**Attention and Consciousness**

**1. Definition**

 Attention is the means by which we actively process a limited amount of information from the enormous amount of information available through our senses, our stored memories, and our other cognitive processes (De Weerd, 2003a). It includes both conscious and unconscious processes. In many cases, conscious processes are relatively easy to study. Unconscious processes are harder to study, simply because you are not conscious of them (Jacoby, Lindsay, & Toth, 1992).

 Attention allows us to use our limited mental resources judiciously. By dimming the lights on many stimuli from outside (sensations) and inside (thoughts and memories), we can highlight the stimuli that interest us. This heightened focus increases the likelihood that we can respond speedily and accurately to interesting stimuli.



**Figure (1): How does attention work? (Sternberg, 1998)**

**2. Kinds of attention**

There are the four main functions of attention:

**2.1. Signal detection and vigilance**

 We try to detect the appearance of a particular stimulus. Air traffic controllers, for example, keep an eye on all traffic near and over the airport. For example, we may try to detect unwelcome sights or sounds; or following an earthquake, we may be wary of the smell of leaking gas or of smoke.

**2.2. Search**

We try to find a signal amidst distracters, for example, when we are looking for our lost cell phone on an autumn leaf-filled hiking path. For example, If we detect smoke (as a result of our vigilance), we may engage in an active search for the source of the smoke. In addition, some of us are often in search of missing keys, sunglasses, and other objects.

**2.3. Selective attention**

We choose to attend to some stimuli and ignore others, as when we are involved in a conversation at a party. For example, we may pay attention to reading a textbook or to listening to a lecture while ignoring such stimuli as a nearby radio or television or latecomers to the lecture.

**2.4. Divided attention**

We prudently allocate our available attentional resources to coordinate our performance of more than one task at a time, as when we are cooking and engaged in a phone conversation at the same time. For example, experienced drivers easily can talk while driving under most circumstances, but if another vehicle seems to be swerving toward their car, they quickly switch all their attention away from talking and toward driving.

**3. Factors that Influence our Ability to Pay Attention**

There are many variables that have an impact on our ability to concentrate and pay attention. Here are some of them:

**3.1. Anxiety**: Being anxious, either by nature (trait-based anxiety) or by situation (state-based anxiety), places constraints on attention (Reinholdt-Dunne et al., 2009).

**3.2.** **Arousal:** Your overall state of arousal affects attention as well. You may be tired, drowsy, or drugged, which may limit attention. Being excited sometimes enhances attention (MacLean et al., 2009).

**3.3. Task difficulty**

 If you are working on a task that is very difficult or novel for you, you’ll need more attentional resources than when you work on an easy or highly familiar task. Task difficulty particularly influences performance during divided attention.

**3.4. Skills**

The more practiced and skilled you are in performing a task, the more your attention is enhanced (Spelke, Hirst, & Neisser, 1976).

**4. Habituation and Adaptation**

 Responses involving physiological adaptation take place mostly in our sense organs, whereas responses involving cognitive habituation take place mostly in our brains (and relate to learning).

**4.1. Habituation**

 It involves our becoming accustomed to a stimulus so that we gradually pay less and less attention to it. The counterpart to habituation is **dishabituation.** In **dishabituation,** a change in a familiar stimulus prompts us to start noticing the stimulus again. Both processes occur automatically. The processes involve no conscious effort. The relative stability and familiarity of the stimulus govern these processes. Any aspects of the stimulus that seem different or novel (unfamiliar) either prompt dishabituation or make habituation less likely to occur in the first place. For example, suppose that a radio is playing instrumental music while you study your cognitive psychology textbook. At first the sound might distract you. But after a while you become habituated to the sound and scarcely notice it. If the loudness of the noise were suddenly to change drastically, however, immediately you would dishabituate to it. The once familiar sound to which you had been habituated would become unfamiliar. It thus would enter your awareness (Castellucci & Kandel, 1976).

**4.2. Sensory adaptation**

 It is a lessening of attention to a stimulus that is not subject to conscious control. It occurs directly in the sense organ, not in the brain. We can exert some conscious control over whether we notice something to which we have become habituated, but we have no conscious control over sensory adaptation. For example, we cannot consciously force ourselves to smell an odor to which our senses have become adapted. Nor can we consciously force our pupils to adapt—or not adapt—to differing degrees of brightness or darkness. In contrast, if someone asked us, “Who’s the lead guitarist in that song?” we can once again notice background music (Schneider & Shiffrin, 1977).

**5. Automatic and Controlled Processes**

There is probably a continuum of cognitive processes, from fully controlled processes to fully automatic ones.

**5.1. Automatic processes**

 For the most part, they are performed without conscious awareness. Nevertheless, you may be aware that you are performing them. They demand little or no effort or even intention. Multiple automatic processes may occur at once, or at least very quickly, and in no particular sequence. Thus, they are termed parallel processes (Palmeri, 2003). Three attributes characterize automatic processes (Posner & Snyder, 1975).

* **First,** they are concealed from consciousness.
* **Second**, they are unintentional.
* **Third,** they consume few attentional resources.

**5.2. Controlled processes**

They are accessible to conscious control and even require it. Such processes are performed serially, for example, when you want to compute the total cost of a trip you are about to book online. In other words, controlled processes occur sequentially, one step at a time. They take a relatively long time to execute, at least as compared with automatic processes. The following table summarizes the characteristics of controlled versus automatic processes.



**Figure (02): Controlled versus Automatic Processes (Sternberg, 1998)**

**6. Consciousness**

 At one time, psychologists believed that attention was the same thing as consciousness. Now, however, they acknowledge that some active attentional processing of sensory and of remembered information proceeds without our conscious awareness (Bahrami et al., 2008). For example, writing your name requires little conscious awareness. You may write it while consciously engaged in other activities. In contrast, writing a name that you have never encountered requires attention to the sequence of letters. Consciousness includes both the feeling of awareness and the content of awareness, some of which may be under the focus of attention (Bourguignon, 2000; Taylor, 2002).

Conscious attention serves three purposes for cognition.

1. It helps in monitoring our interactions with the environment. Through such monitoring, we maintain our awareness of how well we are adapting to the situation in which we find ourselves.
2. It assists us in linking our past (memories) and our present (sensations) to give us a sense of continuity of experience. Such continuity may even serve as the basis for personal identity.
3. It helps us in controlling and planning for our future actions. We can do so based on the information from monitoring and from the links between past memories and present sensations.

**7. Deficits in Perception**

 Clearly, cognitive psychologists learn a great deal about normal perceptual processes by studying perception in normal participants. However, we also often gain understanding of perception by studying people whose perceptual processes differ from the norm (Farah, 1990). In the following sections, we will consider two examples of failing attention: attention deficit hyperactivity disorder and change/inattentional blindness.

**7.1. Attention Deficit Hyperactivity Disorder (ADHD)**

 People with attention deficit hyperactivity disorder **(ADHD)** have difficulties in focusing their attention in ways that enable them to adapt in optimal ways to their environment (Swanson et al., 2003). The three primary symptoms of ADHD are: inattention, hyperactivity (i.e., levels of activity that exceed what is normally shown by children of a given age), and impulsiveness.

Children with the inattentive type of ADHD show several distinctive symptoms:

# They are easily distracted by irrelevant sights and sounds.

* They often fail to pay attention to details.
* They are susceptible to making careless mistakes in their work.
* They often fail to read instructions completely or carefully.
* They are susceptible to forgetting or losing things they need for tasks, such as

 pencils or books.

* They tend to jump from one incomplete task to another.

**7.2. Change Blindness and Inattentional Blindness**

 It is the inability to detect changes in objects or scenes that are being viewed (Galpin et al., 2009). Closely related to change blindness is inattentional blindness, which is a phenomenon in which people are not able to see things that are actually there (Bressan & Pizzighello, 2008).

**7.3. Spatial Neglect—One Half of the World Goes Amiss**

 It is an attentional dysfunction in which participants ignore the half of their visual field that is contralateral to (on the opposite side of) the hemisphere of the brain that has a lesion. It is a result mainly of unilateral lesions in the parietal and frontal lobes, most often in the right hemisphere (Hillis, 2005)