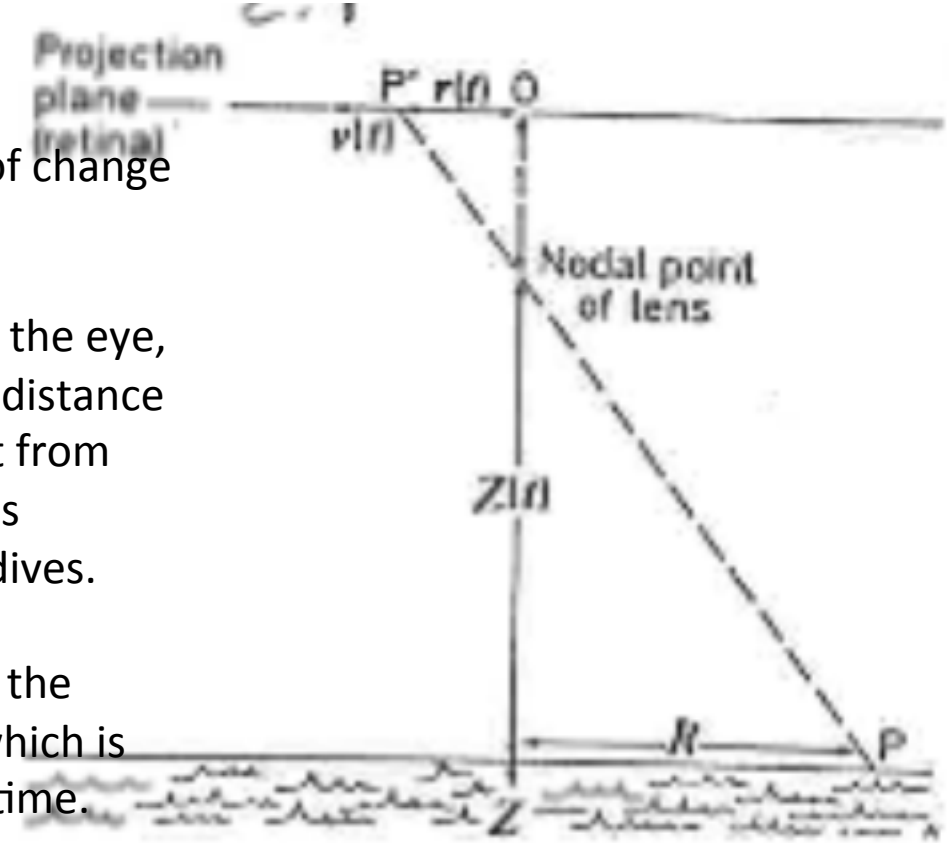
Diving Gannets

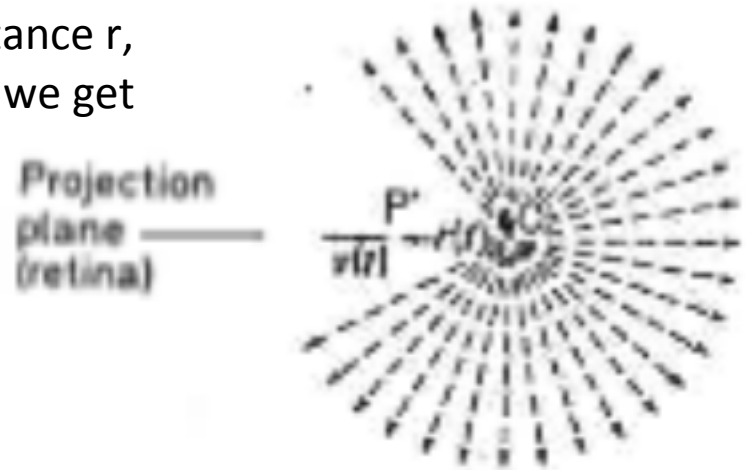
Tau = distance /rate of change of the same distance.

Here, the distance on the eye, corresponding to the distance of some texture point from the point of contact, is changing as the bird dives.

The rate of change of the distance is velocity, which is in units of distance / time.

If one divides the distance r, by its rate of change, we get something like =>





Distance / (Distance/ Time)

The distances cancel out and we are left with time.

THAT is what Lee calls Tau.

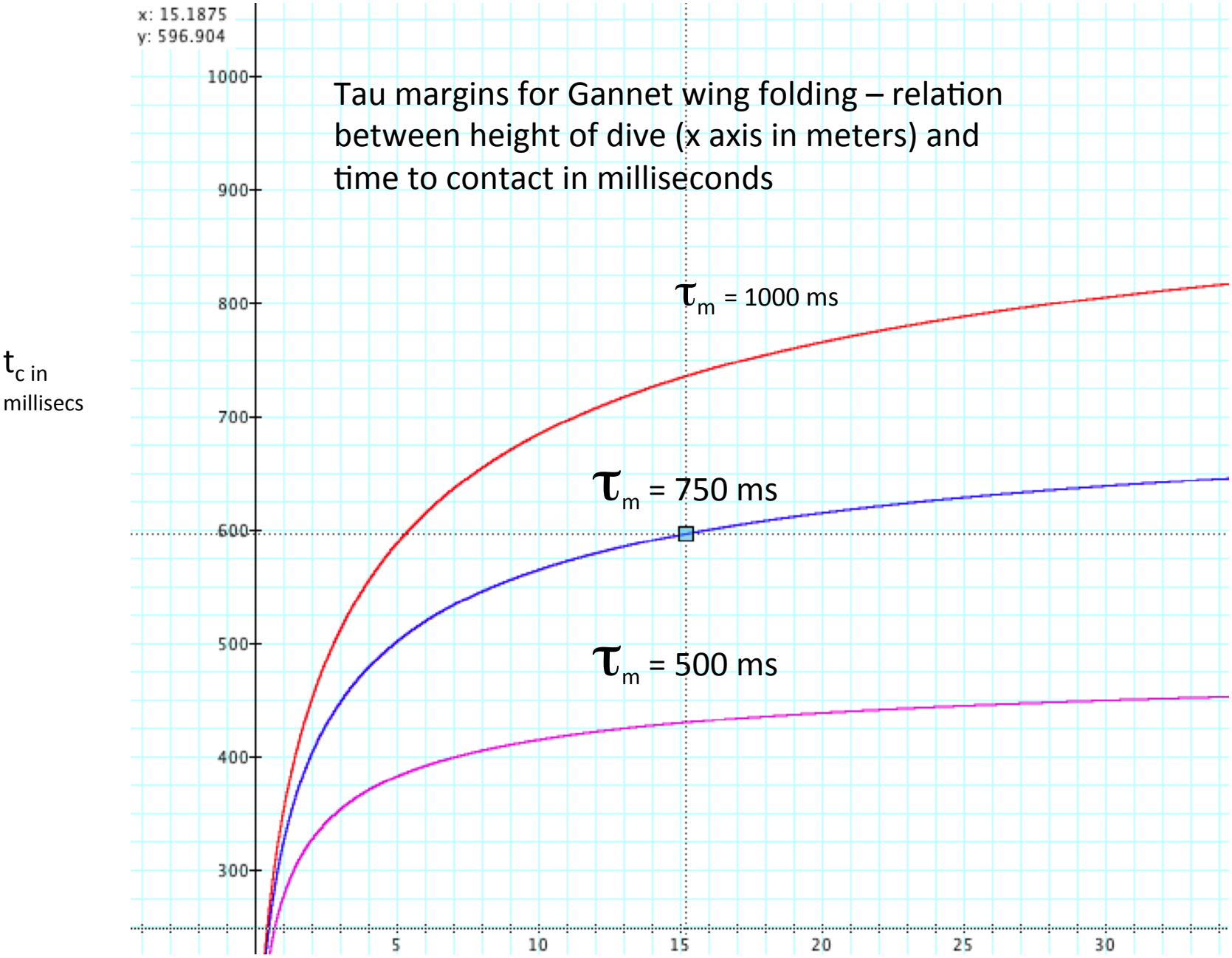
Point of Tau:

It yields Time-to-Contact without separately computing distance and velocity.
It is based strictly on optical properties.

SUMMARY -- τ = x/x dot

x is a distance ----BUT THIS DISTANCE CAN BE SIDEWAYS DISTANCE ON THE EYEBALL!
X dot is a velocity, which is distance / time --- like miles per hour or feet per second.

Then tau (τ) is distance / (distance/time)
[invert and multiply] = Distance x time/distance
For example, if a bird is 100 feet from a target and is going 100 feet per second, that is 100 / (100/1) = 100 x 1/100
100 / (100/1) = ~~100~~ x 1/~~100~~ = 1
The distances cancel out and only the time is left.
If the distance is 1000 feet and the velocity is 100 ft / sec, then tau is 10


x: 15.1875
y: 596.904
Tau margins for Gannet wing folding – relation between height of dive (x axis in meters) and time to contact in milliseconds
τ_m = 1000 ms
τ_m = 750 ms
τ_m = 500 ms
t_c in millisecs
1000
900
800
700
600
500
400
300
5
10
15
20
25
30