**Project Title:** Oculomotor Reflexes as a Test of Visual Dysfunctions in Cognitively Impaired Observers  
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**Objective:** The proposed study aims to develop a battery of tests to diagnose visual dysfunctions in cognitively impaired observers based on their oculomotor reflexes.  

**Background:** Oculomotor reflexes include eye movements, the pupillary reflex (change of the pupil size), accommodation (change of the lens shape), and eyelid movements (e.g. blinks). These reflexes are extremely robust, they are present at birth and are extinguished with death only. Although reflexes are usually thought of as very low-level responses, the oculomotor responses reflect a variety of mental processes. The optokinetic reflex (periodic eye movements caused by drifting stimuli) and the orienting reflex (rapid eye movement to a salient object) have been used to study vision in infants and mentally impaired adults. The pupillary reflex has been used successfully as a diagnostic tool in a host of applications ranging from pain studies to marketing research on the efficacy of TV commercials.  

**Study Design:** The following oculomotor reflexes are well suited for the project: the optokinetic reflex, the orienting reflex, and the pupillary reflex. These reflexes can be triggered by a variety of visual stimuli, and depending on the complexity of the stimulus the reflexes can be used to diagnose a wide range of visual dysfunctions from optic nerve damage to the ability to recognize faces. Although it is possible to suppress the optokinetic and orienting reflexes intentionally it is quite hard to avoid them completely. The pupillary reflex cannot be cognitively controlled, so it can be used to diagnose both psychosomatic dysfunctions and malingering.  

**Specific Aims:** The proposed project embodies a full research and development cycle:  
1. Establish the most effective stimuli for testing various kinds of visual dysfunctions  
2. Design of a hardware testing kit suitable for use by non-specialists  
3. Test the kit for a large number of normal observers and observers with visual and cognitive impairments  

**Relevance:** After a short training course, the kit could be used at army posts and local hospitals to make a quick initial diagnosis.