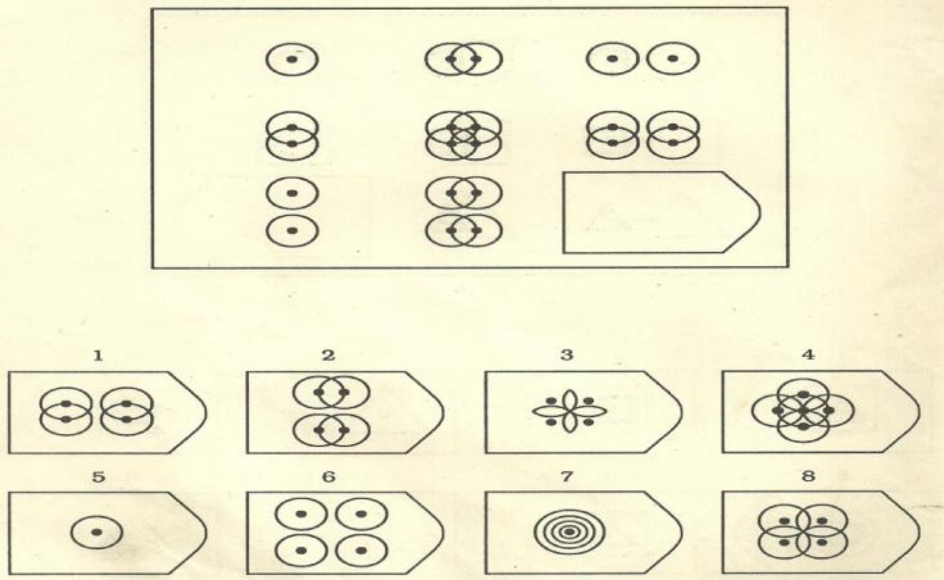

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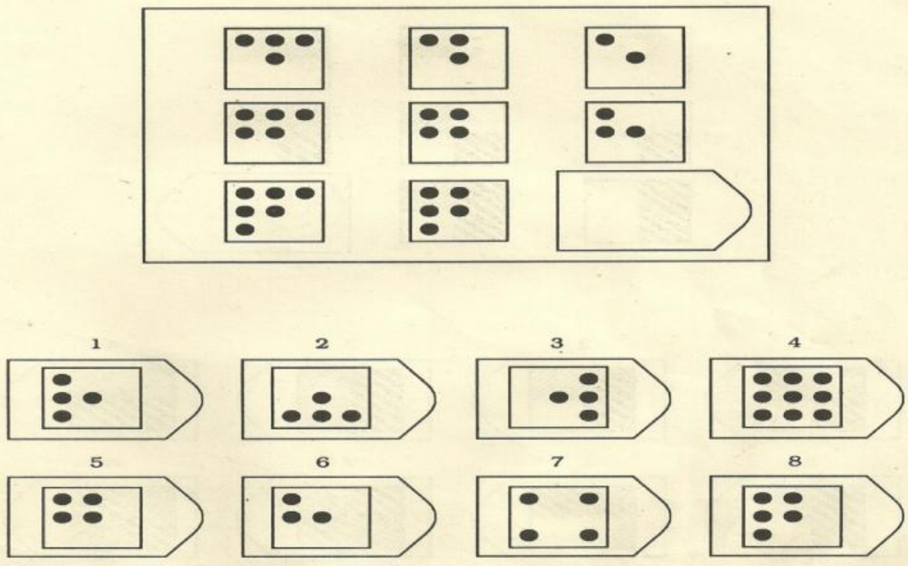

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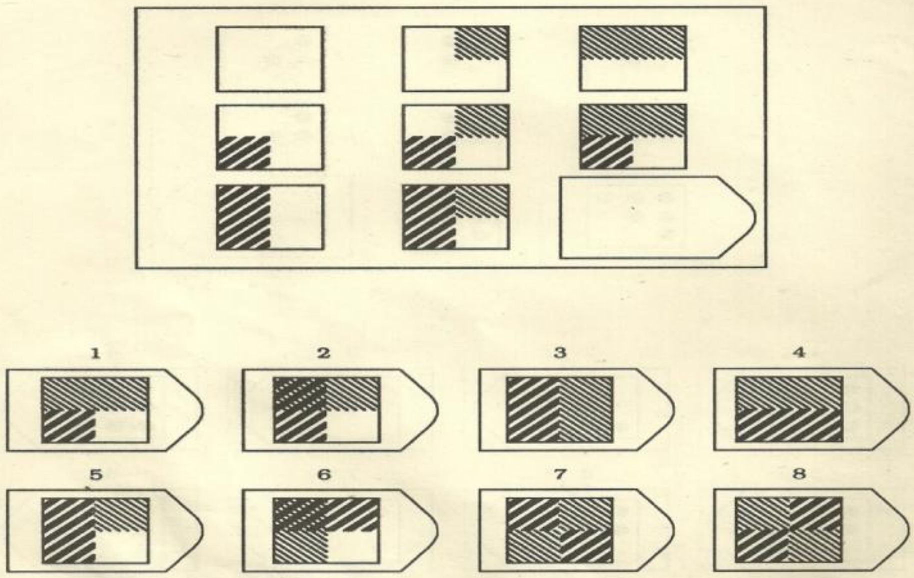

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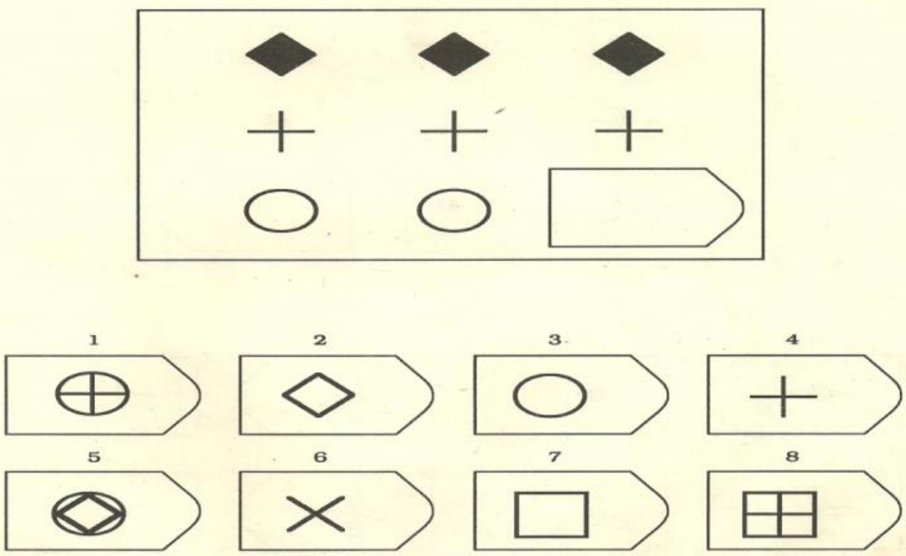

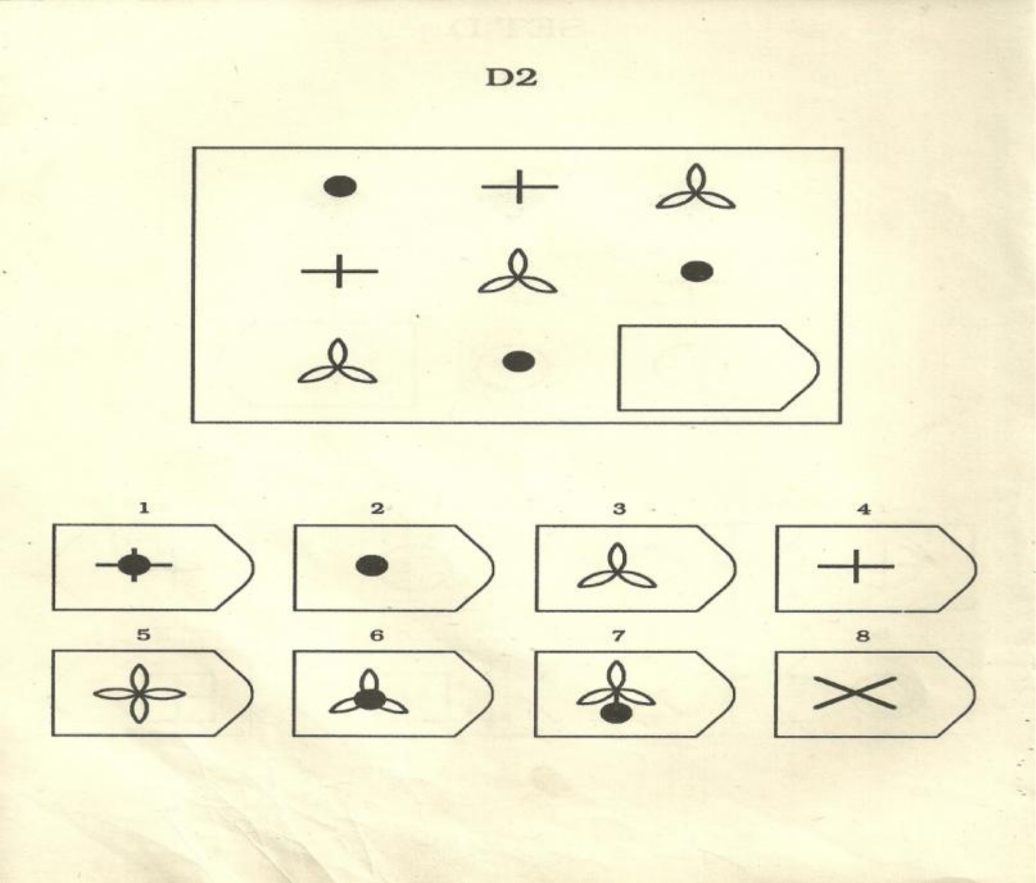
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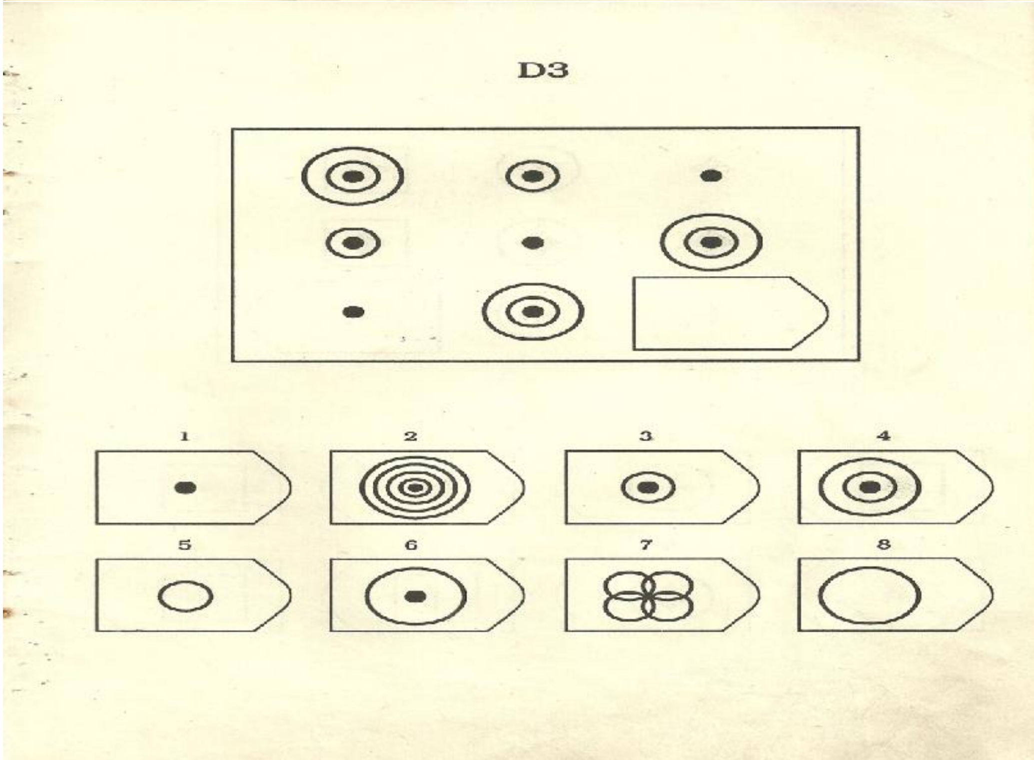
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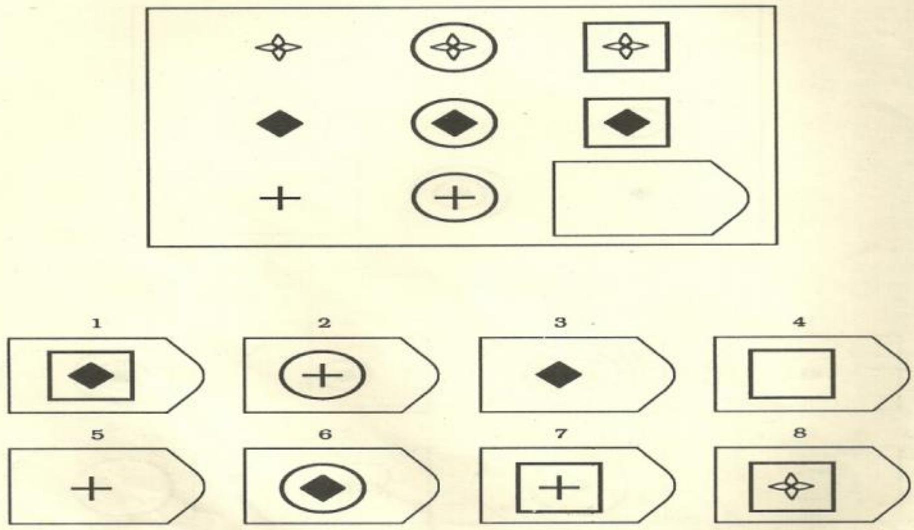

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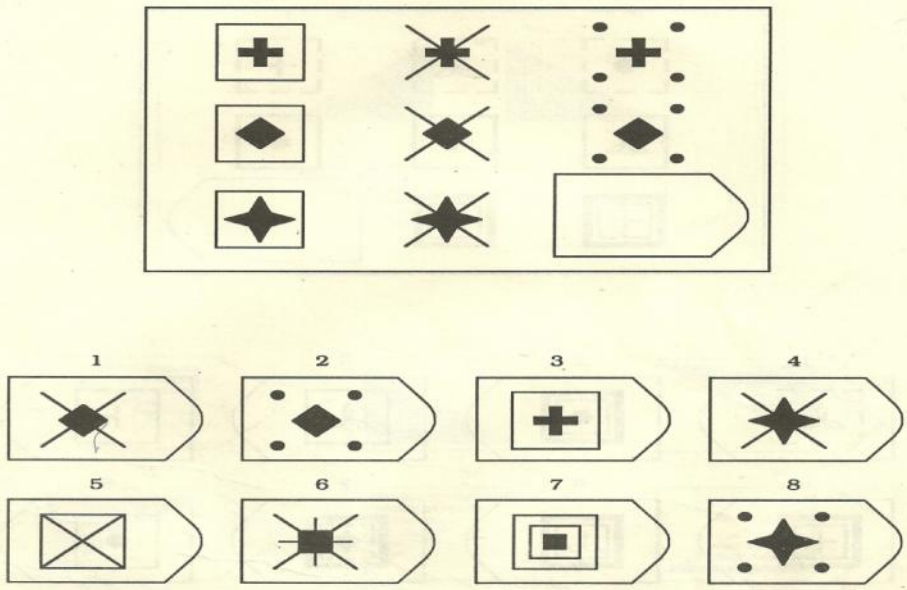

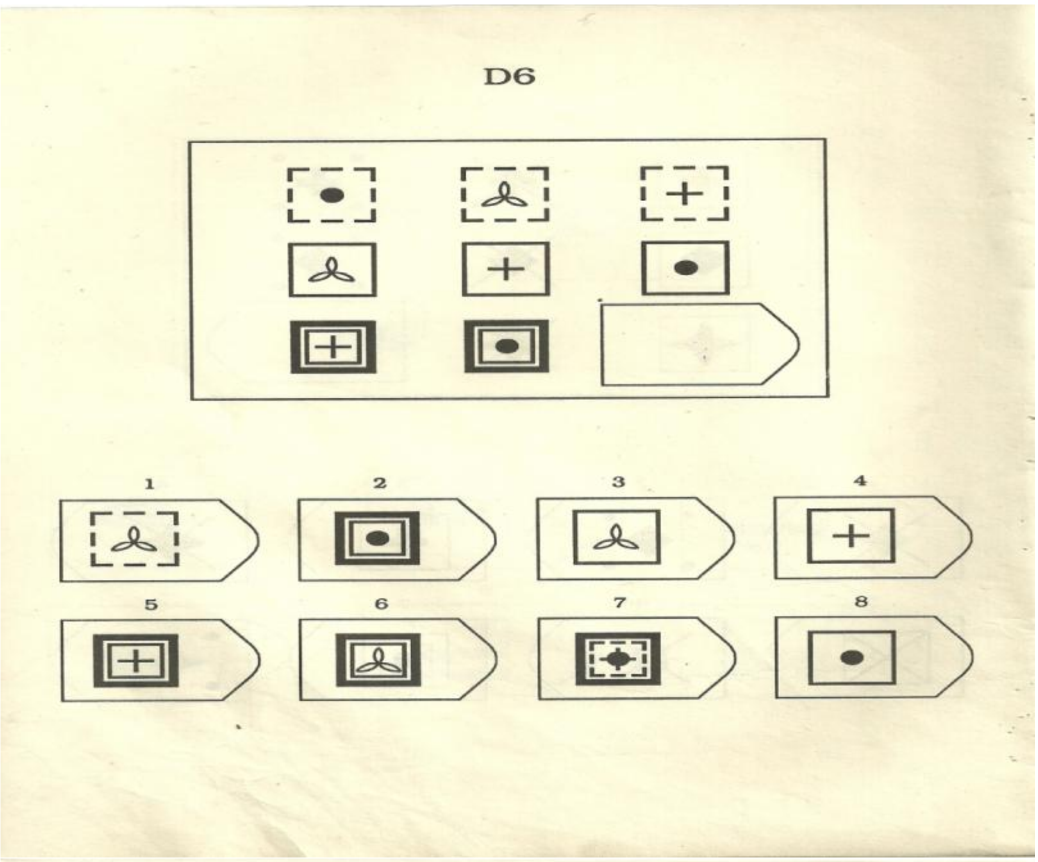
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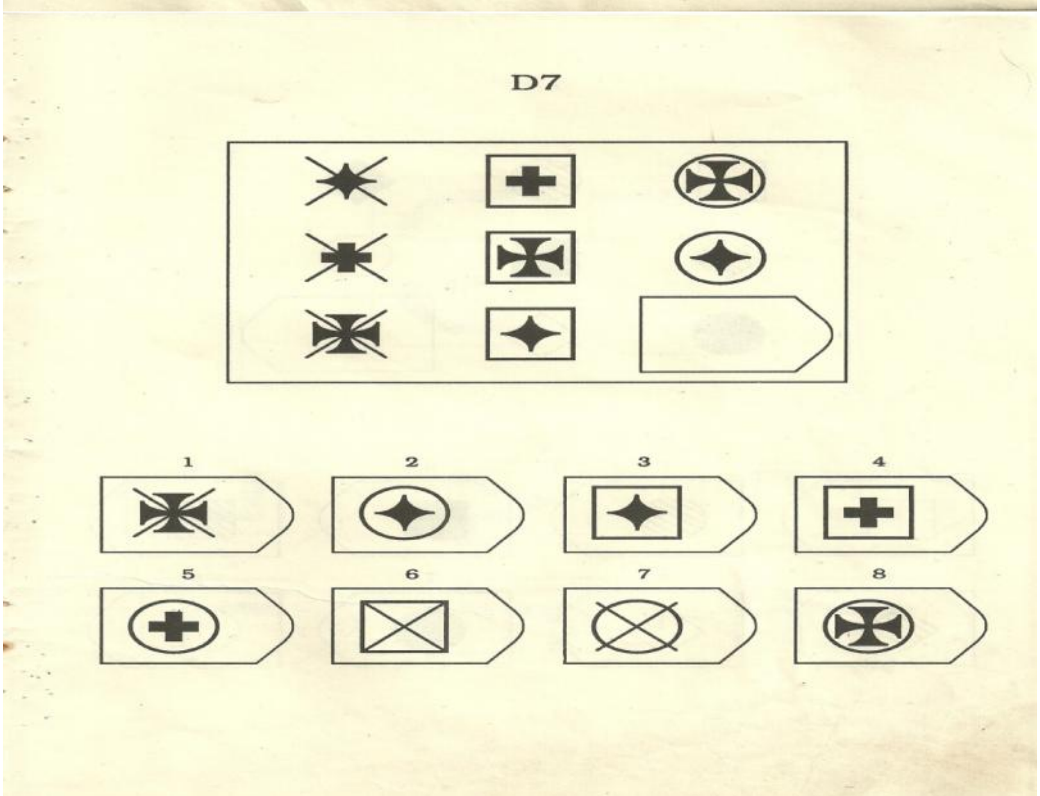
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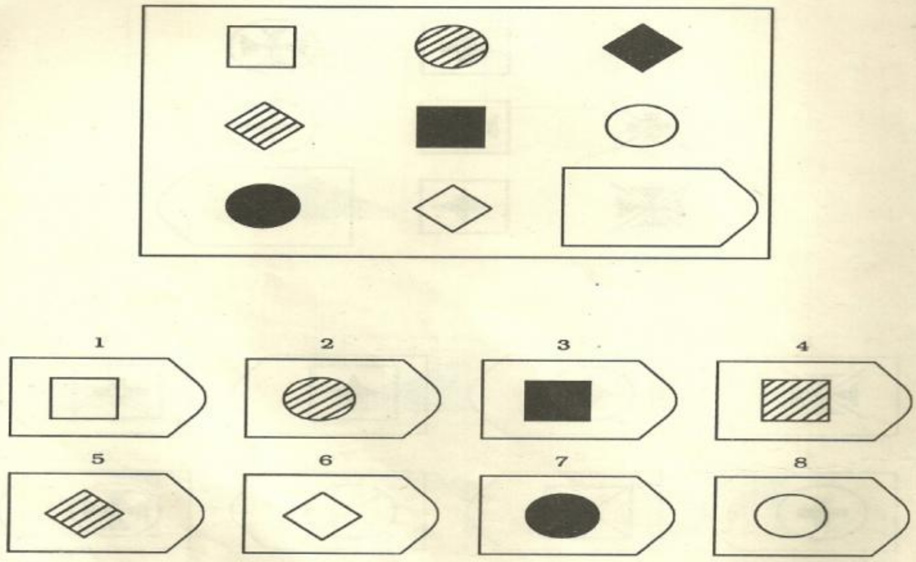

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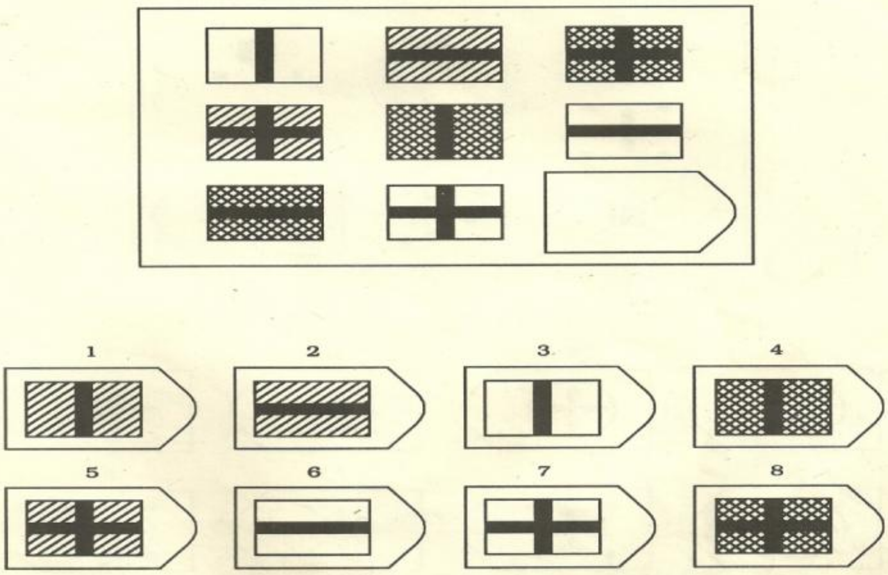

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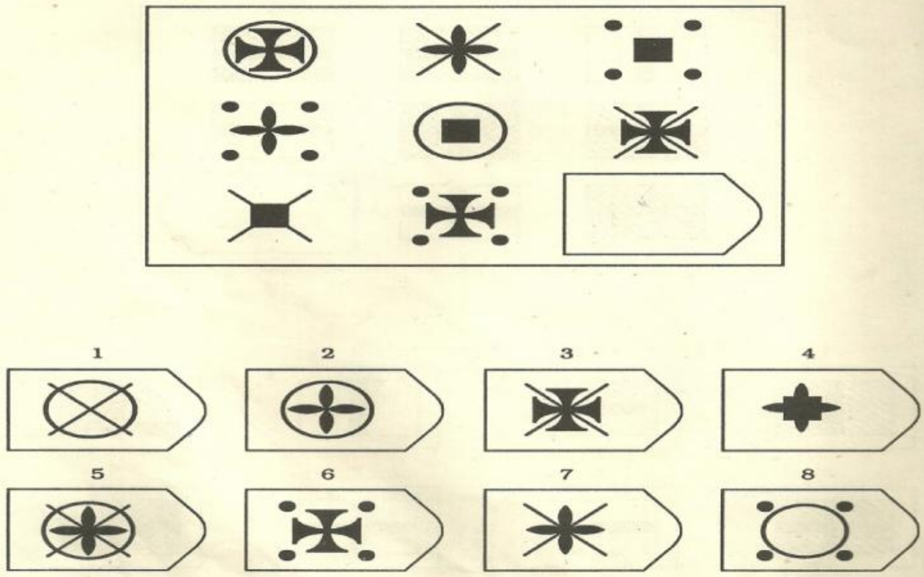

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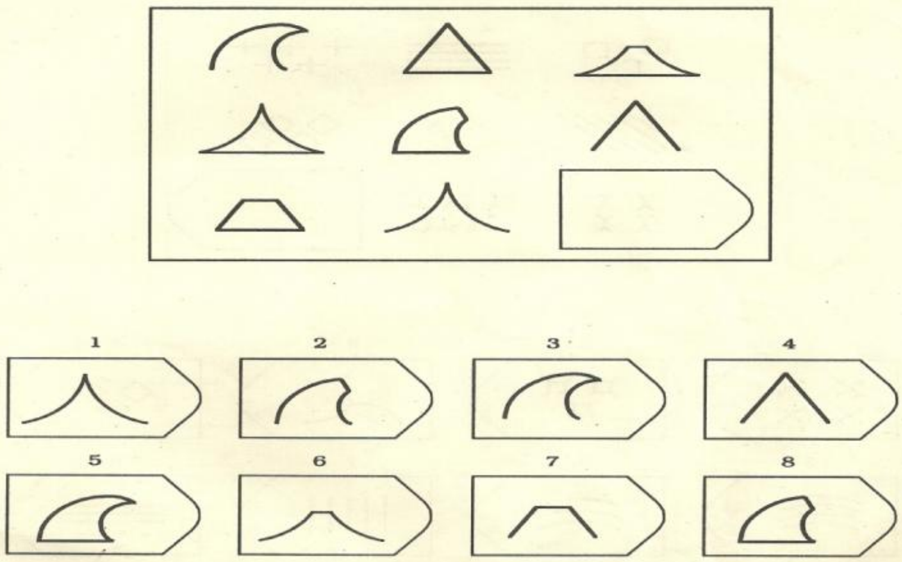

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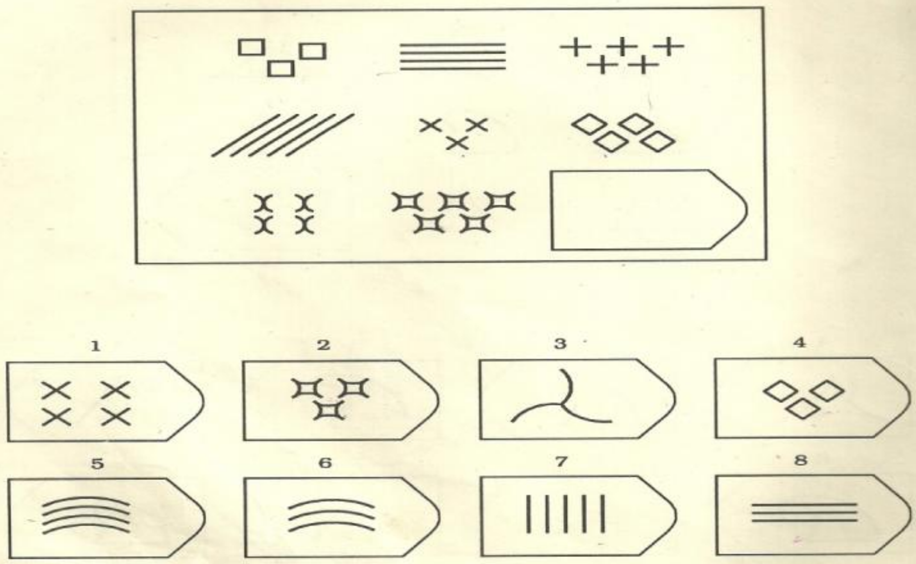

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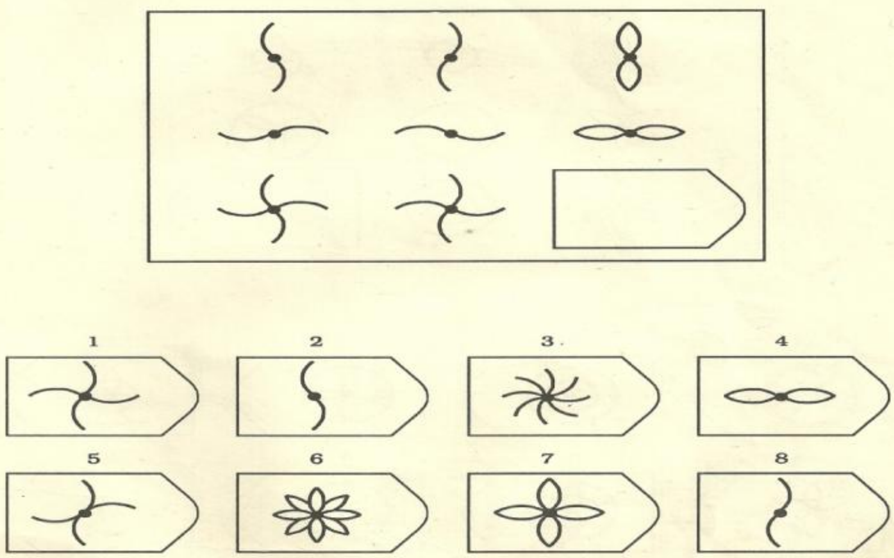

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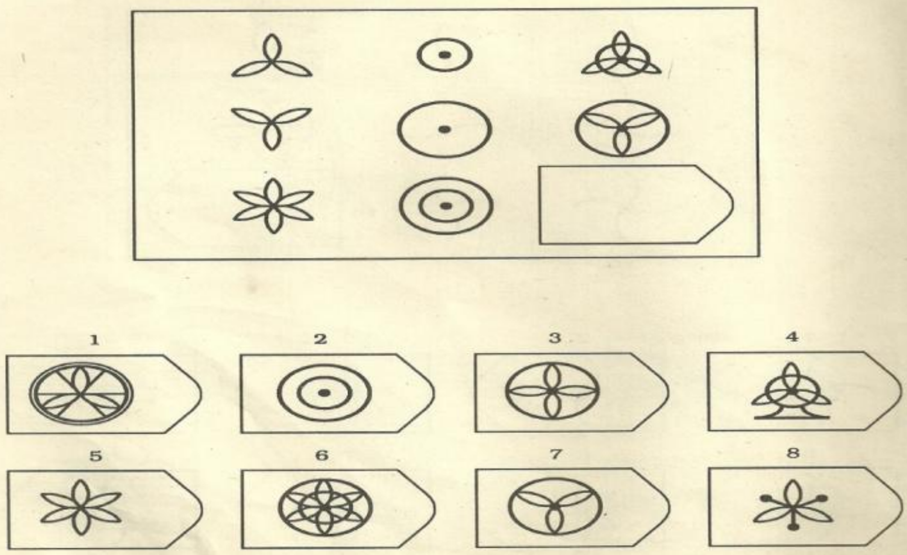

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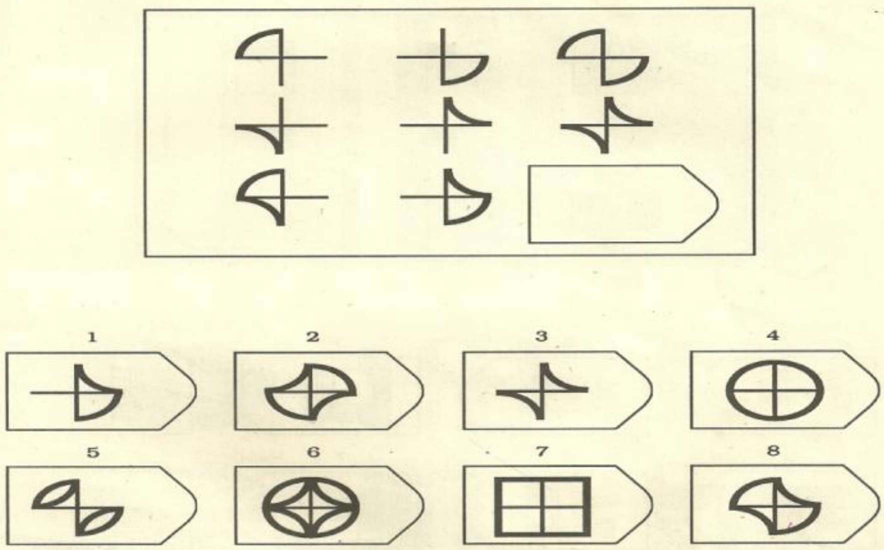

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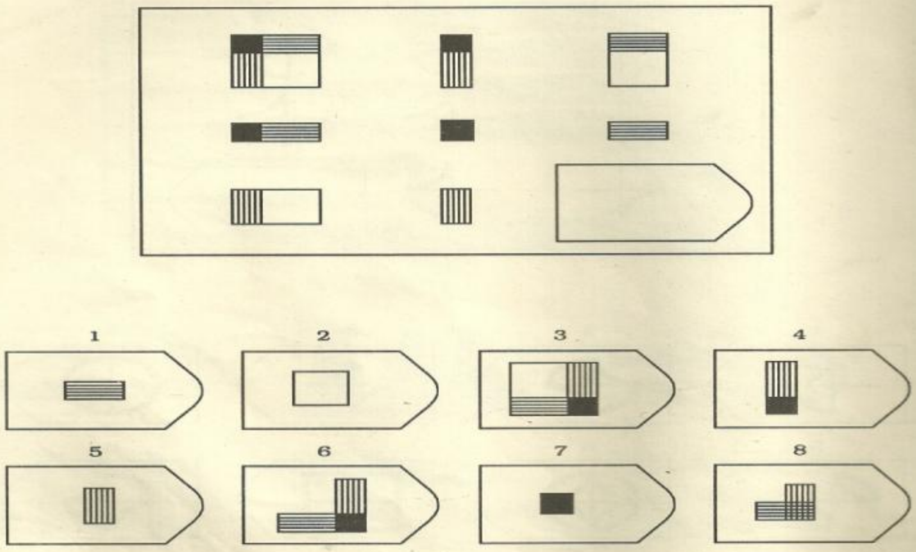

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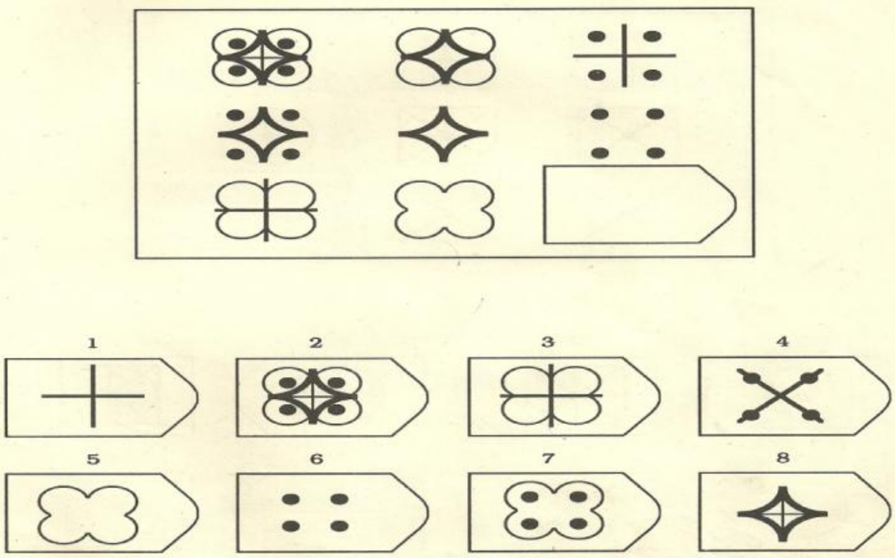

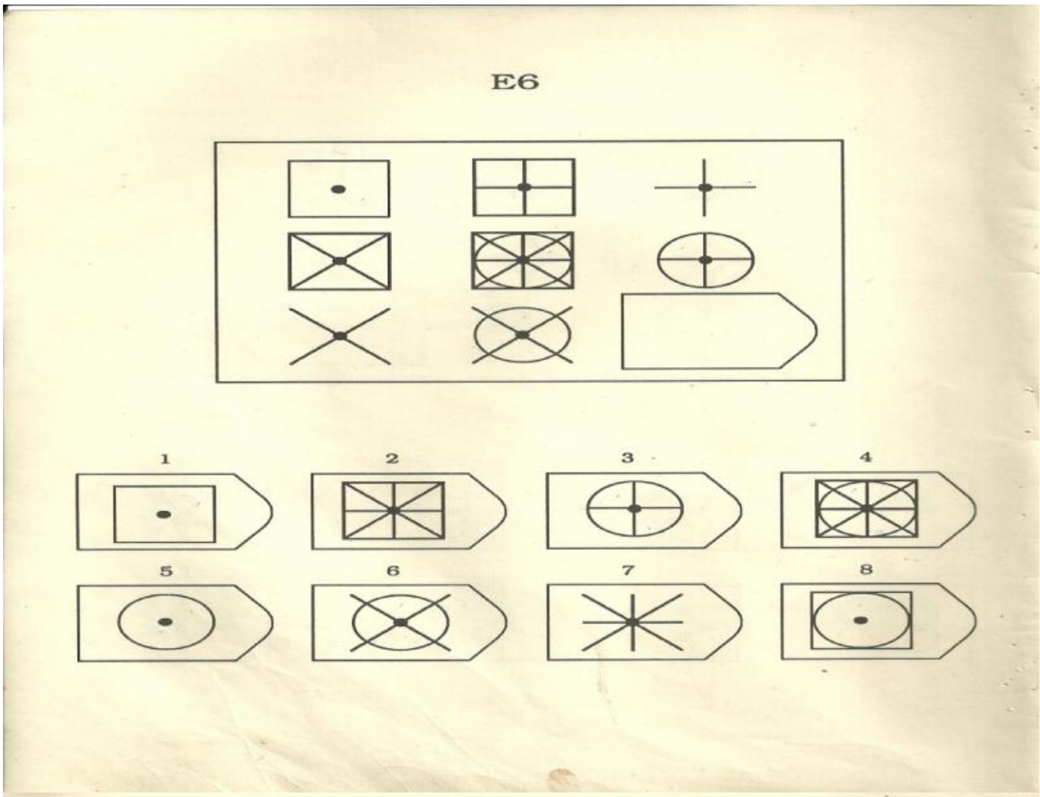
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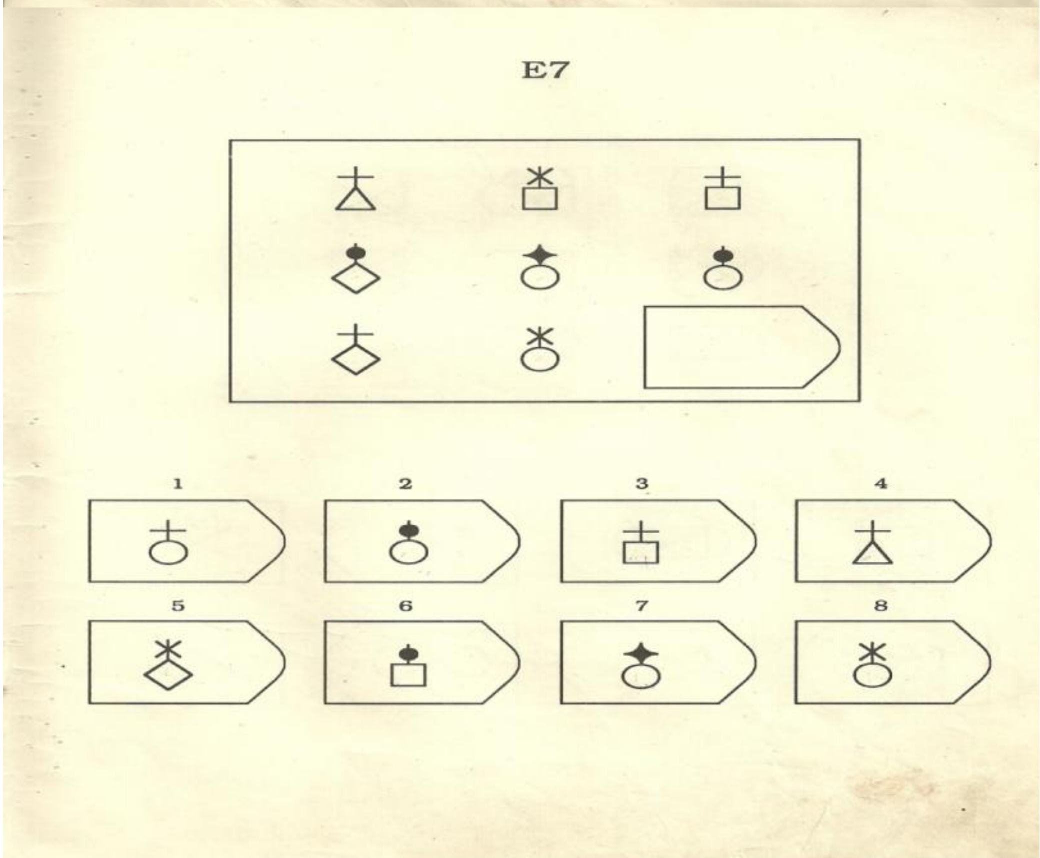
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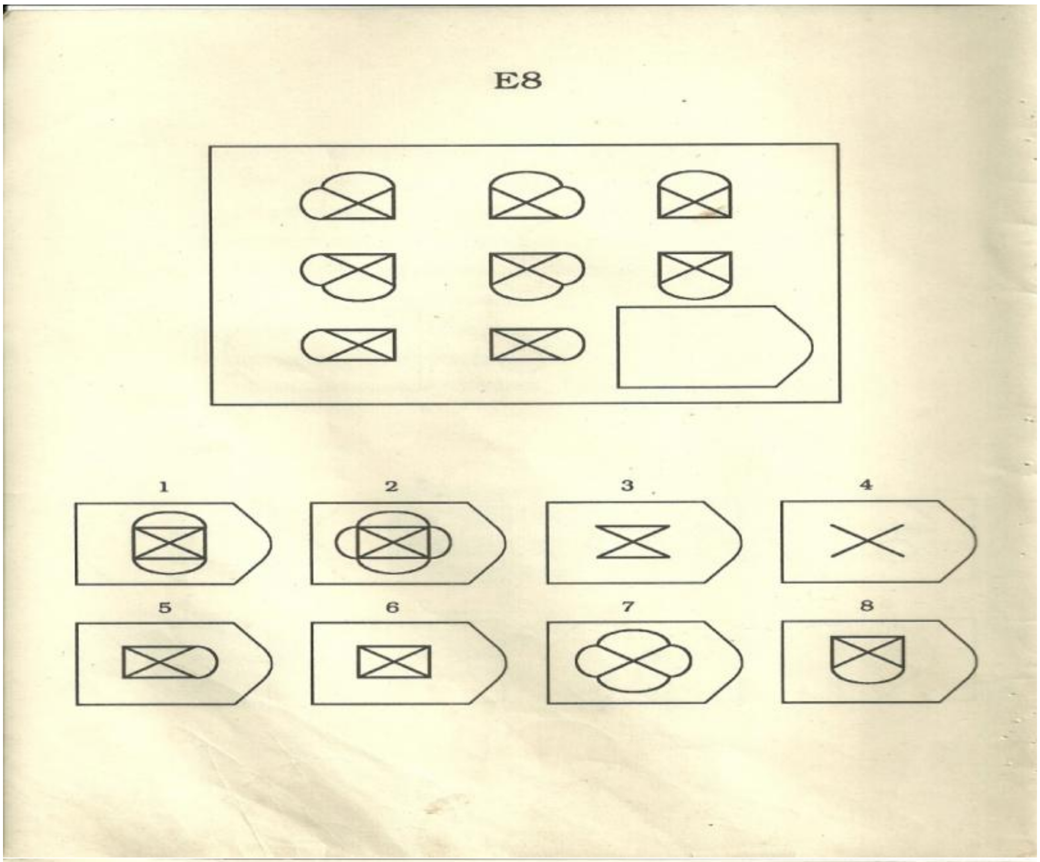
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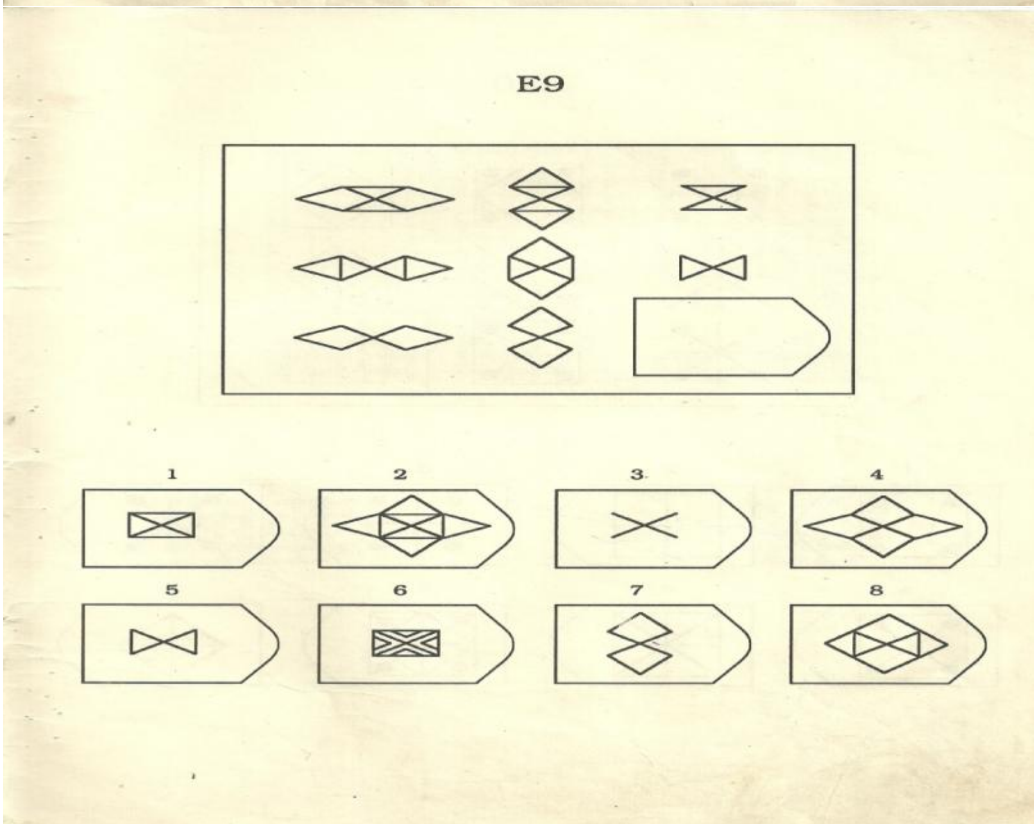
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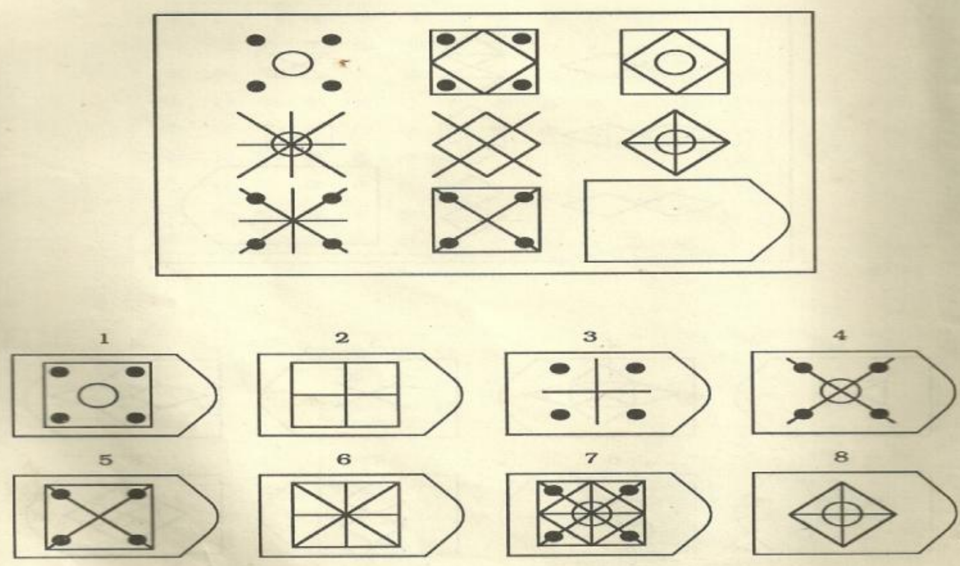

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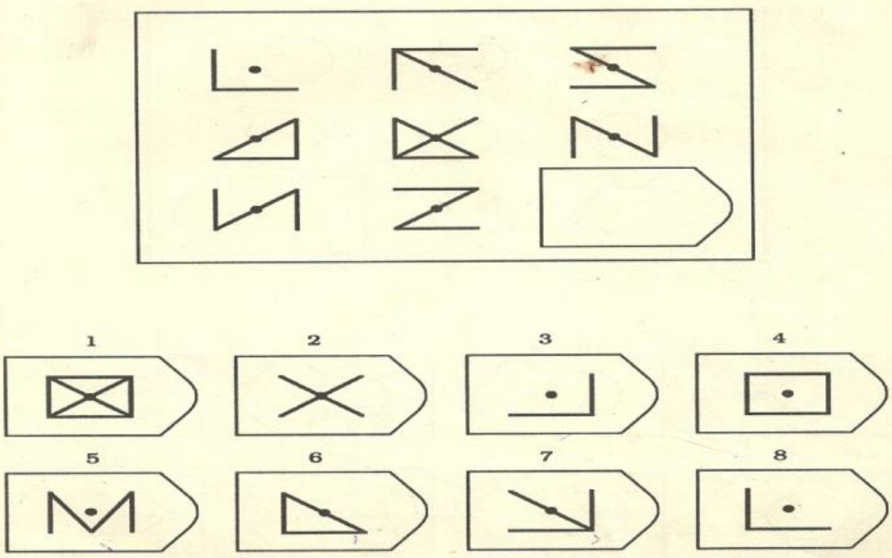

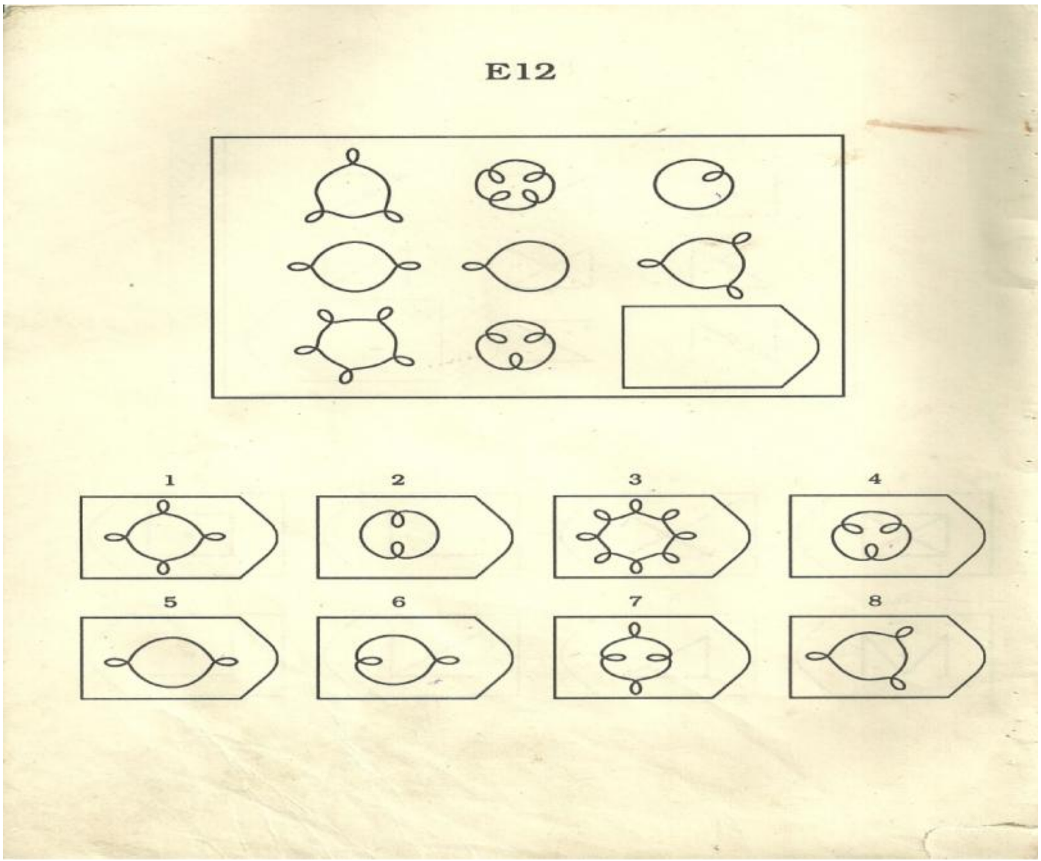
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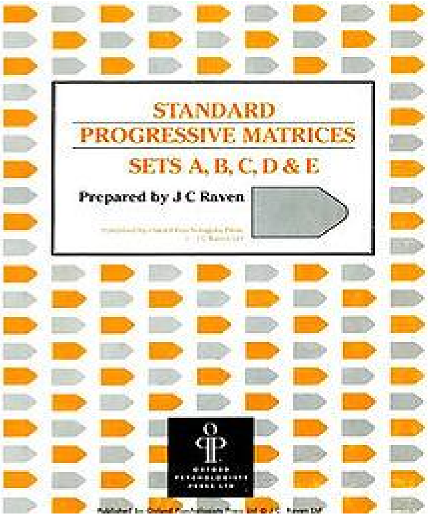
Ravens Standard Progressive Matrices



The cover of a test booklet

Scoring Sheet
Raven's Standard Progressive Matrices
Sets A, B, C, D, & E

Name: ________________________ Ref No:_________________

Place: ________________________ Birthday: _______________

Age: ________________________ Date: __________________

Test Begun: _________________ Test Ended: _____________

A			B			C			D			E		
1			1			1			1			1		
2			2			2			2			2		
3			3			3			3			3		
4			4			4			4			4		
5			5			5			5			5		
6			6			6			6			6		
7			7			7			7			7		
8			8			8			8			8		
9			9			9			9			9		
10			10			10			10			10		
11			11			11			11			11		
12			12			12			12			12		

Time	Total	Grade

Notes:

Tested By:

Digit presented sequentially to the subjects
8643
39106
483701
2958720
79350129
820395981
5019365793
18632847048
958284714862
7308128403796

DIGIT SPAN

Jacobs (1887)

Participants were presented sequences of numbers, and asked to repeat them in the correct order. The sequences are initially short, and gradually increase in length one digit at a time. A person's digit span is the point at which they can recall sequences of a certain length (e.g. seven items) correctly 50% of the time. Jacobs found a digit span of 9.3 on average - when letters were used, the average was 7.3 items. Age differences were also found, with digit span increasing through childhood

The task of the experimenter was to observe how large a quantity of a given sort of material can be reproduced perfectly after one presentation. For the said purposes ten sets of cards containing randomly selected 4-15 digits are presented with tachistoscope. The subjects were given one practice trial followed by experimental task.

CONCEPT FORMATION TEST
(Hanfmann, Kasanin, 1937)

Manual For Hanfmann Kasanin Concept Formation Test

The Classification Method

The method has become a standard procedure and has been extensively used by Hanfmann and kasanin. This method, adapted from a procedure invented by Ach, is based on a problem of classification. The subject is presented with twenty two blocks and is asked to divide them into four groups. The blocks are of five different colours, six different shapes, two heights (tall and flat), and two sizes large and small) with respect to the area of the top or bottom surface. On the under side of each block, concealed from the subject, is written one of four non-sense syllabus : lag on all blocks which are both tall and large: mur on those which are tall and small ; bik on those which are flat and large ; cev on those which are flat and small.*

It is highly important feature of the method that the subjects, in order to achieve the correct classification, must construct the appropriate concept. The blocks cannot be sorted into four groups on the basis of a single perceptual feature like colour, form, size, height, or any other characteristic, e.g., volume that can be named by a single word. Hence the task encourages departure from concrete and "given" and encourages operation at the level of abstraction and construction. It has been widely used as a test in clinical practice and also as a means of investigating Goldstein's theory that concrete and abstract behaviors represent two qualitatively different modes of procedure, two distinct levels of activity.

The experiment or test is begun by presenting the subject with a board on which the blocks are placed in random order. The procedure has been described as follows:

The subject is told that these are four different kinds of blocks, that each kind has a name that his task is to find the four kinds and to put each of them into a separate corner. The examiner then turns up one of the blocks, shows its name to the subject, and putting it into of the corner spaces, suggest that the subject, and, putting it into one of the corner spaces, suggest that the subject start by picking out and putting in the same corner all blocks which he thinks start by picking out and putting in the same corner all blocks which he thinks might belong to the same kind. After he has done so, selecting, for instance, all blocks of the same color or all blocks of the same shapes as the sample, the experimenter turns up one of the wrongly selected blocks, showing that this is a block of a different kind, and encourages the subject continue trying. This he may do in any way he please, either by trying to match the first or the first or the second sample, or by trying to organize the entire material simultaneously into four classes. After each new attempt one of the wrongly placed blocks is turned, and the process continues until the subject discovers the principle of the classification and organizes the blocks accordingly, or until the same result is achieved through all the blocks having been turned by the examiner in the process of correction. In either case the subject is asked to formulate the principle of the classification. After this the blocks are turned over and mixed up again and the subject is asked to put them in order once more, this time without any help from the examiner. This repetition served as a check as to whether or not the subject has actually grasped the principle of the double dichotomy: large or small, and tall or flat, on which the classification is based, Throughout the experiment the subject is encourages to "think aloud" and a detailed record is made by the subject and of all corrections made by the subject and of all corrections made by the examiner.

The primary concern in this kind of inquiry is not with test scores and quantitative measures; it is with a qualitative analysis of the subjects procedure.

Although two quantitative measures are available and are actually used the time of the total performance and the number of corrections or block turned up. These are regarded as constituting in themselves neither in themselves neither reliable nor significant measures of the subject's proficiency. The quality of the performance is far better indicated by the manner in which the subjects arranges and rearranges the blocks and by his accompanying comments. Such reactions are used as evidence of the course of his thinking from moment to moment; In particular,, of his interpretation of the instruction, of the kinds of groupings he attempts, of the hypotheses he employs, of the use the makes of the nonsense words and of the "corrections", and above all, of whether he treats the blocks simply as concrete, individual objects or as representatives of the general qualities on the basis of which he makes his classification- in other words whether the level on which he is operating is concrete or abstract, whether he is working with "things" or with "categories". By observing the subject's behavior, the examiner tries to discover whether he realize that the material affords many possible bases of classification, whether he has insight into the structure of the classification as a whole, and whether, if he has failed to make the classification himself, he is able to grasp the principle when the experimenter demonstrate s he correct classification. Thus the subject's reaction are interpreted as indicating degrees of concreteness and degrees of abstractness, i.e., degrees of proficiency within each of the two levels.

Partly because the materials call out modes of attack so varied and covering so wide a range; and partly because the required motor reactions present no difficulty in themselves the test is suitable for subjects of many kinds. It has been used with normal people, both children and adults and with patients suffering from mental disorders, organic and functional. There is thus a considerable body of evidence in the light of which its result may be interpreted. In the main, they have been reported as indicating that normal subjects are capable of both the concrete and the abstract attitude, but that in patients suffering from serious brain injuries or from certain kinds of functional disorders, notably schizophrenia, the abstract attitude is impaired in characteristic ways, and the patient tends to be restricted to the concrete level of activity.