Safety Box - Be Sharp Not Complacent!
September 16, 2013

We are well into the 2013 soaring season so we want to guard against complacency. Everything has been going well, we feel good, our skills are sharp and we are busy having fun! Any chance we might be just a little too confident, too relaxed?

A good pilot is always asking him/herself, "What happens next?" This habit allows the pilot to anticipate what actions will be necessary in the next several minutes and to perform as many of them ahead of time as possible. This allows us time after checking the gizmos, say 15 seconds, to spend the next 45 seconds looking for traffic and maybe at that majestic Elk or Moose on the rocks we are polishing also.

A few reminders of what's involved in the VFR flying we are doing. After we make sure there's a safe place to land and we won't become part of the mountain etc. our primary responsibility is to see and avoid other traffic. Pretty simple, right? Or not?

14 CFR 91.113, Right-of-Way Rules: Except Water Operations, sets forth the see-and-be-seen concept. This rule requires that each person operating an aircraft maintain vigilance for other traffic at all times (weather conditions permitting) in flights conducted under both IFR and VFR.

Fact is most midair collision (MAC) accidents and near midair collision (NMAC) incidents occur during good day-VFR weather conditions. Studies have shown that the minimum time required for a pilot to spot traffic, identify it as a collision threat, react, and have the sailplane respond is 12.5 seconds.

Scenario: Two aircraft are approaching head-on, and visual detection is made at 3 NM. If the aircraft are converging at a speed of 200 kt., each pilot has 54 sec. to react to avoid a collision.

D = Distance, R = Rate, and T = Time

$D = R \times T$

$T = D/R$

$T = 3/200$

$T = 0.015 \text{ hours} \times 60 = 0.9 \text{ minutes} \times 60 \text{ seconds} = 54 \text{ seconds}$

If the aircraft are converging at a speed of 300 kt., each pilot has 36 sec. to react to avoid a collision.

D = Distance, R = Rate, and T = Time

$D = R \times T$

$T = D/R$

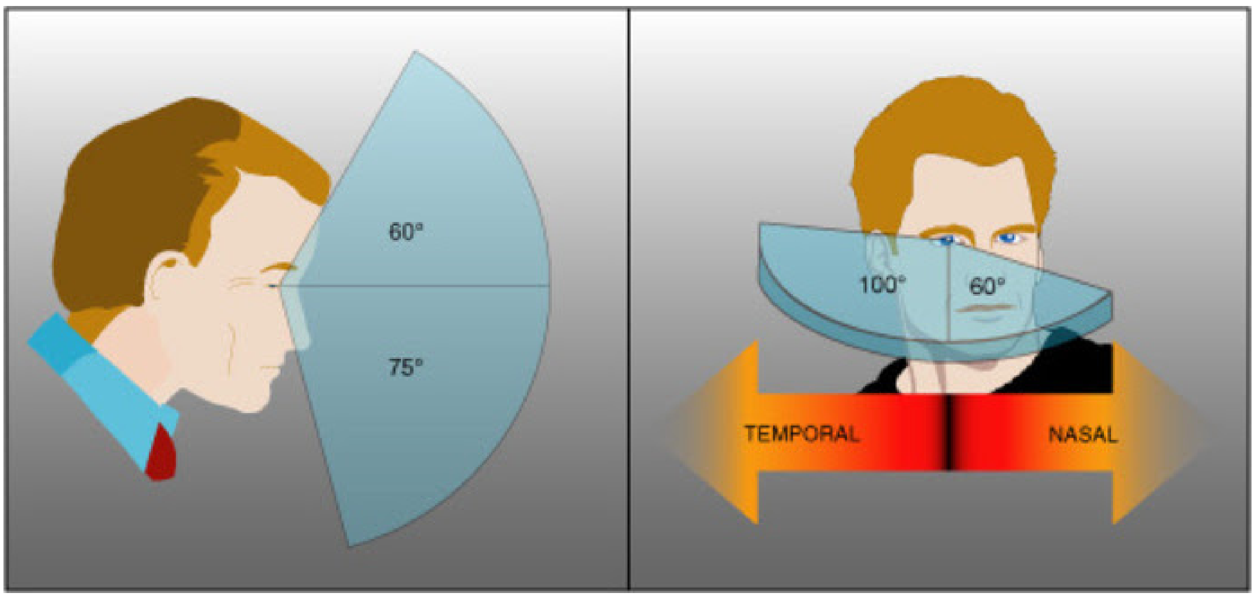
$T = 3/300$

$T = 0.01 \text{ hours} \times 60 = 0.6 \text{ minutes} \times 60 \text{ seconds} = 36 \text{ seconds}$

Remember during daylight, an object can be seen best by looking directly at it while scanning so let's revisit our eyes:

Our eye contains the fovea. The **fovea** is a small, notched area of the retina that is located directly behind the lens. This area contains cones only. It takes about 10 seconds for the eyes to adjust to changing sunlight by the way. The fovea is the area of sharpest vision.

Thus, when looking directly at an object, the eye focuses the image mainly on the fovea. The normal field of vision for each eye is about 135° vertically and about 160° horizontally, as shown below.

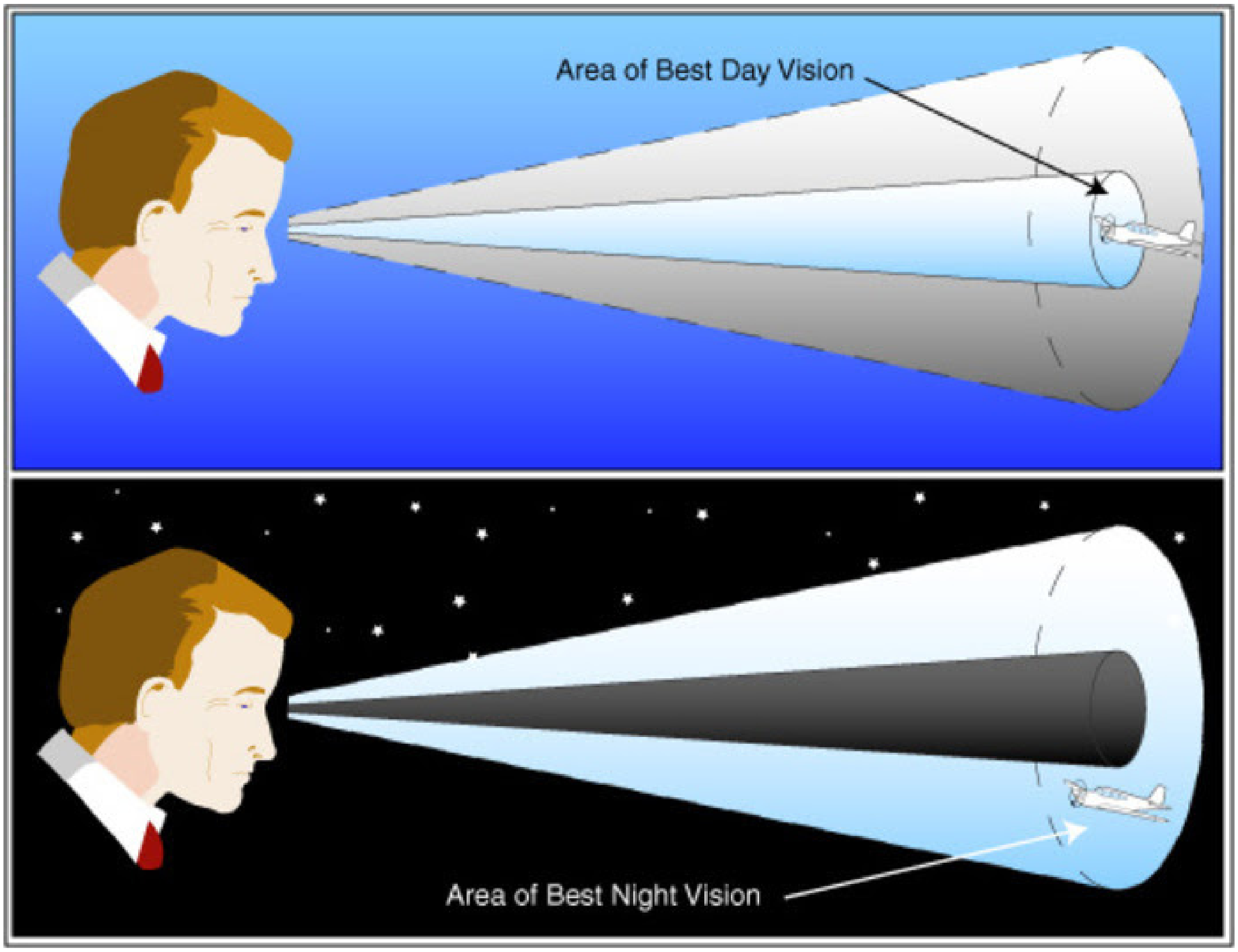


The fovea's vision is concentrated in the central 1° area of this field. Our visual acuity (detail) drops off rapidly outside of the fovea's field of vision.

a. EXAMPLE: Outside of a 10° cone (centered on the fovea cone) a pilot will see only about one-tenth of what he can see in the fovea cone.

b. Put in terms of its effect on collision avoidance, this fact means that an aircraft that can be seen in the fovea cone when 5,000 ft. away must be as close as 500 ft. to be detected with peripheral vision.

c. We do not detect objects while the eyes are moving; they only work during the pauses.



Proper Visual Scanning Technique

While the eyes can observe an approximately 160°-wide arc of the horizon at one glance (see field of vision illustration above), only the fovea has the ability to send clear, sharply focused messages to the brain.

1. All other visual information that is not processed directly through the fovea will be of less detail.
    a. EXAMPLE: An aircraft at a distance of 7 mi. that appears in sharp focus within the fovea's center of vision would have to be as close as 0.7 mi. in order to be recognized if it were outside of the fovea's vision.
2. Because the eyes can focus only on this narrow viewing area, effective scanning is accomplished with a series of short, regularly spaced eye movements that bring successive areas of the sky into the central visual field.
    a. Each movement should not exceed 10°, and each area should be observed for at least 1 second to enable detection.

Peripheral vision is useful in spotting collision threats from other aircraft also.

1. Each time a scan is stopped and the eyes are refocused, the peripheral vision takes on more importance because it is through peripheral vision that movement is detected.
    a. Apparent movement is almost always the first perception of a collision threat.
    b. If another aircraft appears to have no relative motion, it is potentially on a collision course with you.
        1. An aircraft that appears to maintain a fixed position in your windshield may be traveling toward you, or away from you, with no significant visual indicators to tell which direction it is moving in.
        2. Moments before impact, the other aircraft shows no lateral or vertical motion but appears to be increasing in size, and evasive action must be taken immediately.

I hope you've stuck with me this far and that a refresher on the eye mechanics has been helpful.

Fly safe, have fun and may everyone experience long cloud streets with high bases and blue skies.

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