

Chapter 1 : Piaget's Theory of Cognitive Development You'd Be Fascinated to Know

Introduction. Cognitive development is a major domain of early childhood development. The term cognition refers to how the mind operates and the study of cognitive development focuses on how the mind thinks and learns during the early years of life 1.

Check new design of our homepage! PsycholoGenie Staff Last Updated: Mar 12, As children, we all understand this world only after a certain stage. Jean Piaget 9 August - 16 September -- a Swiss psychologist and a well-regarded name in the field of epistemological studies with children, is best known for his theory of cognitive development. He was intrigued by the wrong answers given by children for questions related to logical reasoning. He concluded that the children were no less intelligent than adults; instead, their way of thinking, reasoning, and interpreting the world was totally different. This growing interest led him to study the ways in which children develop knowledge. Based on years of research and study, Piaget came up with what is known as the "theory of cognitive development. Key Concepts Schemas Schemas can be defined as unit of knowledge, each representing a specific activity, or a thing. Infants are born with some inherent schemas, like sucking schema, grasping schema, etc. It comes naturally to them. When they grow, these schemas are modified, elaborated, or replaced, and gradually, many more schemas are added. Assimilation Assimilation is the process of putting in new information into an already existing schema. Say, a child has a schema for a certain breed of dog. But later, he comes across a different breed of dog with some distinctly different features. New information needs to be added to the existing schema about dogs. Hence, the schema is modified by the process of assimilation. Say, a child has already formed a schema for dogs, and then, he notices a cat. His mind will add a new schema for cats as the existing schema for dogs does not fit into the description of cats. In other words, children can easily transform an information that is entering their brain so that it meets with their existent thoughts. Stages of Cognitive Development Piaget believed that cognitive development in children does not happen gradually; rather, it happens in leaps and bounds. This structure helps him to understand the world, store, analyze and use information, etc. Needless to say, it is very important for the overall intellectual development of the child. Piaget suggested that children, irrespective of geographical restrictions, adapt to a new environment and learn new things in a similar pattern. Piaget divided the cognitive development of children into four stages. In this phase, a child is able to differentiate his own self from objects and other things. A child has some innate schemas with the help of which he carries out various activities, like sucking, trying to put anything that is given to him in his mouth, or constant touching of objects and trying to play with them. It is an indication that a child begins to become the doer of acts, intentionally. In this condition of the sensorimotor stage , a child is able to understand that things do exist even if the object is out of sight. Piaget further divided this stage into six substages: Substage 1 months Reflexes: From birth itself, infants have inherited reflexes, and they begin to build understanding and make sense of things. A child uses his innate schemas only, like sucking, grasping, eye movements, awareness to sound, etc. Substage 2 months Primary Circular Actions: The child repeats actions on his own body repeatedly. Take the example of thumb sucking which the child may find enjoyable and will keep doing it. The child also tries to refine these reflexes, forming a more complex version of them. Substage 3 months Secondary Circular Actions: There is a degree of intention in its actions. However, the child is not sure about the consequences of the actions. Substage 4 months Coordination of Secondary Circular Reactions: At this stage, their action becomes goal-oriented. For instance, they would want to kick a ball to hit a particular toy. Object permanence is also acquired at this stage. Substage 5 months Tertiary Circular Reactions: At this stage, children are more adventurous. With increased mobility, they want to explore various new actions and experiment with things. They try to learn things by trial and error. At this stage, children begin to develop symbols to represent various objects and events. They begin to understand the world through their mind rather than through actions. The child is able to assimilate and learn images, words, and develops the ability to pick up language skills. Egocentrism, as Piaget puts it, is still abundant and the child feels, he or she is the center of the world. The child develops the ability to identify objects by a unique feature, or clubs them by a single feature. For instance, if there are several balls

of different colors and sizes, the child may be able to identify all red balls, or black balls, based on 1 single feature -- its color, irrespective of its shape. A child also does not have the understanding of conservation. For example, the level of equal volume of water in different shapes of glass will be different. But to them, the water in a taller glass will be more. Another key characteristic of this stage is animism. Children, at this stage, think that inanimate objects also have feelings. The child becomes more smart in classifying objects based on numerous factors, such as height, weight, shape, size, etc. The child can even put objects in order, depending on any particular series. He becomes less egocentric and understands conservation better. He is able to understand numbers, weight, and other physical features of objects. Formal Operational Stage Children above 11 years of age are grouped in this phase. A sense of individuality gradually begins to creep in. Children in the adolescence and teenage years struggle with issues of future, ideologies, discipline, right, wrong, and morality. As per this theory, in this phase, children are able to accept that societal rules must be obeyed, but as they grow, their ideologies of personal liberty and individualism start triggering them to break rules. Here, they identify that societal rules are negotiable. Logical thinking faculties develop properly, and the child is able to think on abstract topics -- more or less, depending on maturity level gained. Children can approach and solve a problem, logically and systematically. The research method used by Piaget had been greatly selective. Much of the observational results were deduced by studying his own children and that of his friends. His research sample was too narrow to generalize his findings for a larger population. Piaget had distinctly demarcated the 4 stages with specific traits. However, it has been seen in later studies that many children show an overlap of the traits at different stages. They exhibit certain traits at an earlier, or later stage than Piaget expected. Apparently, it does play an important role in the mental development of a child. Many argue that it is a continuous process. It formed the basis for later researches. It helped and guided people in understanding and communicating with children, more significantly in the field of education.

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Data gathered from such a large cohort would allow for the first time the creation of standards of normal brain development (similar to what currently exists for height, weight, etc.) as well as the study of numerous facets of adolescent brain, cognitive, social, emotional, and physical development.

Piaget was a precocious child who developed an interest in biology and the natural world. His early interest in zoology earned him a reputation among those in the field after he had published several articles on mollusks by the age of 11. There never was a kidnapper. Piaget became fascinated that he had somehow formed a memory of this kidnapping incident, a memory that endured even after he understood it to be false. During this time, he published two philosophical papers that showed the direction of his thinking at the time, but which he later dismissed as adolescent thought. It was while he was helping to mark some of these tests that Piaget noticed that young children consistently gave wrong answers to certain questions. Ultimately, he was to propose a global theory of cognitive developmental stages in which individuals exhibit certain common patterns of cognition in each period of development. From 1929 to 1954, Piaget worked as a professor of psychology, sociology, and the philosophy of science at the University of Neuchatel. Having taught at the University of Geneva and at the University of Paris, in 1954, Piaget was invited to serve as chief consultant at two conferences at Cornell University March 11-13 and University of California, Berkeley March 16-17. This was as per his request. The resulting theoretical frameworks are sufficiently different from each other that they have been characterized as representing different "Piagets." He received a doctorate in psychology from the University of Neuchatel. He then undertook post-doctoral training in Zurich, and Paris. Sociological model of development[edit] Piaget first developed as a psychologist in the 1920s. Piaget proposed that children moved from a position of egocentrism to sociocentrism. For this explanation he combined the use of psychological and clinical methods to create what he called a semiclinical interview. He began the interview by asking children standardized questions and depending on how they answered, he would ask them a series of nonstandard questions. Piaget was looking for what he called "spontaneous conviction" so he often asked questions the children neither expected nor anticipated. In his studies, he noticed there was a gradual progression from intuitive to scientific and socially acceptable responses. This work was used by Elton Mayo as the basis for the famous Hawthorne Experiments. There is assimilation when a child responds to a new event in a way that is consistent with an existing schema. He claimed infants transform all objects into an object to be sucked. The children were assimilating the objects to conform to their own mental structures. Piaget then made the assumption that whenever one transforms the world to meet individual needs or conceptions, one is, in a way, assimilating it. Piaget also observed his children not only assimilating objects to fit their needs, but also modifying some of their mental structures to meet the demands of the environment. This is the second division of adaptation known as accommodation. To start out, the infants only engaged in primarily reflex actions such as sucking, but not long after, they would pick up objects and put them in their mouths. When they do this, they modify their reflex response to accommodate the external objects into reflex actions. Because the two are often in conflict, they provide the impetus for intellectual development. The constant need to balance the two triggers intellectual growth. To test his theory, Piaget observed the habits in his own children. Elaboration of the logical model of intellectual development[edit] In the model Piaget developed in stage three, he argued that intelligence develops in a series of stages that are related to age and are progressive because one stage must be accomplished before the next can occur. For each stage of development the child forms a view of reality for that age period. At the next stage, the child must keep up with earlier level of mental abilities to reconstruct concepts. Piaget conceived intellectual development as an upward expanding spiral in which children must constantly reconstruct the ideas formed at earlier levels with new, higher order concepts acquired at the next level. Logical concepts are described as being completely reversible because they can always get back to the starting point, meaning that if one starts with a given premise and follows logical steps to reach a conclusion, the same steps may be done in the opposite order, starting from the conclusion to arrive at the premise. The perceptual concepts Piaget studied could not be manipulated. To describe the figurative process, Piaget uses

pictures as examples. Pictures cannot be separated because contours cannot be separated from the forms they outline. Memory is the same way: During this last period of work, Piaget and his colleague Inhelder also published books on perception, memory, and other figurative processes such as learning. Readiness concerns when certain information or concepts should be taught. He considered cognitive structures development as a differentiation of biological regulations. When his entire theory first became known "the theory in itself being based on a structuralist and a cognitivist approach" it was an outstanding and exciting development in regards to the psychological community at that time. In particular, during one period of research, he described himself studying his own three children, and carefully observing and interpreting their cognitive development. The Central Problem of Intellectual Development, he intends to explain knowledge development as a process of equilibration using two main concepts in his theory, assimilation and accommodation, as belonging not only to biological interactions but also to cognitive ones. Piaget believed answers for the epistemological questions at his time could be answered, or better proposed, if one looked to the genetic aspect of it, hence his experimentations with children and adolescents. As he says in the introduction of his book Genetic Epistemology: The children experience the world through movement and their senses. The sensorimotor stage is divided into six substages: Simple reflexes; From birth to one month old. At this time infants use reflexes such as rooting and sucking. First habits and primary circular reactions; From one month to four months old. During this time infants learn to coordinate sensation and two types of schema habit and circular reactions. A primary circular reaction is when the infant tries to reproduce an event that happened by accident ex.: Secondary circular reactions; From four to eight months old. At this time they become aware of things beyond their own body; they are more object-oriented. At this time they might accidentally shake a rattle and continue to do it for sake of satisfaction. Coordination of secondary circular reactions; From eight months to twelve months old. During this stage they can do things intentionally. They can now combine and recombine schemata and try to reach a goal ex.: They also begin to understand object permanence in the later months and early into the next stage. Tertiary circular reactions, novelty, and curiosity; From twelve months old to eighteen months old. During this stage infants explore new possibilities of objects; they try different things to get different results. During the pre-operational Stage of cognitive development, Piaget noted that children do not yet understand concrete logic and cannot mentally manipulate information. However, the child still has trouble seeing things from different points of view. Such play is demonstrated by the idea of checkers being snacks, pieces of paper being plates, and a box being a table. Their observations of symbols exemplifies the idea of play with the absence of the actual objects involved. By observing sequences of play, Piaget was able to demonstrate that, towards the end of the second year, a qualitatively new kind of psychological functioning occurs, known as the Pre-operational Stage. The child is able to form stable concepts as well as magical beliefs. The child, however, is still not able to perform operations, which are tasks that the child can do mentally, rather than physically. Thinking in this stage is still egocentric, meaning the child has difficulty seeing the viewpoint of others. The Pre-operational Stage is split into two substages: The symbolic function substage is when children are able to understand, represent, remember, and picture objects in their mind without having the object in front of them. The intuitive thought substage is when children tend to propose the questions of "why? Symbolic Function Substage From two to four years of age children find themselves using symbols to represent physical models of the world around them. The child knows they are not accurate but it does not seem to be an issue to them. Intuitive Thought Substage At between about the ages of four and seven, children tend to become very curious and ask many questions, beginning the use of primitive reasoning. There is an emergence in the interest of reasoning and wanting to know why things are the way they are. Piaget called it the "intuitive substage" because children realize they have a vast amount of knowledge, but they are unaware of how they acquired it. Centration, conservation, irreversibility, class inclusion, and transitive inference are all characteristics of preoperative thought. Children can now conserve and think logically they understand reversibility but are limited to what they can physically manipulate. They are no longer egocentric. During this stage, children become more aware of logic and conservation, topics previously foreign to them. Children also improve drastically with their classification skills 4. Children develop abstract thought and can easily conserve and think logically in their mind. Abstract thought is newly present during this stage of

development. Children are now able to think abstractly and utilize metacognition. Along with this, the children in the formal operational stage display more skills oriented towards problem solving, often in multiple steps. Developmental process[edit] Piaget provided no concise description of the development process as a whole. Broadly speaking it consisted of a cycle: The child performs an action which has an effect on or organizes objects, and the child is able to note the characteristics of the action and its effects. Through repeated actions, perhaps with variations or in different contexts or on different kinds of objects, the child is able to differentiate and integrate its elements and effects. This is the process of "reflecting abstraction" described in detail in Piaget At the same time, the child is able to identify the properties of objects by the way different kinds of action affect them. This is the process of "empirical abstraction". By repeating this process across a wide range of objects and actions, the child establishes a new level of knowledge and insight. This is the process of forming a new " cognitive stage". This dual process allows the child to construct new ways of dealing with objects and new knowledge about objects themselves.

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Piaget () was the first psychologist to make a systematic study of cognitive development. His contributions include a stage theory of child cognitive development, detailed observational studies of cognition in children, and a series of simple but ingenious tests to reveal different cognitive abilities.

Be able to identify and describe the main areas of cognitive development. Be able to describe major theories of cognitive development and what distinguishes them. Understand how nature and nurture work together to produce cognitive development. Understand why cognitive development is sometimes viewed as discontinuous and sometimes as continuous. Know some ways in which research on cognitive development is being used to improve education.

Introduction By the time you reach adulthood you have learned a few things about how the world works. People accumulate all this useful knowledge through the process of cognitive development, which involves a multitude of factors, both inherent and learned. Cognitive development in childhood is about change. One Laptop per Child, <https://www.ollpc.org/>: Defining thinking can be problematic, because no clear boundaries separate thinking from other mental activities. Thinking obviously involves the higher mental processes: However, thinking also involves other mental processes that seem more basic and at which even toddlers are skilled—such as perceiving objects and events in the environment, acting skillfully on objects to obtain goals, and understanding and producing language. As the name suggests, cognitive development is about change. To find out, she brought an unusually even-tempered cat named Maynard to a psychology laboratory and allowed the 3- to 6-year-old participants in the study to pet and play with him. There are several main types of theories of child development. Information processing theories, such as that of David Klahr, examine the mental processes that produce thinking at any one time and the transition processes that lead to growth in that thinking. At the heart of all of these theories, and indeed of all research on cognitive development, are two main questions: In the remainder of this module, we examine the answers that are emerging regarding these questions, as well as ways in which cognitive developmental research is being used to improve education.

Nature and Nurture The most basic question about child development is how nature and nurture together shape development. Nature refers to our biological endowment, the genes we receive from our parents. Nurture refers to the environments, social as well as physical, that influence our development, everything from the womb in which we develop before birth to the homes in which we grow up, the schools we attend, and the many people with whom we interact. The nature-nurture issue is often presented as an either-or question: Is our intelligence for example due to our genes or to the environments in which we live? In fact, however, every aspect of development is produced by the interaction of genes and environment. At the most basic level, without genes, there would be no child, and without an environment to provide nurture, there also would be no child. The way in which nature and nurture work together can be seen in findings on visual development. Many people view vision as something that people either are born with or that is purely a matter of biological maturation, but it also depends on the right kind of experience at the right time. For example, development of depth perception, the ability to actively perceive the distance from oneself to objects in the environment, depends on seeing patterned light and having normal brain activity in response to the patterned light, in infancy Held, If no patterned light is received, for example when a baby has severe cataracts or blindness that is not surgically corrected until later in development, depth perception remains abnormal even after the surgery. A child that is perceived to be attractive and calm may receive a different sort of care and attention from adults and as a result enjoy a developmental advantage. Also contributing to the complex interplay of nature and nurture is the role of children in shaping their own cognitive development. From the first days out of the womb, children actively choose to attend more to some things and less to others. When children are young, their parents largely determine their experiences: In contrast, older children and adolescents choose their environments to a larger degree. Thus, the issue is not whether cognitive development is a product of nature or nurture; rather, the issue is how nature and nurture work together to produce cognitive development. Some aspects of the development of living organisms, such as the growth of the width of a pine tree, involve quantitative changes, with the tree getting a little wider each year. Other changes, such as the life

cycle of a ladybug, involve qualitative changes, with the creature becoming a totally different type of entity after a transition than before Figure 1. Continuous and discontinuous development. Some researchers see development as a continuous gradual process, much like a maple tree growing steadily in height and cross-sectional area. Other researchers see development as a progression of discontinuous stages, involving rapid discontinuous changes, such as those in the life cycle of a ladybug, separated by longer periods of slow, gradual change. The four stages that Piaget hypothesized were the sensorimotor stage birth to 2 years, the preoperational reasoning stage 2 to 6 or 7 years, the concrete operational reasoning stage 6 or 7 to 11 or 12 years, and the formal operational reasoning stage 11 or 12 years and throughout the rest of life. Their mental representations are very limited. If an infant younger than 9 months of age is playing with a favorite toy, and another person removes the toy from view, for example by putting it under an opaque cover and not letting the infant immediately reach for it, the infant is very likely to make no effort to retrieve it and to show no emotional distress. Piaget, Instead, Piaget claimed that infants less than 9 months do not understand that objects continue to exist even when out of sight. During the preoperational stage, according to Piaget, children can solve not only this simple problem which they actually can solve after 9 months but show a wide variety of other symbolic-representation capabilities, such as those involved in drawing and using language. However, such 2- to 7-year-olds tend to focus on a single dimension, even when solving problems would require them to consider multiple dimensions. For example, if a glass of water is poured into a taller, thinner glass, children below age 7 generally say that there now is more water than before. Similarly, if a clay ball is reshaped into a long, thin sausage, they claim that there is now more clay, and if a row of coins is spread out, they claim that there are now more coins. In all cases, the children are focusing on one dimension, while ignoring the changes in other dimensions for example, the greater width of the glass and the clay ball. However, according to Piaget, they still cannot think in systematic scientific ways, even when such thinking would be useful. Thus, if asked to find out which variables influence the period that a pendulum takes to complete its arc, and given weights that they can attach to strings in order to do experiments with the pendulum to find out, most children younger than age 12, perform biased experiments from which no conclusion can be drawn, and then conclude that whatever they originally believed is correct. Finally, in the formal operations period, children attain the reasoning power of mature adults, which allows them to solve the pendulum problem and a wide range of other problems. However, this formal operations stage tends not to occur without exposure to formal education in scientific reasoning, and appears to be largely or completely absent from some societies that do not provide this type of education. Many more recent researchers have obtained findings indicating that cognitive development is considerably more continuous than Piaget claimed. For example, Diamond found that on the object permanence task described above, infants show earlier knowledge if the waiting period is shorter. At age 6 months, they retrieve the hidden object if the wait is no longer than 2 seconds; at 7 months, they retrieve it if the wait is no longer than 4 seconds; and so on. Even earlier, at 3 or 4 months, infants show surprise in the form of longer looking times if objects suddenly appear to vanish with no obvious cause. Baillargeon, Thus, the debate between those who emphasize discontinuous, stage-like changes in cognitive development and those who emphasize gradual continuous changes remains a lively one. Applications to Education Understanding how children think and learn has proven useful for improving education. One example comes from the area of reading. Cognitive developmental research has shown that phonemic awareness—that is, awareness of the component sounds within words—is a crucial skill in learning to read. To measure awareness of the component sounds within words, researchers ask children to decide whether two words rhyme, to decide whether the words start with the same sound, to identify the component sounds within words, and to indicate what would be left if a given sound were removed from a word. Moreover, teaching these skills to randomly chosen 4- and 5-year-olds results in their being better readers years later. National Reading Panel, Activities like playing games that involve working with numbers and spatial relationships can give young children a developmental advantage over peers who have less exposure to the same concepts. Even before they enter kindergarten, the mathematical knowledge of children from low-income backgrounds lags far behind that of children from more affluent backgrounds. Ramani and Siegler hypothesized that this difference is due to the children in middle- and upper-income families engaging more frequently in numerical

activities, for example playing numerical board games such as Chutes and Ladders. Chutes and Ladders is a game with a number in each square; children start at the number one and spin a spinner or throw a dice to determine how far to move their token. Playing this game seemed likely to teach children about numbers, because in it, larger numbers are associated with greater values on a variety of dimensions. An advantage of this type of educational intervention is that it has minimal if any cost—a parent could just draw a game on a piece of paper. Understanding of cognitive development is advancing on many different fronts. Although many people believe that brain maturation is something that occurs before birth, the brain actually continues to change in large ways for many years thereafter. Such new research domains, as well as enduring issues such as nature and nurture, continuity and discontinuity, and how to apply cognitive development research to education, insure that cognitive development will continue to be an exciting area of research in the coming years. For instance, if we want our kids to have a strong grasp of language we could concentrate on phonemic awareness early on. If we want them to be good at math and science we could engage them in numerical games and activities early on. Perhaps most importantly, we no longer think of brains as empty vessels waiting to be filled up with knowledge but as adaptable organs that develop all the way through early adulthood.

Teaching math to young children: John Wiley and Sons. Cognition, perception, and language. Theories of developmental psychology 5th ed. Upper Saddle River, NJ: Discussion Questions Why are there different theories of cognitive development? Do you see development as more continuous or more discontinuous? Can you think of ways other than those described in the module in which research on cognitive development could be used to improve education? Vocabulary A numerical board game that seems to be useful for building numerical knowledge. Concrete operations stage Piagetian stage between ages 7 and 12 when children can think logically about concrete situations but not engage in systematic scientific reasoning. Conservation problems Problems pioneered by Piaget in which physical transformation of an object or set of objects changes a perceptually salient dimension but not the quantity that is being asked about. Continuous development Ways in which development occurs in a gradual incremental manner, rather than through sudden jumps. Depth perception The ability to actively perceive the distance from oneself of objects in the environment. Discontinuous development Discontinuous development Formal operations stage Piagetian stage starting at age 12 years and continuing for the rest of life, in which adolescents may gain the reasoning powers of educated adults. Information processing theories Theories that focus on describing the cognitive processes that underlie thinking at any one age and cognitive growth over time. Nature The genes that children bring with them to life and that influence all aspects of their development.

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For our study, we selected three age categories to study a broad range of cognitive development: year-old, year-old and year-old children. Table Table 1 1 summarizes the cognitive developmental differences between the three age groups.

Only group A associated eating fruit with school and a party. In group B, half of the children agreed that sport and being with friends were appropriate occasions for fruit, besides home. Group C stated that fruit and vegetables were too healthy for a party. A party was associated with eating candy and other "unhealthy stuff". The three age groups used different arguments when deciding on appropriate times or occasions. Group A relied on their own behaviour or on the features of the picture cards. Group B referred to their own behaviour, parental and school rules or the opportunity for eating. A few children used the features of the picture cards in their argumentation for appropriate times. In group C, social norms emerged in reasoning about appropriate times. The children took into account what they had seen their peers doing or not and they were aware of a general norm "It is not common to do this". In addition, they used arguments relating to their own behaviour, the availability of food, the time opportunity for eating and the functions of fruit energy for example. In summary, children of all ages had fixed ideas about appropriate times and occasions for eating fruit and vegetables. With increasing age, the children saw more opportunities for eating fruit. In addition, older children used a broader range of arguments and their arguments were more abstract. Parent and child healthy eating strategies The conversations made clear that almost all parents try to influence the eating behaviour of their child. The children were very well aware of the rules and strategies their parents apply in relation to eating. To promote healthy eating, parents in all age groups used "moderation" and "health" arguments. In group A, instrumental eating was used more often than in the other age groups. Instrumental eating means that the children are promised a reward if they eat well [36]. Another often-used strategy was permission to use apple sauce in combination with disliked vegetables, which is a form of taste masking. This tactic was applied quite often in group B too. Children in this age group said that they invented their own ways of dealing with disliked products: In group C, adding apple sauce was a less used strategy. In this age category, parents mentioned the effort they had put into cooking the vegetables as an argument to get the children to eat them. All children in group C had invented their own creative strategy to cope with eating disliked vegetables, such as squeezing their nose, finishing first the non-tasty food or adding ketchup to the vegetables. Concept of health A clear trend was seen for the concept of health. Young children could not describe health. The older the children, the more comprehensive and abstract the concept. Most of the 4-5-year-olds could not categorize products correctly into healthy or not healthy. They used concrete and simple "rules" to categorize products as healthy or not. This fits for the leek, but not for a green candy. The other two age groups could correctly categorize products into healthy or not. In groups B and C, food-health and food-nutrient links food classification linked to its provision of a specific nutrient such as "It is healthy, because it contains vitamin C" were most popular justification categories. Social influence "family says" or "others say" and general knowledge "I just know" were the third and fourth most often mentioned. As children mature, their cognitions relating to fruit and vegetables increase in number and become more abstract. Although cognitive development as a viewpoint from which to study fruit and vegetable preferences is new, our findings are not incompatible with previous research. Age related differences in preferences have been found in other studies [8 , 37]. An interesting finding from our study was that cognitive development is related to the attributes children consider when evaluating products. Young children focus on appearance and texture, whereas older children focus on taste aspects. For 6-7-year-old children, mouth feel characteristics were most important for liking, whereas in 10-year-olds taste and smell were most important. Szczesniak [39] stated that texture would be especially important for disliking products, but in our study it was also the most important attribute for liking among the two youngest age groups. Young children could tell whether they liked or disliked the taste of a product, but could not identify the specific taste. This finding is in line with the study of Liem et al [40] where 4-year-old children could indicate which solution they preferred but failed to distinguish sweetness intensities during discrimination tests. In our study, the 4-5-year-old children knew and could properly use

the taste salt, but not the other basic tastes. Older children had an improved understanding of the four basic tastes and, consequently, were more specific about taste when talking about likes and dislikes. In other studies it has been found that pre-operational children focus on the most striking attributes that catch the eye, whereas older children use more functional and underlying attributes [23 , 41]. One aspect of cognitive development is an increase in the level of abstraction [21 , 22]. Furthermore, the arguments for appropriate occasions were very concrete in groups A and B, whereas this was not the case in group C. Roos [42] found that 9-year-old children could correctly identify which foods are considered healthy, a finding that is in line with ours. As in the findings of Hart et al. In our study, only pre-operational children mentioned preference links as an explanation for healthiness. This is in contrast to the findings of Hart et al. Parents play an important role in the nutrition behaviour of children [44 - 46]. Food deals were more frequently reported by younger children 7-8 years compared to older children 10-11 years. Although the age range is somewhat different, these findings are in agreement with our findings, where instrumental rewarding, which is comparable to a food deal, was used in respect of the youngest children but disappeared as children grow up. Probably, parents use instrumental rewarding, because it is a concrete strategy for the child "If you eat your vegetables, you will get a candy". The finding that parental effort is used as an argument in the oldest age group appears to fit their cognitive capacities. So children of this age can understand this argument. The strategies that children in group B invent to cope with eating vegetables reveal their emergent idea of conservation [22].

Limitations Although a qualitative approach is the best method to explore a new topic, the limitations should be acknowledged. A small number of children participated in the conversations. Therefore it is not easy to generalize to a larger and broader population [31]. Further research is needed to confirm our findings. Qualitative research is sometimes criticized for being low in both reliability and validity because of the subjective interpretation of results [31 , 32]. Several different actions were taken in this study to ensure reliability and validity. We used accepted systematic procedures for data collection, data handling and data analysis. The fact that children were assured that there were no wrong answers and that we did not finish their responses for them supports validity [47]. As advised by Morrison-Beedy et al. Major topics, confusing and conflicting data were discussed. The analyses and interpretations were thoroughly discussed with the co-authors, with other researchers and with experts in research with children and taste. In addition, the comparison of our results with other findings in the literature strengthens evidence [47]. We have been very careful with interpretation and are confident that the findings are an accurate reflection of what the children said. Another limitation is that we did not measure cognitive development. It is true that children develop at different rates, and this can result in differences within an age group. However, on the basis of cognitive development theories we are convinced that the differences in cognitive development between children of distinct age groups are larger than the differences between children within an age group. Besides, it would have been very impractical to measure the whole concept of cognitive development, as this is enormously time consuming and would have been a heavy burden for the children.

Practical implications and future research A great advantage of our study method is that we found important practical implications and fruitful directions for future research that would have been missed with a quantitative approach. In our study, vegetables came out as least favourite food in all age groups. A promising finding was that fruits especially apples and strawberries were liked and that almost all children liked at least one vegetable. It was also positive that children considered fruit and vegetables as food for themselves as well as for adults; it would be a barrier if they perceived it only as adult food. It is often thought that fruits and vegetables are not cool enough for children. A reason often mentioned for eating fruits and vegetables at a particular time was "Because I eat it at that time". So if we teach children to have more fruit and vegetable eating times during the day, we could increase their intake. In our study, just a few children in group C associated fruit with the computer or TV. In group C, it became apparent that the children did not think of cucumber and tomato as vegetables. When the research assistant mentioned that cucumber and tomato are also considered vegetables, then the children suddenly saw more time opportunities for eating vegetables: This finding could be very valuable in promoting vegetable intake by increasing the number of daily vegetable eating times. In our study, older children were more specific about the preferred preparation of vegetables, and young children valued textural attributes and

appearance more, whereas older children valued taste aspects more. A very surprising finding in our study was that the youngest children argued that foods are healthy, because they taste nice. Research has shown that children associate healthy with distaste [49 - 51]. However, the age of the children in these studies was nine years and older, whereas the children in this group in our study were 4â€”5 years. It may be that young children associate healthy with tasty through the connecting term "good"; tasty food is good and being healthy is also good. However, at a certain age point, there seems to emerge a differentiation: It would be interesting to investigate at what age this negative change in association occurs and how this change comes about. In concordance with Hart et al. The children should eat healthily, are restricted to specific foods and are often persuaded to eat fruit and vegetables because they are healthy. It is not clear whether parents did not apply more positive strategies or whether more positive strategies were just not reported by the children. If parents use many negative strategies for healthy products, then this may be a reason why children develop a negative taste association for these healthy foods [36]. It would be very interesting to investigate this interaction between parents and children further, together with the effects of this interaction.

Chapter 5 : Jean Piaget - Wikipedia

Published: Mon, 5 Dec 1-Swiss biologist and psychologist Jean Piaget () observed his children (and their process of making sense of the world around them) and eventually developed a four-stage model of how the mind processes new information encountered.

Cognitive Studies Summary of Major The Cognitive Studies major is for students who wish to become active inquirers into the processes by which people learn to think, solve problems, and reason. It is broader in focus than is a traditional psychology major. This fact is reflected in the title of the Intro course: The Cognitive Studies major provides excellent preparation for graduate study in the social and behavioral sciences as well as areas -such as medicine and law -that place importance on inquiry and thinking. The curriculum is planned to ensure that students receive a strong background in both science and the liberal arts, with an emphasis on problem solving and complex decision-making. Courses in the core curriculum focus on various aspects of human cognition, including communication, cognitive development, basic cognitive processes, applications of theories of knowledge, and sociocultural aspects of learning. Students are encouraged to consult their advisers about pursuing a second major or developing an area of concentration that is consistent with their career plans.

Honors Program The Honors Program in Cognitive Studies offers qualified majors the opportunity to conduct individual research projects in collaboration with faculty members. This research experience culminates in the writing and public presentation of a senior thesis. Students who major in Cognitive Studies are eligible to apply for the Honors Program at the end of their sophomore year if they have an overall grade point average of at least 3. Students who complete the program successfully and who have a final grade point average of at least 3. The program is highly appropriate for those intending to do graduate work.

Undergraduate Research Students have the opportunity to work directly with faculty to have a hands-on experience with research. Through working in research labs, students are able to learn about conducting research, data analysis and scientific writing. Cognitive Studies students make extensive use of computer technology and modern brain imaging neuroscience methods to conduct research and design cutting-edge learning opportunities for others. Ongoing experiments allow students to become actively involved in research. Recent graduates have been able to use their research conducted in the Cognitive Studies program as the foundation for graduate work. After Vanderbilt Cognitive Studies graduates are well prepared to pursue graduate studies as well as enter the job market because they have learned to generate sound new ideas and potential solutions to complex problems. They also pursue graduate studies in management, medicine and law, as well as careers in the social and behavioral sciences, government, human resources, and education - all areas where critical, original thinking is needed.

Masters at Harvard University and now is a Producer at Curriculum Associates in Los Angeles Faculty While the faculty shares common interests in psychological processes and their development, specific interests and expertise are diverse. Some are committed to increasing our understanding of basic psychological processes, whereas others emphasize implications for clinical, social, and educational issues. Faculty are specifically involved in research focusing on human perception, cognition, and neuroscience.

Chapter 6 : Cognitive development - Wikipedia

Recent Cognitive Development Articles Recently published articles from Cognitive Development. Infants' looking times in a dynamic mental rotation task: Clarifying inconsistent results.

Description It was once believed that infants lacked the ability to think or form complex ideas and remained without cognition until they learned language. It is now known that babies are aware of their surroundings and interested in exploration from the time they are born. From birth, babies begin to actively learn. They gather, sort, and process information from around them, using the data to develop perception and thinking skills. Cognitive development refers to how a person perceives, thinks, and gains understanding of his or her world through the interaction of genetic and learned factors. Among the areas of cognitive development are information processing, intelligence, reasoning, language development, and memory. Historically, the cognitive development of children has been studied in a variety of ways. The oldest is through intelligence tests, such as the widely used Stanford Binet Intelligence Quotient IQ test first adopted for use in the United States by psychologist Lewis Terman in from a French model pioneered in IQ tests are widely used in the United States, but they have come under increasing criticism for defining intelligence too narrowly and for being biased with regard to race and gender. Skinner, who argued that children are completely malleable. Although Piaget was interested in how children reacted to their environment, he proposed a more active role for them than that suggested by learning theory. Schemas are continually being modified by two complementary processes that Piaget termed assimilation and accommodation. Assimilation refers to the process of taking in new information by incorporating it into an existing schema. In other words, people assimilate new experiences by relating them to things they already know. On the other hand, accommodation is what happens when the schema itself changes to accommodate new knowledge. According to Piaget, cognitive development involves an ongoing attempt to achieve a balance between assimilation and accommodation that he termed equilibration. These stages always occur in the same order, and each builds on what was learned in the previous stage. They are as follows: In this period, which has six sub-stages, intelligence is demonstrated through motor activity without the use of symbols. Knowledge of the world is limited, but developing, because it is based on physical interactions and experiences. Children acquire object permanence at about seven months of age memory. Physical development mobility allows the child to begin developing new intellectual abilities. Some symbolic language abilities are developed at the end of this stage. Pre-operational stage toddlerhood and early childhood: In this period, which has two sub stages, intelligence is demonstrated through the use of symbols, language use matures, and memory and imagination are developed, but thinking is done in a non-logical, non-reversible manner. Concrete operational stage elementary and early adolescence: In this stage, characterized by seven types of conservation number, length, liquid, mass, weight, area, and volume, intelligence is demonstrated through logical and systematic manipulation of symbols related to concrete objects. Operational thinking develops mental actions that are reversible. Formal operational stage adolescence and adulthood: In this stage, intelligence is demonstrated through the logical use of symbols related to abstract concepts. Early in the period there is a return to egocentric thought. Only 35 percent of high school graduates in industrialized countries obtain formal operations; many people do not think formally during adulthood. The most significant alternative to the work of Piaget has been the information-processing approach, which uses the computer as a model to provide new insight into how the human mind receives, stores, retrieves, and uses information. For example, researchers have found that the superior memory skills of older children are due in part to memorization strategies, such as repeating items in order to memorize them or dividing them into categories. Infancy As soon as they are born, infants begin learning to use their senses to explore the world around them. Most newborns can focus on and follow moving objects, distinguish the pitch and volume of sound, see all colors and distinguish their hue and brightness, and start anticipating events, such as sucking at the sight of a nipple. By three months old, infants can recognize faces; imitate the facial expressions of others, such as smiling and frowning; and respond to familiar sounds. At six months of age, babies are just beginning to understand how the world around them works. They imitate

sounds, enjoy hearing their own voice, recognize parents, fear strangers, distinguish between animate and inanimate objects, and base distance on the size of an object. They also realize that if they drop an object, they can pick it up again. At four to seven months, babies can recognize their names. By nine months, infants can imitate gestures and actions, experiment with the physical properties of objects, understand simple words such as "no," and understand that an object still exists even when they cannot see it. They also begin to test parental responses to their behavior, such as throwing food on the floor. They remember the reaction and test the parents again to see if they get the same reaction. At 12 months of age, babies can follow a fast moving object; can speak two to four words, including "mama" and "papa"; imitate animal sounds; associate names with objects; develop attachments to objects, such as a toy or blanket; and experience separation anxiety when away from their parents. By 18 months of age, babies are able to understand about 10-50 words; identify body parts; feel a sense of ownership by using the word "my" with certain people or objects; and can follow directions that involve two different tasks, such as picking up toys and putting them in a box. For instance, they understand the permanence of objects and people, visually follow the displacement of objects, and begin to use instruments and tools. Toddlers start to strive for more independence, which can present challenges to parents concerned for their safety. They also understand discipline and what behavior is appropriate and inappropriate, and they understand the concepts of words like "please" and "thank you." Toddlers also have a better understanding of emotions, such as love, trust, and fear. They begin to understand some of the ordinary aspects of everyday life, such as shopping for food, telling time, and being read to. They should be conditioned to learning and memorizing, and their view of the world is normally very self-centered. Preschoolers usually have also developed their social interaction skills, such as playing and cooperating with other children their own age. It is normal for preschoolers to test the limits of their cognitive abilities, and they learn negative concepts and actions, such as talking back to adults, lying, and bullying. Other cognitive development in preschoolers are developing an increased attention span, learning to read, and developing structured routines, such as doing household chores. They understand the concepts of permanence and conservation by learning that volume, weight, and numbers may remain constant despite changes in outward appearance. These children should be able to build on past experiences, using them to explain why some things happen. Their attention span should increase with age, from being able to focus on a task for about 15 minutes at age six to an hour by age nine. It is characterized by an increased independence for thinking through problems and situations. Adolescents should be able to understand pure abstractions, such as philosophy and higher math concepts. During this age, children should be able to learn and apply general information needed to adapt to specific situations. They should also be able to learn specific information and skills necessary for an occupation. A major component of the passage through adolescence is a cognitive transition. Compared to children, adolescents think in ways that are more advanced, more efficient, and generally more complex. This ability can be seen in five ways. First, during adolescence individuals become better able than children to think about what is possible, instead of limiting their thought to what is real. Second, during the passage into adolescence, individuals become better able to think about abstract ideas. For example, adolescents find it easier than children to comprehend the sorts of higher-order, abstract logic inherent in puns, proverbs, metaphors, and analogies. Third, during adolescence individuals begin thinking more often about the process of thinking itself, or metacognition. As a result, adolescents may display increased introspection and self-consciousness. Although improvements in metacognitive abilities provide important intellectual advantages, one potentially negative byproduct of these advances is the tendency for adolescents to develop a sort of egocentrism, or intense preoccupation with the self. A fourth change in cognition is that thinking tends to become multidimensional, rather than limited to a single issue. Whereas children tend to think about things one aspect at a time, adolescents can see things through more complicated lenses. Adolescents describe themselves and others in more differentiated and complicated terms and find it easier to look at problems from multiple perspectives. One month Watches person when spoken to. Two months Smiles at familiar person talking. Begins to follow moving person with eyes. Four months Shows interest in bottle, breast, familiar toy, or new surroundings. Five months Smiles at own image in mirror. Looks for fallen objects. Six months May stick out tongue in imitation. Laughs at peekaboo game. Vocalizes at

mirror image. May act shy around strangers. Seven months Responds to own name. Tries to establish contact with a person by cough or other noise. Eight months Reaches for toys out of reach. May try to prevent face-washing or other activity that is disliked. Shows excitement and interest in foods or toys that are well-liked. Ten months Starts to understand some words. Holds out arm or leg for dressing. Eleven months Repeats performance that is laughed at. Shows interest in books. Twelve months May understand some "where is? May kiss on request. Fifteen months Asks for objects by pointing. Starting to feed self. Eighteen months Points to familiar objects when asked "where is? Know some body parts.

Cognitive Development in Childhood By Robert Siegler. Carnegie Mellon University. This module examines what cognitive development is, major theories about how it occurs, the roles of nature and nurture, whether it is continuous or discontinuous, and how research in the area is being used to improve education.

This stage lasts from birth to two years old. During this stage, behaviors lack a sense of thought and logic. Behaviors gradually move from acting upon inherited reflexes to interacting with the environment with a goal in mind and being able to represent the external world at the end. The sensorimotor stage has been broken down into six sub stages that explain the gradual development of infants from birth to age 2. Once the child gains the ability to mentally represent reality, the child begins the transition to the preoperational stage of development. Examples of these reflexes include grasping and sucking. If the sensation is pleasurable to the child, then the child will attempt to recreate the behavior. Schemes are groups of similar actions or thoughts that are used repeatedly in response to the environment. For example, an infant may assimilate a new teddy bear into their putting things in their mouth scheme and use their reflexes to make the teddy bear go into their mouth. For example, a child accidentally hits the mobile above the crib and likes to watch it spin. When it stops the child begins to grab at the object to make it spin again. Once there is another distraction say the parent walks in the room the baby will no longer focus on the mobile. They begin to understand that one action can cause a reaction. The baby wants a rattle but the blanket is in the way. The baby moves the blanket to get the rattle. Now that the infant can understand that the object still exists, they can differentiate between the object, and the experience of the object. According to psychologist David Elkind, "An internal representation of the absent object is the earliest manifestation of the symbolic function which develops gradually during the second year of life whose activities dominate the next stage of mental growth. For example a baby drums on a pot with a wooden spoon, then drums on the floor, then on the table. The end product is established after the infant has pursued for the appropriate means. The means are formed from the schemes that are known by the child. Preoperational stage[edit] Lasts from 2 years of age until 6 or 7. It can be characterized in two somewhat different ways. Egocentrism is when a child can only see a certain situation his or her own way. One can not comprehend that other people have other views and perceptions of scenarios. Animism is when an individual gives a lifeless object human-like qualities. An individual usually believes that this object has human emotions, thoughts and intentions. Once he had proposed his structuralist theory, Piaget characterized the preoperational child as lacking the cognitive structures possessed by the concrete operational child. The absence of these structures explains, in part, the behaviors Piaget had previously described as egocentric and animistic, for example, an inability to comprehend that another individual may have different emotional responses to similar experiences. Concrete operational stage[edit] Lasts from 6 or 7 years until about 12 or Piaget argues that the same general principles can be discerned in a wide range of behaviors. One of the best-known achievements of this stage is that of conservation. A preoperational child will typically judge the taller, thinner glass to contain more, while a concrete operational child will judge the amounts still to be the same. The ability to reason in this way reflects the development of a principle of conservation. The need for concrete examples is no longer necessary because abstract thinking can be used instead. In this stage adolescents are also able to view themselves in the future and can picture the ideal life they would like to pursue. Some theorists believe the formal operational stage can be divided into two sub-categories: Early formal operational thoughts may be just fantasies, but as adolescents advance to late formal operational thought the life experiences they have encountered changes those fantasy thoughts to realistic thoughts. For example, he claimed that young children cannot conserve numbers. However, further experiments showed that children did not really understand what was being asked of them. When the experiment is done with candies, and the children are asked which set they want rather than having to tell an adult which is more, they show no confusion about which group has more items. It does not take into account later stages of adult cognitive development as described by for example Harvard University professor Robert Kegan. The debate is over whether these systems are learned by general-purpose learning devices, or domain-specific cognition.

Moreover, many modern cognitive developmental psychologists, recognizing that the term "innate" does not square with modern knowledge about epigenesis, neurobiological development, or learning, favor a non-nativist framework. Researchers who discuss "core systems" often speculate about differences in thinking and learning between proposed domains. Researchers who posit a set of so-called "core domains" suggest that children have an innate sensitivity to specific kinds of patterns of information. Those commonly cited include:

Number[edit] Infants appear to have two systems for dealing with numbers. One deals with small numbers, often called subitizing. Another deals with larger numbers in an approximate fashion. This basic ability to infer the direction and distance of unseen locations develops in ways that are not entirely clear. However, there is some evidence that it involves the development of complex language skills between 3 and 5 years.

Visual perception[edit] One of the original nativist versus empiricist debates was over depth perception. There is some evidence that children less than 72 hours old can perceive such complex things as biological motion. There are far more elaborate aspects of visual perception that develop during infancy and beyond.

Essentialism[edit] Young children seem to be predisposed to think of biological entities e.

Language acquisition[edit] A major, well-studied process and consequence of cognitive development is language acquisition. The traditional view was that this is the result of deterministic, human-specific genetic structures and processes. Other traditions, however, have emphasized the role of social experience in language learning. However, the relation of gene activity, experience, and language development is now recognized as incredibly complex and difficult to specify. Language development is sometimes separated into learning of phonology systematic organization of sounds , morphology structure of linguistic unitsâ€”root words, affixes, parts of speech, intonation, etc. However, all of these aspects of language knowledgeâ€”which were originally posited by the linguist Noam Chomsky to be autonomous or separateâ€”are now recognized to interact in complex ways. Ellen Bialystok was, and is, a big game changer in this field. Bialystok has done years of research on the effects bilingualism has on cognitive development. There have been a number of studies showing how bilingualism contributes to the executive function of the brain, which is the main center at which cognitive development happens. In other words, it is the belief that language determines our thoughts and perceptions. For example, it used to be thought that the Greeks, who wrote left to right, thought differently than Egyptians since the Egyptians wrote right to left.

Neo-Piagetian theories of cognitive development[edit] Main article: Neo-Piagetian theories of cognitive development Neo-Piagetian theories of cognitive development emphasized the role of information processing mechanisms in cognitive development, such as attention control and working memory. They suggested that progression along Piagetian stages or other levels of cognitive development is a function of strengthening of control mechanisms and enhancement of working memory storage capacity.

Neuroscience[edit] During development, especially the first few years of life, children show interesting patterns of neural development and a high degree of neuroplasticity. Neuroplasticity, as explained by The World Health Organization, can be summed in three points. Any adaptive mechanism used by the nervous system to repair itself after injury. Any means by which the nervous system can repair individually damaged central circuits. Any means by which the capacity of the central nervous system can adapt to new physiological conditions and environment. The relation of brain development and cognitive development is extremely complex and, since the s, has been a growing area of research. In other words, culture can influence brain structures which then influence our interpretation of the culture. These examples reveal cultural variations in neural responses: Figure-line task Hedden et al. In general, East Asian cultures are more interdependent whereas Western cultures are more independent. The study showed that participants used regions of the brain associated with attentional control when they had to perform culturally incongruent tasks. In other words, neural paths used for the same task were different for Americans and East Asians Hedden et al. They found universal activation of the region bilateral ventromedial prefrontal cortex in theory of mind tasks. However, American children showed greater activity in the left inferior frontal gyrus during the tasks whereas Japanese children had greater activity in right inferior frontal gyrus during the Japanese Theory of Mind tasks.

Chapter 8 : Cognitive development research - School of Psychology - University of Birmingham

Jean Piaget's theory of cognitive development suggests that children move through four different stages of mental development. His theory focuses not only on understanding how children acquire knowledge, but also on understanding the nature of intelligence.

Schemas Imagine what it would be like if you did not have a mental model of your world. It would mean that you would not be able to make so much use of information from your past experience or to plan future actions. Schemas are the basic building blocks of such cognitive models, and enable us to form a mental representation of the world. Piaget emphasized the importance of schemas in cognitive development and described how they were developed or acquired. A schema can be defined as a set of linked mental representations of the world, which we use both to understand and to respond to situations. The assumption is that we store these mental representations and apply them when needed. For example, a person might have a schema about buying a meal in a restaurant. The schema is a stored form of the pattern of behavior which includes looking at a menu, ordering food, eating it and paying the bill. The schemas Piaget described tend to be simpler than this - especially those used by infants. He described how - as a child gets older - his or her schemas become more numerous and elaborate. Piaget believed that newborn babies have a small number of innate schemas - even before they have had many opportunities to experience the world. These neonatal schemas are the cognitive structures underlying innate reflexes. These reflexes are genetically programmed into us. Shaking a rattle would be the combination of two schemas, grasping and shaking. Assimilation and Accommodation Jean Piaget ; see also Wadsworth, viewed intellectual growth as a process of adaptation adjustment to the world. Piaget believed that cognitive development did not progress at a steady rate, but rather in leaps and bounds. However, an unpleasant state of disequilibrium occurs when new information cannot be fitted into existing schemas assimilation. Equilibration is the force which drives the learning process as we do not like to be frustrated and will seek to restore balance by mastering the new challenge accommodation. Once the new information is acquired the process of assimilation with the new schema will continue until the next time we need to make an adjustment to it. Example of Assimilation A 2-year-old child sees a man who is bald on top of his head and has long frizzy hair on the sides. Sensorimotor stage birth to age 2 2. Pre-operational stage from age 2 to age 7 3. Concrete operational stage from age 7 to age 11 4. Each child goes through the stages in the same order, and child development is determined by biological maturation and interaction with the environment. Although no stage can be missed out, there are individual differences in the rate at which children progress through stages, and some individuals may never attain the later stages. Piaget did not claim that a particular stage was reached at a certain age - although descriptions of the stages often include an indication of the age at which the average child would reach each stage. Sensorimotor Stage Birth-2 yrs The main achievement during this stage is object permanence - knowing that an object still exists, even if it is hidden. It requires the ability to form a mental representation i. Preoperational Stage years During this stage, young children can think about things symbolically. This is the ability to make one thing - a word or an object - stand for something other than itself. Thinking is still egocentric , and the infant has difficulty taking the viewpoint of others. This means the child can work things out internally in their head rather than physically try things out in the real world. Children can conserve number age 6 , mass age 7 , and weight age 9. Conservation is the understanding that something stays the same in quantity even though its appearance changes. Formal Operational Stage 11 years and over The formal operational stage begins at approximately age eleven and lasts into adulthood. During this time, people develop the ability to think about abstract concepts, and logically test hypotheses. Piaget has been extremely influential in developing educational policy and teaching practice. The result of this review led to the publication of the Plowden report "Discovery learning" the idea that children learn best through doing and actively exploring - was seen as central to the transformation of the primary school curriculum. Readiness concerns when certain information or concepts should be taught. According to Piaget , assimilation and accommodation require an active learner, not a passive one, because problem-solving skills cannot be taught, they must be discovered. Within the classroom

learning should be student-centered and accomplished through active discovery learning. The role of the teacher is to facilitate learning, rather than direct tuition. Therefore, teachers should encourage the following within the classroom: He was an inspiration to many who came after and took up his ideas. His ideas have been of practical use in understanding and communicating with children, particularly in the field of education re: Criticisms Are the stages real? Vygotsky and Bruner would rather not talk about stages at all, preferring to see development as a continuous process. Others have queried the age ranges of the stages. Some studies have shown that progress to the formal operational stage is not guaranteed. Because Piaget concentrated on the universal stages of cognitive development and biological maturation, he failed to consider the effect that the social setting and culture may have on cognitive development. Dasen cites studies he conducted in remote parts of the central Australian desert with year old Aborigines. He gave them conservation of liquid tasks and spatial awareness tasks. However, he found that spatial awareness abilities developed earlier amongst the Aboriginal children than the Swiss children. Such a study demonstrates cognitive development is not purely dependent on maturation but on cultural factors too – spatial awareness is crucial for nomadic groups of people. Vygotsky, a contemporary of Piaget, argued that social interaction is crucial for cognitive development. This social interaction provides language opportunities and language is the foundation of thought. Piaget made careful, detailed naturalistic observations of children, and from these he wrote diary descriptions charting their development. He also used clinical interviews and observations of older children who were able to understand questions and hold conversations. Because Piaget conducted the observations alone the data collected are based on his own subjective interpretation of events. It would have been more reliable if Piaget conducted the observations with another researcher and compared the results afterward to check if they are similar. Although clinical interviews allow the researcher to explore data in more depth, the interpretation of the interviewer may be biased. Such methods meant that Piaget may have formed inaccurate conclusions. As several studies have shown Piaget underestimated the abilities of children because his tests were sometimes confusing or difficult to understand. Piaget failed to distinguish between competence what a child is capable of doing and performance what a child can show when given a particular task. When tasks were altered, performance and therefore competence was affected. For example, a child might have object permanence competence but still not be able to search for objects performance. However, Piaget relied on manual search methods – whether the child was looking for the object or not. The concept of schema is incompatible with the theories of Bruner and Vygotsky. Therefore, they would claim it cannot be objectively measured. Piaget studied his own children and the children of his colleagues in Geneva in order to deduce general principles about the intellectual development of all children. Not only was his sample very small, but it was composed solely of European children from families of high socio-economic status. Researchers have therefore questioned the generalisability of his data. For Piaget, language is seen as secondary to action, i. The Russian psychologist Lev Vygotsky argues that the development of language and thought go together and that the origin of reasoning is more to do with our ability to communicate with others than with our interaction with the material world. Object permanence in young infants: Toward a theory of instruction. Central Advisory Council for Education Culture and cognitive development from a Piagetian perspective. Egocentrism in preschool children. The moral judgment of the child. Origins of intelligence in the child. Play, dreams and imitation in childhood. Construction of reality in the child. The growth of logical thinking from childhood to adolescence. The origins of intelligence in children. The development of higher psychological processes. How to reference this article: How Do Children Think? Download this article as a PDF.

The conferences addressed the relationship of cognitive studies and curriculum development and strived to conceive implications of recent investigations of children's cognitive development for curricula.

Piaget proposed that youngsters progress through four stages of cognitive development which are characterized by different thought processes. Piaget regarded his age norms as approximations and acknowledged that transitional ages may vary, but he was convinced that all children progress through his four stages of cognitive development in the same order. He designed a proper framework to understand the structure, functioning and development of the human cognitive network. He believed that there are two aspects to human mind; one is cognitive structure and other is cognitive functioning. The human baby is born with few practical instincts and reflexes such as sucking, looking, reaching and grasping. Piaget termed these reflexes and instincts as Schemas. As child grows, through interaction with physical and social environment, he is able to form different schemas, resulting in changes and modifications in his cognitive structure. An individual response to social and physical environment depends on the schemas available to him. On the other hand, the individual has to adapt to his environment for survival as well as for proper growth and development. The task of such adaptation is carried out through the process of assimilation and accommodation. This adjustment mechanism was called equilibration Piaget. The biologically inherited reflexes and mental dispositions as the fundamental cognitive structure. The changes and development brought about in the cognitive structure through maturation. The changes and development in the cognitive structure brought about through experiences involving the processes of assimilation, accommodation and equilibration.

Sensorimotor stage From birth to about two years Piaget called this stage sensorimotor because infants are developing the ability to coordinate their sensory input with their motor actions. The cognitive development during this stage occurs along the following pattern: At birth the infant exhibits a limited number of uncoordinated reflexes such as sucking, looking, reaching and grasping. During the next four months the uncoordinated reflexes are coordinated into simple schemes providing the child with a general potential to perform certain classes of behaviour. But by the end of the stage, the infant is able to react to object outside himself. The key to this transition is the acquisition of the concept of object Permanence. The first signs of object permanence usually appear between four and eight months of age, when children will often pursue an object that is partially covered in their presence. Although progress in symbolic thought continues, Piaget emphasized shortcomings in symbolic thought continue, in pre operational thought. Consider a simple problem that Piaget presented to youngsters. He would take two identical beakers and fill each with equal amount of water. After the youngsters had agreed that both beakers contained the same amount of water, he would pour water from one of the beakers into much taller and thinner. He would then ask the child whether the two differently shaped containers still contained the same amount of water. The children in the preoperational period generally said no. They typically focused on the higher water line in the taller beaker and insisted that there was more water in the slender beaker. This is because the children in this stage have not yet mastered the principle of conservation. According to Piaget, their inability to understand conservation is due to some basic flaws in preoperational thinking. These flaws include centration, irreversibility, and ego centricism, Centration is the tendency to focus on just one feature of the problem, neglecting other important aspects. When working on the conservation problem with water, preoperational children that to concentrate on the height of the water while ignoring the width. Irreversibility is the ability to envision reversing an action: For instance, if you ask a preoperational girl whether her sister has a sister, she will probably say no if they are the only two girls in the family. A notable feature of egocentrism is animism- the belief that all things are living, just like oneself. As evident, Piaget emphasized the weaknesses apparent in preoperational thought. Indeed that is why he called this stage preoperational the ability to perform operations internal transformations, manipulations, and reorganization of mental structures emerges in next stage. The development of mental operations makes the beginning of the concrete operational stage, which usually east from 7 to 11 years. Piaget called these stage concrete operations because children can perform operation only

on images of tangible objects and actual events. During this stage, children master the operations of irreversibility and decentration. Reversibility allows them to mentally undo a thing. Decentration allows them to focus on more than one feature of a problem simultaneously. This ability in turn leads to a decline in egocentrism as it applies to liquid, mass, number, volume, area, length. In this stage, children begin to apply their operations to abstract concepts in addition to concrete objects. Many adolescents spend hours mulling over hypothetical possibilities related to abstractions such as justice, love and free will. According to Piaget, youngsters graduate to relatively adult modes of thinking in this stage. He believed that after children achieve formal operations, further development in thinking are changes in degree rather than fundamental changes in the nature of thinking. Youngsters in this stage become more systematic in their problem-solving efforts. Rather than employing trial and error, they envision possible courses of action, try to use logic to reason out the likely consequences of each possible solution before they act. Hence, their thought processes can be characterized as abstract, systematic, logic and reflective. However, there are some weak points which are as follows. For example, researchers have found evidence that children begin to develop object permanence much earlier than Piaget thought, perhaps as early as three to four months of age. Also, they have found evidence that preoperational children exhibit less egocentrism and animism than Piaget believed. Piaget had little to say about individual differences in development. Also, people often simultaneously display patterns of thinking which are characteristic of several stages. Piaget believed that children all across the globe developed their cognitive thinking in the order which he presented at roughly the same age. Subsequent research has shown that the sequence of stages is largely invariant, but the timetable that children follow in passing through these stages varies considerably across cultures. Thus, Piaget underestimated the influence of culture factors on cognitive development.