

TMA No 5: What have been the major challenges to Piaget's theory of cognitive development? What aspects of the theory still have value?

Jean Piaget (1896 – 1980) was a constructivist theorist. He saw children as constructing their own world, playing an active part in their own development. Children are intrinsically motivated to interact with their environment and so learn about the world they live in. Piaget's insight opened up a new window into the inner working mind and as a result he carried out some remarkable studies on children that had a powerful influence on theories of child thought. This essay is going to explain the main features and principles of the Piagetian theory, how Piaget has influenced education and relate the Piagetian theory to two challenging perspectives, social constructivism and connectionist modelling.

Piaget saw children as constructing their own world, playing an active part in their own development, which was the bulk of his work but also believed that social context was an important feature as well. Children are intrinsically motivated to interact with their environment and so learn about the world they live in. Piaget believed that children had the ability to adapt to their environment and saw intelligence as an evolutionary process.

Piaget alleged children's thinking goes through changes at each of four stages (sensori motor, concrete operations and formal operations) of development until they can think and reason as an adult. The stages represent qualitatively different ways of thinking, are universal, and children go through each stage in the same order. According to Piaget each stage must be completed before they can move into the next one and involving increasing levels of organisation and increasingly logical underlying structures. Piaget stated that the 'lower stages never disappear; they become integrated into the new stage (hierarchic integration) (Inhelder and Piaget, 1958). Children themselves, through their actions on the environment, interacting with there biologically – determined level of maturation, bring about the cognitive changes, which result in adult thinking.

The stages theory is open to criticism as they are too rigid and neglects individual differences such as memory span, motivation etc. Piaget also underestimated the age at which children could do things. This maybe because he failed to distinguish between competence and performance. Piaget's studies tested performance and then he assumed that a child who failed simply lacked the underlying cognitive structures that he believed were needed to succeed on that task. Subsequent research suggests that a child may have these competencies earlier than Piaget suggested. However, simply to focus on age limits is to miss the central point of Piaget's theory that universal, qualitative, biologically regulated cognitive changes occur during development. This is supported by cross-cultural research that has replicated Piaget's findings (Smith et al, 1998).

A positive aspect is that Piaget's view of children as active constructors of their own cognitive world had considerable educational implications, with its emphasis on discovery learning, sensitivity to children's readiness to learn, and acceptance of individual differences. Piaget's main features suggest 'that the role of the teacher is to allow children to engage with their environment in an active way and have appropriate experiences at appropriate times so as to foster their natural capacity to learn.' (Gupta and Richardson, 1995 p8) These experiences will only be effective if full account is taken of the children's level of understanding. As a result Piaget's

psychological research has provided evidence for the Plowden report and some teachers have applied Piaget's theory to their teaching methods in relation to the importance of 'active learning, qualitative differences between child and adult thinking, and the influence of environmental experience on development.

Piaget's theory is immensely rich, deep and quite often very difficult; as such it resists encapsulation. However, it is possible to draw out certain themes. Piaget clearly distinguishes between development and learning, believing the former to be a spontaneous, structured whole, in contrast to the provoked, limited nature of the latter. Piaget argued that there are four main factors in the development of one set of structures from another: maturation, experience, social transmission and equilibration. Piaget devised a number of ingenious tests of thought to illustrate this style of thinking and to study 'how children developed the ability to realise that there are things that do not change even when there are perceptual transformations.' (Light and Oates, 1990 pg 101). He illustrated his concepts of egocentrism by using a three mountains task and conservation tasks. These studies came to the following conclusions that children are: 1) unable to conserve, 2) They are unable to reserve mental operations and 3) they are perceptually egocentric. When discussing Piaget's experiments ecological validity needs to be taken into account. Piaget used his own children as participants and the clinical interview method also casts doubts.

Another criticism relates to the concept of biological maturation or 'readiness'. If the development of cognitive structures is related to maturity, then practice should not improve performance. In other words, if a person is not biologically ready to move on to the next stage then no amount of practice should get them there. However, there is evidence to suggest that practice can make a difference (Danner and Day 1977).

Piaget did not deny the role of experience. He used the concept of 'horizontal decalage' to explain why it is that not all aspects of the same stage appear at the same time; for example, the ability to conserve number and volume may not appear at the same time, but one after the other. He suggested that uneven cognitive performance is probably due to different learning experiences.

A third criticism relates to the role of language and social factors. Piaget did not feel that language influenced cognitive development. To incorporate these two elements researchers have extended Piaget's experiments. Margaret Donaldson (1978, as cited by Lights and Oates, p 114) argued that the real problem with the Piagetian tasks is that they are testing deimbedded thinking on the part of the child; they are asking the child to solve problems unrelated to the child's own knowledge and experience. A change in materials used will enable children to perform better on some tasks than on others.

Several aspects of Piaget's theory have been questioned but other aspects remain influential. Piaget's work has encouraged other theorists such as Vygotsky to study children's cognition.

Vygotsky took a socio cultural view of development that makes social interaction the centre of his theory. Cognition and behaviour arise from the interaction of a person with other persons and vents in the world, over time with the use of cultural tools. Vygotsky claimed that cultural tools are acquired through interacting with others, which children then adopt as their own: what was an interpersonal behaviour pattern becomes an intrapersonal cognitive process. One major way in which Vygotsky's theory is distinctive is the importance for him of instruction. He believed that the highest forms of thinking could only be achieved through appropriate instruction. Vygotsky claimed that purely abstract thinking is only found in highly technological cultures, which have a heavy emphasis on formal instruction. Whereas Piaget

concluded that young children's language is egocentric and non-social, Vygotsky reasoned that children speak to themselves for self-guidance and self-direction. Because language helps children think about their own behaviour and select courses of action, Vygotsky regarded it as the foundation for all higher cognitive processes. Vygotsky believed that through joint activities with more mature members of society, children come to master activities and think in ways that have meaning in their culture. He believed that children learn best when tasks are in their zone of proximal development, a range of tasks that the child cannot yet handle alone but can accomplish with the help of adults and more skilled peers. This emphasises the role of the adult as a teacher.

Vygotsky's theory has also influenced education through concepts and techniques such as assisted discovery, peer collaboration, reciprocal teaching, and cooperative learning. A new Vygotsky-inspired educational approach transforms classrooms into communities of learners, where no distinction is made between adult and child contributions; all collaborate and develop. An evaluation of Vygotsky's theory indicates that its emphasis on the role of language may not accurately describe cognitive development in all cultures. Also, by focusing on the cultural line of development, his theory does not describe exactly how elementary cognitive processes contribute to higher cognitive processes derived from social experience.

Vygotsky's theory was an attempt to explain consciousness as the end product of socialisation. For example, in the learning of language, our first utterances with peers or adults is for the purpose of communication but once mastered they become internalised and allow "inner speech".

Like Piaget's theory, Vygotsky's theory is also a stage theory. 'Both Piaget and Vygotsky agreed that human development is made up of both continuous and discontinuous changes and that transitions in development are the result of changes in the organisation of mental structures. However, Vygotsky believed that instruction is essential to reach the highest levels of thinking. He argued that purely abstract levels of thinking are only prevalent in technologically advanced societies which emphasise formal instruction.' (Gupta and Richardson, 1995, p14)

Vygotsky believed the pattern of social interaction determines the structure and pattern of internal cognition: 'the very mechanism underlying higher mental functions is a copy from social interaction; all higher mental functions are internalised social relationships. (Vygotsky, 1988,p74,p14)

Piaget assumed that development and instruction are entirely separate, incommensurate processes; the function of instruction is merely to introduce adult ways of thinking, which conflict with the child's own and eventually supplant them. Studying child thought apart from the influence of instruction, as Piaget did, excludes a very important source of change (Vygotsky 1962, p116 -17)

In summary, Vygotsky argued strongly that the child's cognitive development took place as a result of social interactions between the child and other people. Vygotsky's theory centred on the social construction of knowledge. The infant has elementary mental functions. This kind of thinking is not dissimilar to that of other primates. Around the age of two, the use of language and other cultural symbols transforms a child's rudimentary abilities into more sophisticated cognitive abilities. These symbols are learned from others (experts) and are therefore external. In time they become internalised. This child learns to make sense of the world through the 'shared meanings' of others.

There is little empirical evidence for Vygotsky's theory, but it is growing, as interest in the theory has increased. Glassman (1999) argues it is wrong to see Vygotsky and

Piaget as opposites, that in fact the two theories are remarkably similar especially at their central core. Piaget focused on the natural laws of intellectual development while Vygotsky concentrated on the impact of social processes and culture. An integration of both views might therefore be highly productive.

The next theory is connectionist modelling which shows that the human brain has many interconnected cells which acts as a self organising system that creates representations in interaction with structured information in its environment (Plunkett and Sinha, 1992) The changes of structures and complexity in such representations are seen as the essence of cognitive development. Some connectionist theorists claim that the development of representational networks takes an essentially 'constructivist form, thus presenting an amalgamation of association and constructivist perspectives.

Jerry Fodor (1983) has argued that there is little evidence for qualitative or structural changes in development at all. Instead he suggests that we are all born with identical representational and computational systems, which are genetically pre-structured to allow us to make sense of the world in which humans evolved.'(Gupta and Richardson, p21) Recent theory based on this idea involves the concepts of models and domains. 'Modules are different subsets of our neural networks, which are genetically pre structured for processing information. The 'architectures' and processes in these specialised sets don't change with age and experience. Rather their task is to pass on the information they have processed to a 'central executive' in the form of common language of thought. On this basis the executive builds up information in memory, and can generate new hypothesis about the world, make decisions and so on.' (Gupa and Richardson, 1995 p21)

A domain is the set of representations on which a particular kind of knowledge and the cognitive processes associated with it are based. Development according to this theory is 'domain specific' – which means that development (or maturation) in one domain is independent of development (or maturation) in other domains. Meaning that children can develop in particular areas such as writing but could be backward in drawing. This though does not necessarily imply a modular system. Piaget's is domain general in that development in particular domains arises from the application of the same general processes to different knowledge areas. (Gupa and Richardson, 1995 p21)

The difference between the stage theorists and Fodor is that the modules focus predominantly on their role in on line processing. Little account has been taken into consideration of developmental change apart from when new modules are being developed. Piaget believes that processing or storage of information is domain specific, but however must recognize that there are different sensory transducers for vision, audition, touch etc. Neither the Piagetian nor the behaviourist theory takes into consideration that the infant has any innate structures or domain specific knowledge. Each grants only some domain – general, biologically specified processes: for the Piagetians, a set of sensory reflexes and three functional processes (assimilation, accommodation, and equilibration. Piaget sees the infants mind as assailed by 'undifferentiated and chaotic inputs (Piaget, 1955, as cited in Gupta and Richardson) is substantially the same. The nativist thesis sees the infant pre-programmed to make sense of specific information sources rather than one that has a chaotic mind.

In conclusion it can be seen that both Piaget's and Vygotsky's theories have had a significant effect on the way that children cognitive processes have been studied and they have also had a profound effect on education. It would be fair to say that Vygotsky did not reject all of the elements of Piaget's theory but took the weak areas and strengthened them by taking into consideration socio – cultural factors and

language for example. The connectionist modelling theory is domain specific and believes that children's minds are pre - programmed and organised. Children's minds are very complicated and not easy to study psychologically, but with these three different perspectives we are able to understand children's cognitive abilities better.

References:

Inhelder and Piaget, (1958), as cited in 'Children's Cognitive and Language Development, Gupta, P and Richardson, K (1995), Blackwell Publishers Ltd in association with the Open University.

Light P and Oates, J (1990) 'The development of Children's Understanding' in Roth, I (Ed) Introduction to Psychology, Vol 1, Hove, East Sussex, Psychology Press in association with the Open University.

Glassman (1999) as cited in 'Cognitive Development' in Gross, R and McIlveen, Psychology a New Introduction, Hodder and Stoughton.

Gupta and Richardson, 1995, Children's Cognitive and Language Development, Blackwell Publishers Ltd in association with the Open University.

Smith et al, 1998, as cited in 'Children's Cognitive and Language Development, Gupta, P and Richardson, K (1995), Blackwell Publishers Ltd in association with the Open University.

Vygotsky, L.S. (1988) 'The genesis of higher mental functions' in Richardson, K and Sheldon, S. (eds) Cognitive development to Adolescents, Hove, Erlbaum.