

# COGNITIVE TRANSITIONS

## Difference Between Children and Adolescents

1. During adolescence individuals become better able to think about what is possible.
2. Adolescents become better able to think about abstract things.
3. Adolescents tends to think in multidimensional ways, i.e., understanding things with deeper understanding of the complexity of an issue or the multiple ways in interpreting a statement, like sarcasm.
4. Adolescents as a group are more likely than children to see things to relative turns than in black and white.
5. During adolescence individuals tend to have the capacity to attend to the process of thinking. That is, to think about their thinking processes. This is called Metacognition

## **Metacognition**

**Objective level:** thoughts regarding the external world

**First meta level:** concurrently reflecting on one's thinking about some objective level matter

**Second metal level:** concurrently thinking about one's thinking about how the mind is functioning as it thinks about some external matter.

**Deductive Reasoning.  
Inductive Reasoning**

**Jean Piaget View: Formal Operations**

**Information-Processing View**

1. Increased Attention and Divided Attention
2. More affective working memory and long term memory
3. Increased mental processing speed
4. Ability to Organize
5. The development of metacognition

“Unlike the von Neumann architecture of the programmable digital computer, the brain intermixes memory elements in the form of modifiable interconnections within the computational substrate, the neuronal membrane. Thus, no separate memory ‘fetch’ and ‘store’ cycles are necessary.” Koch and Hepp P612

Robbie Case  
Automatization

**Adolescent as Scientist**

A central premise underlying science is that scientific theories stand in relation to actual or potential bodies of evidence against which they can be evaluated.

Reciprocally, scientific “facts” stand in relation to one or more actual or potential theories that offer a vehicle for their organization and interpretation. . . .Research. . .has shown that children [adolescents] and adults hold a variety of naive, intuitive conceptions, usually misconceptions—about how the world works. These conceptions, although they are wrong, have been shown to be powerful and remarkably resistant to instruction, so that science educators must conceive of their tasks as making contact with these incorrect conceptions and working to modify them rather than superimposing new, correct concepts. Kuhn 1989, pp 674-675

## **Ventromedial prefrontal cortex**

Antonio Damasio

When one is attempting to focus in on a salient detail or has to make a decision based on one's accumulated knowledge, the ventromedial prefrontal cortex would activate an affective signal as a response to the specific bit of knowledge needed. This signal would occur because the knowledge had been paired with a remembered outcome and the emotion associated with that outcome. Gut feelings, *ah-hah* experiences, hunches, *it doesn't feel right* awarenesses, and intuition would be more evident and overt examples of this. Damasio proposes, though, that this process is more often than not covert. Either way this emotional linkage allows for a more efficient and effective decision making process than could be realized purely through high reason, i.e., pure intellect.

Without such a mechanism...options and outcomes become virtually equalized and the process of choosing will depend entirely on logic operations over many option-outcome pairs. The strategy is necessarily slower and may fail to take into account previous experiences. This is the pattern of slow and error-prone decision behaviour we often see in ventro-medial frontal lobe patients [and children]. Random and impulsive decision making is a related pattern (Damasio, 1996, p. 1415).

## **Synaptic Pruning**

### **Adolescent Risk Taking: Dietrich Dorner**