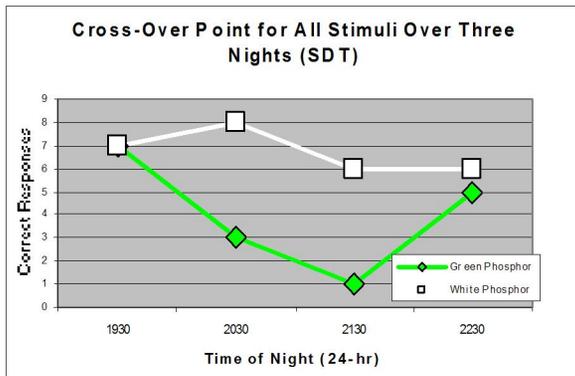
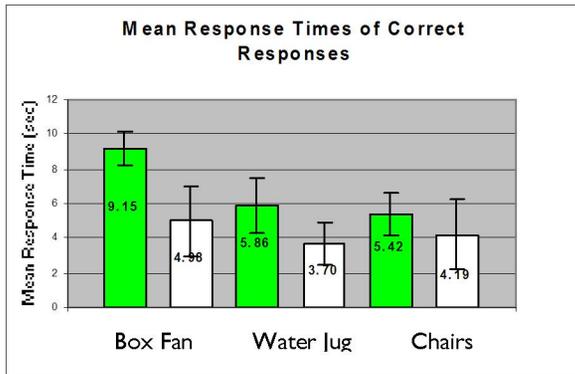
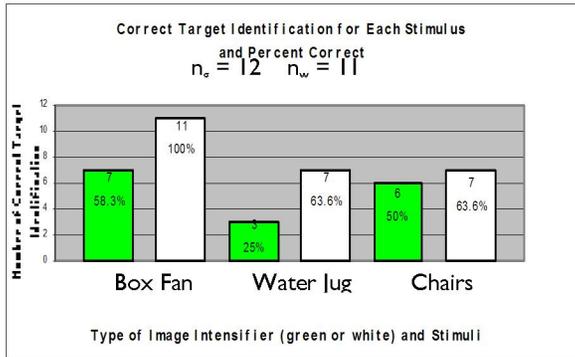


Results



Response Time and Correct Target Identification

Source	F-statistic	p-value
Box Fan	3.33	0.087
Water Jug	3.26	0.108
Camp Chairs	1.12	0.312
All 3 Stimuli	8.78	0.005

Discussion

SWIR must undergo more extensive evaluation and research in a laboratory and field setting. The head-mounted sensors should be designed with an IR illuminator that operates within the SWIR frequency (.5-2.5 microns).

Between the white phosphor I² and green phosphor I², there was no statistically significant difference between for each individual target stimulus; however, there was a statistically significant difference between green and white phosphor I² when all three stimuli were combined. Therefore, target identification and response time was better overall using white phosphor I² as opposed to green phosphor I².

There was also no significant difference with the effects of time of night between both sensors. Because this is a field experiment, it is difficult to extrapolate the data due to varying atmospheric and environmental conditions. Hence, future studies should observe the performance of the sensors from dusk until dawn.

Though white phosphor I² provides better clarity and contrast than green phosphor I², which was indicative through the faster response time and better accuracy, it is much more expensive to manufacture and distribute to troops.

Questions about night vision?

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Human Factors Associated with Short-wave Infrared and Image Intensifier Night Vision Devices



See the Night, Own the Night!

A service provided by the

Engineering Psychology Program

Cadets Edward Anderson ('07) & Bryan Bhark ('07)

Importance of Research

The use of night vision technology in our military has proven significant to winning decisive battles against our enemies. The ability to see with limited illumination has given our Army a marked tactical and strategic advantage. The most currently used night vision device is the Gen III green phosphor Image Intensifier and white phosphor Image Intensifier. These current models, while very reliable through many years of use, must rely on ambient light sources. The Short-wave Infrared (SWIR) night vision device is a new technology that utilizes the infrared portion of the electromagnetic spectrum. SWIR essentially allows the user to effectively distinguish objects in a low-light environment by presence of nightglow.

With the addition of this new technology, one cannot merely assume that it is superior to current night vision devices. It is important to test SWIR's reliability in the realm of Human Factors Engineering. The integration of SWIR into the military is almost certain if we determine that it is significantly better than current night vision technology.

The purpose of this study is to determine the most optimal conditions in which to employ SWIR and I² and which sensor performs better during various nighttime conditions. The metrics used to determine the cross-over point will be correct target identification, response time, and time of night.

Methods

- Initial experiment indicates that this specific SWIR sensor is unusable and ineffective. Therefore, the focus of the experiment shifted to Green Phosphor I² and White Phosphor I².
- 23 Freshman Participants
- Between-subjects design: 11 assigned White Phosphor I², 12 assigned Green Phosphor I².
- Three Stimulus Lanes: Box Fan, Water Jug, and Two Camp Chairs.
- All stimuli arranged 50ft from participants.
- Staggered report times for participants (1930, 2030, 2130, and 2230).
- Participants' goal will be to correctly identify the target stimuli as quickly as possible.
- Experimenters will measure accuracy of target identification and response time in regards to the time of night.

For more information, contact:

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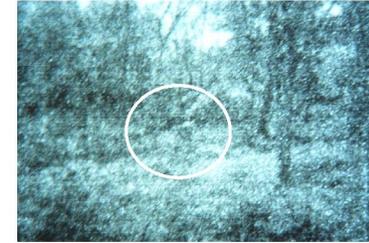
On the Web:

<http://www.dean.usma.edu/departments/bsl>

SWIR vs. Green and White I²

Water Jug Stimuli

SWIR



Green Phosphor



White Phosphor



SWIR's Performance???

SWIR performed poorly in all conditions. The absence of an IR illuminator and sufficient nightglow caused a severe degradation in image quality and contrast sensitivity. SWIR was not able to identify any of the targets. The water jug, which was the first target used, is above for comparison between the three sensors.

Due to this incident, we chose to test cross-over effects and response time using white phosphor and green phosphor I². SWIR requires more extensive research because it failed in all conditions.