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Homework 8: Reafference Principle
10 Points: Due at beginning of class, Thursday, 23 April 2015

There are two parts to this homework assignment. Each part counts 5 points. Late homework will receive a grade of zero.

Part 1:

The visual world appears stable when you voluntarily move your eyes, yet it appears to move when the eyes are moved passively. According to the "Reafference Theory" of Erich von Holst, this normal stability is achieved by comparing the afferent information coming in from a sensory system with an internal copy (the efferent copy) that is generated when a voluntary motor command is given. The perceiver experiences the difference between the afference (AF) and the efferent copy (EC). Afference has two components: exafference and reafference. The efferent copy is a copy of the expected reafference. Thus in the normal situation, when afference is composed entirely of reafference, no movement will be experienced when the eyes are moved voluntarily because the efferent copy will be identical to the afference so when the efferent copy is subtracted from the afference, the difference will be zero.

Assume that your motion detection system gives a negative signal when objects move to the left, a positive signal when objects move to the right, and zero signal when objects are stationary (with the eyes stationary). Assume also that the magnitude of the signal is equal to the distance of the movement (e.g., -10 means an object moved ten degrees to the left). Make a table giving the expected values of the afference (AF), efferent copy (EC), and the difference between them (afference - efferent copy) for the following four conditions:

1. eyes stationary, object moves to left 5 degrees;
2. eyes stationary, object moves to right 3 degrees;
3. eyes move to right 5 degrees, object is stationary;
4. eyes move to left 5 degrees, object moves to right 3 degrees.

	AF	EC	AF-EC
1			
2			
3			
4			

Part 2:

Assuming the same motion detection system as above, what will be the values of afference, efferent copy, and difference when viewing a stationary object and attempting to move your eyes to the right by 7 degrees when your eyes are paralyzed (they cannot and do not move)? Assuming that you perceive the difference signal, what will you perceive when you try to move your paralyzed eyes to the right? Why?

AF	EC	AF-EC