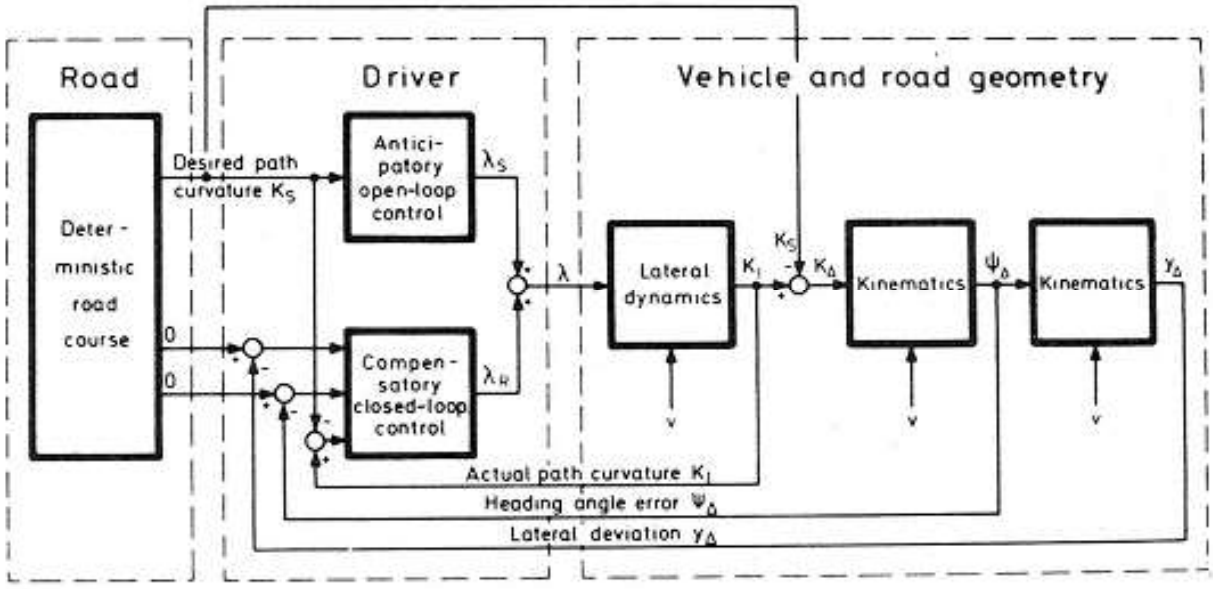
What we need

A model of steering control

- A model that processes information from the visual scene
- A motor system that converts steering intention into actions

Two-levels visual control of steering



Donges (1978), Human Factors

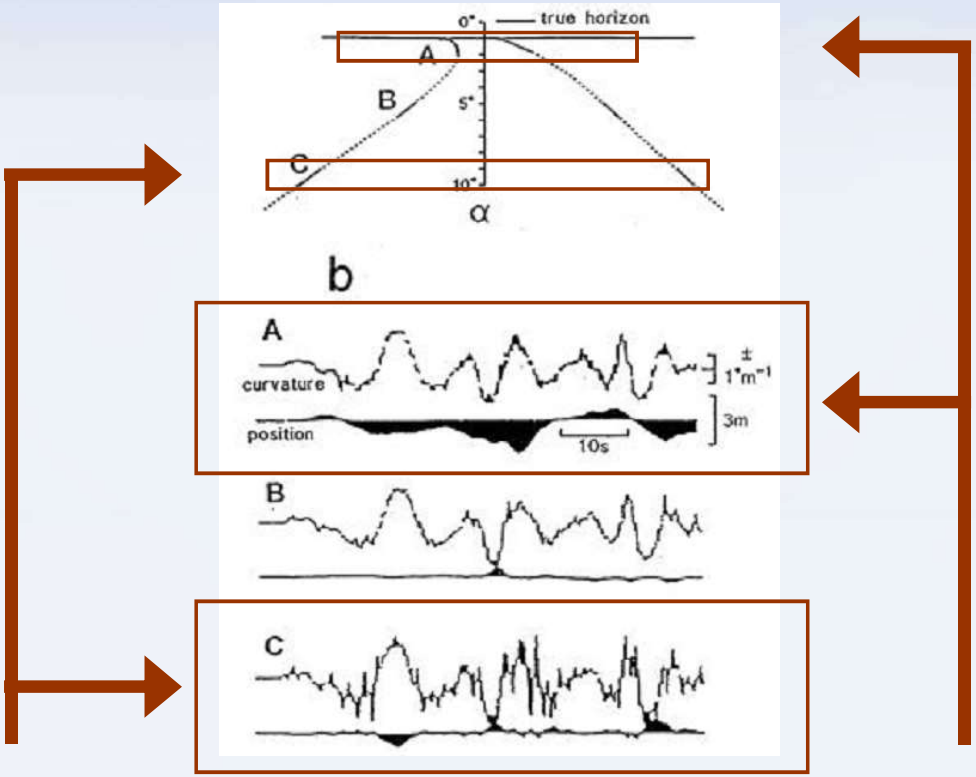
Anticipatory control

- anticipation of changes in road curvature
- fed by far visual information

Compensatory control

- on-line correction of lateral position errors
- fed by near visual information

Two-levels visual control of steering



Land & Horwood (1995), Nature

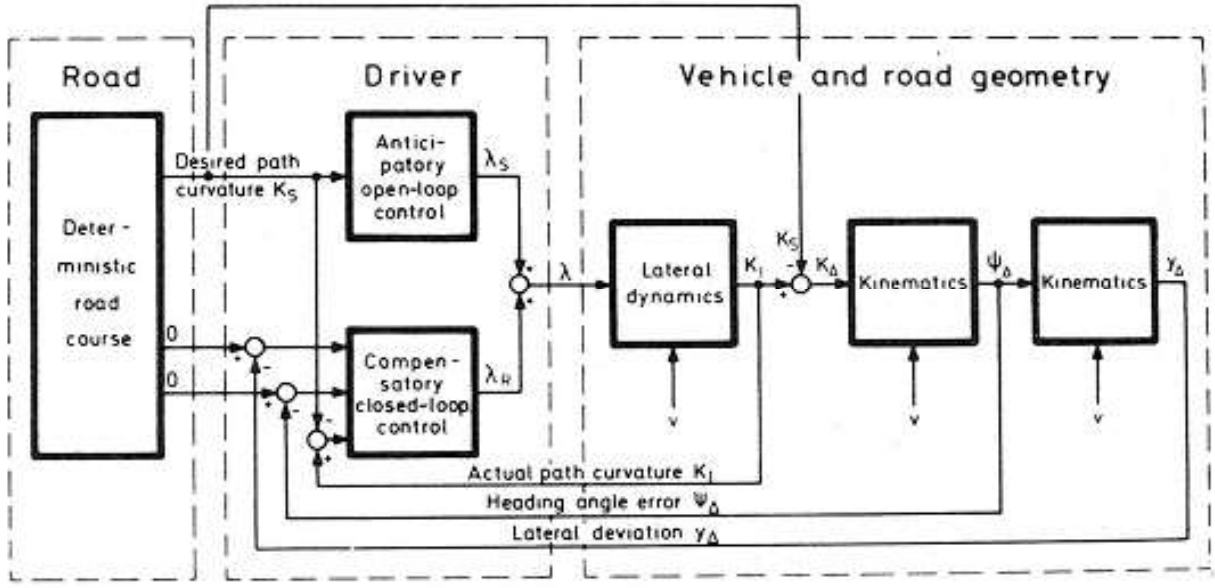
Compensatory control only

- few lateral deviations
- steering becomes jerky

Anticipatory control only

- large lateral errors
- smooth steering

Two-levels visual control of steering



Donges (1978), Human Factors

Anticipatory control

- fed by what?

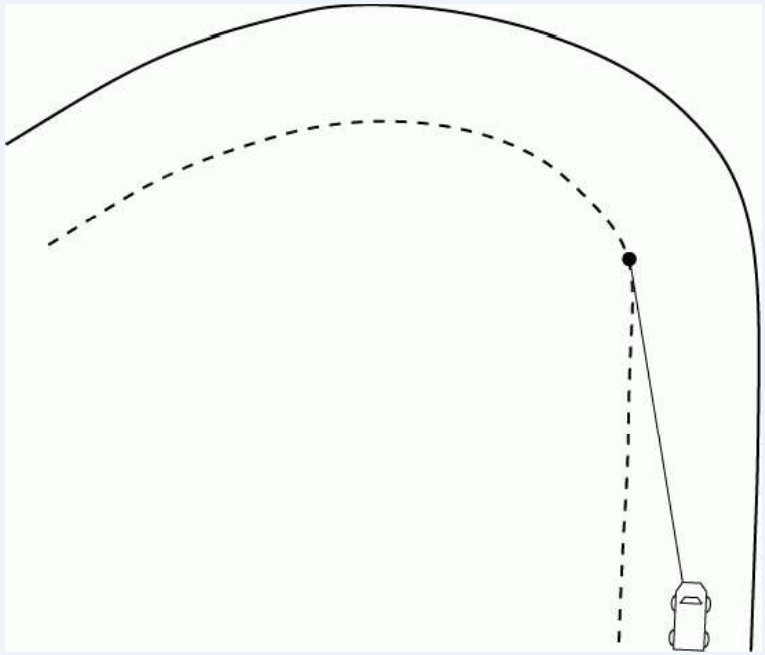
Compensatory control

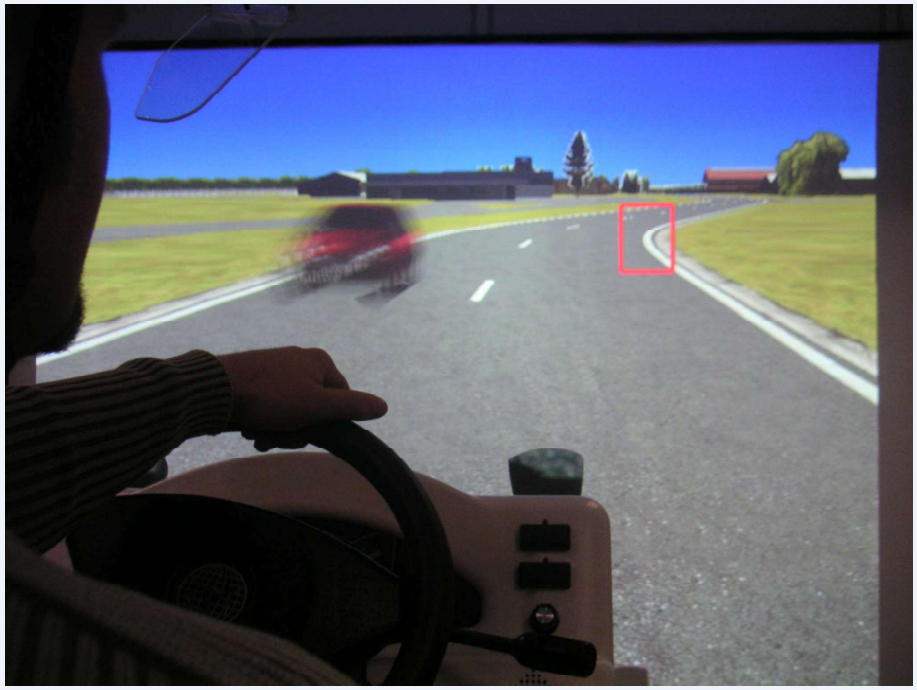
- fed by near peripheral vision

Which sensory cue for far vision?

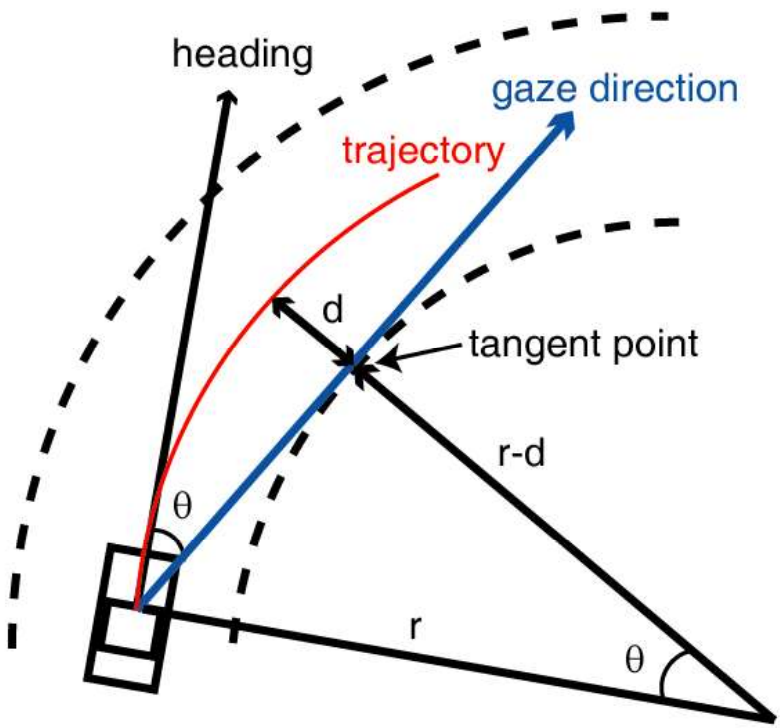
65% of glances are directed toward the tangent point

Land & Lee, Nature (1994)





Which sensory cue for far vision?



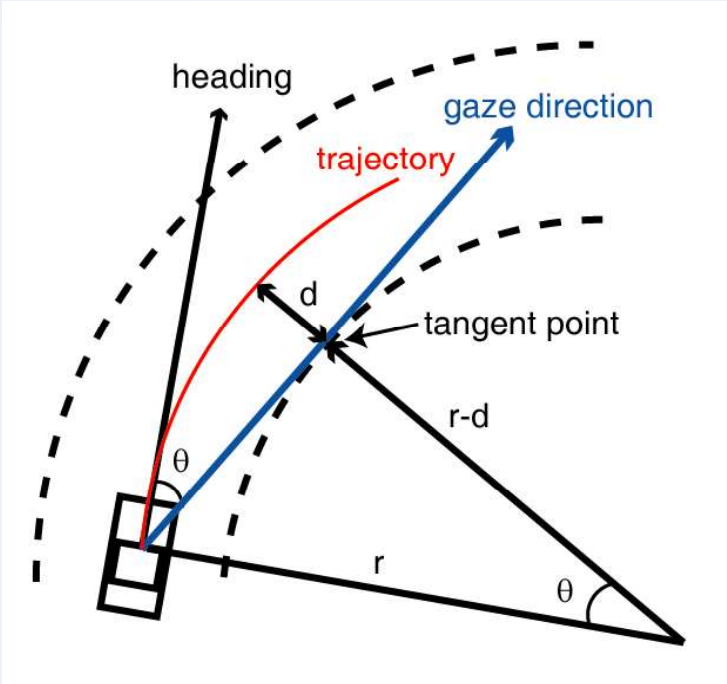
A simple geometrical relationship between the angle to the TP and the road curvature

Looking at the TP as a way to read the curvature at the sensorimotor level

Tracking any point that has the dynamics of the TP improves steering control *(Mars 2008, J. of Vision)*

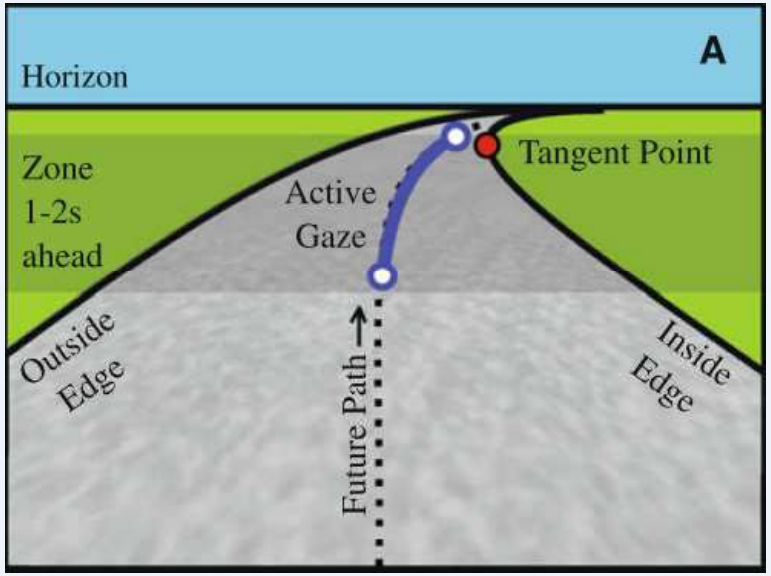
TP or not TP ?

Tangent point hypothesis



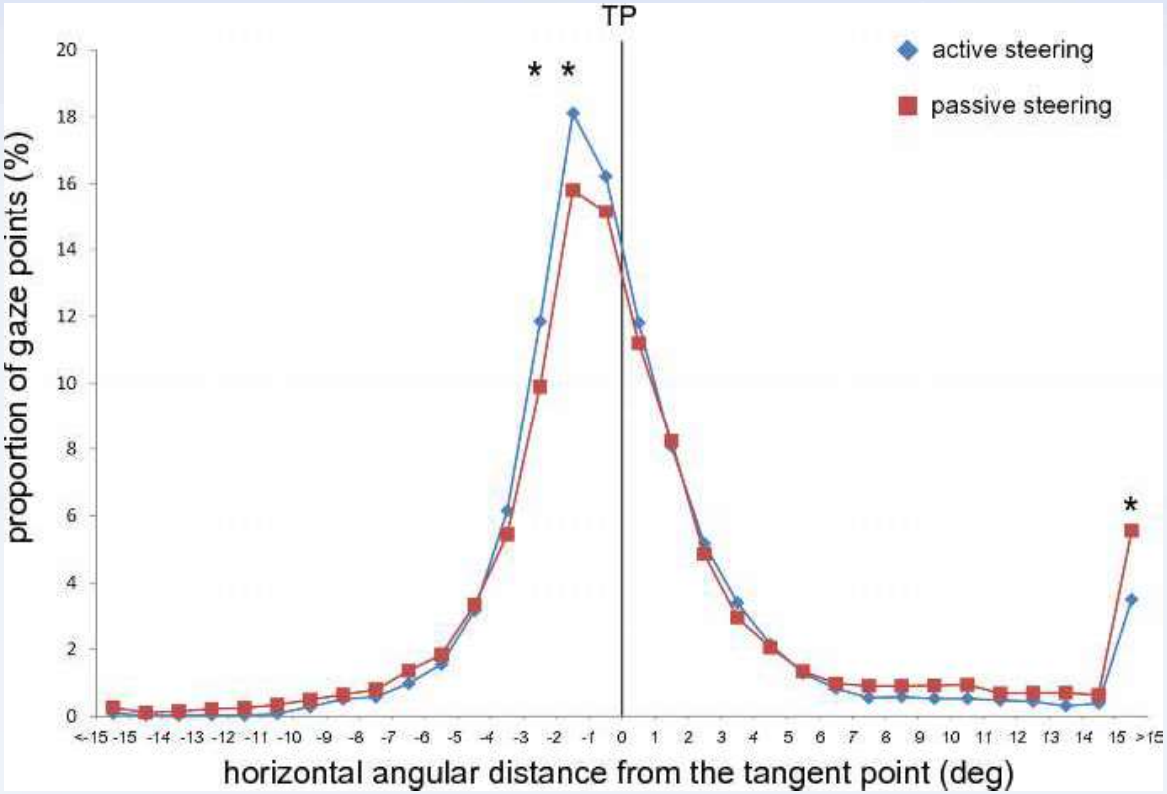
Land & Lee (1994), *Nature*

Future path hypothesis



Wilkie et al. (2010), *Experimental Brain Research*

Which sensory cue for far vision?

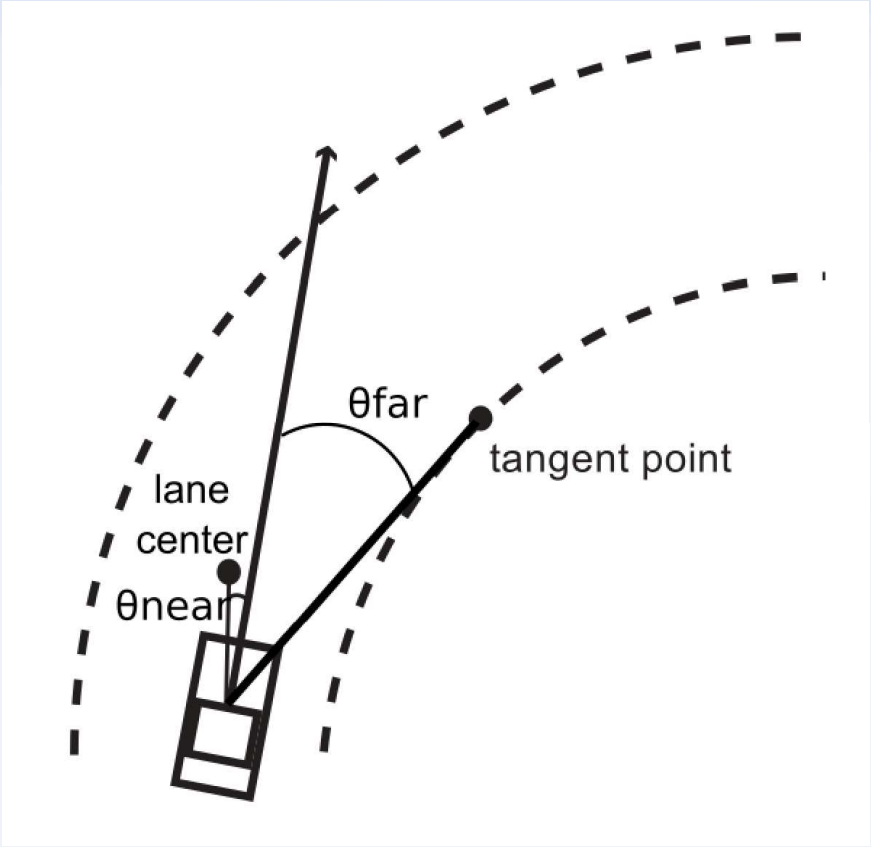


Mars & Navarro (2012), PLoS One

Gaze strategy = looking at the boundary of a safe trajectory envelope

The TP as an input to visual anticipation = a good enough approximation

Two visual inputs for the model



Salvucci & Gray (2002), Perception