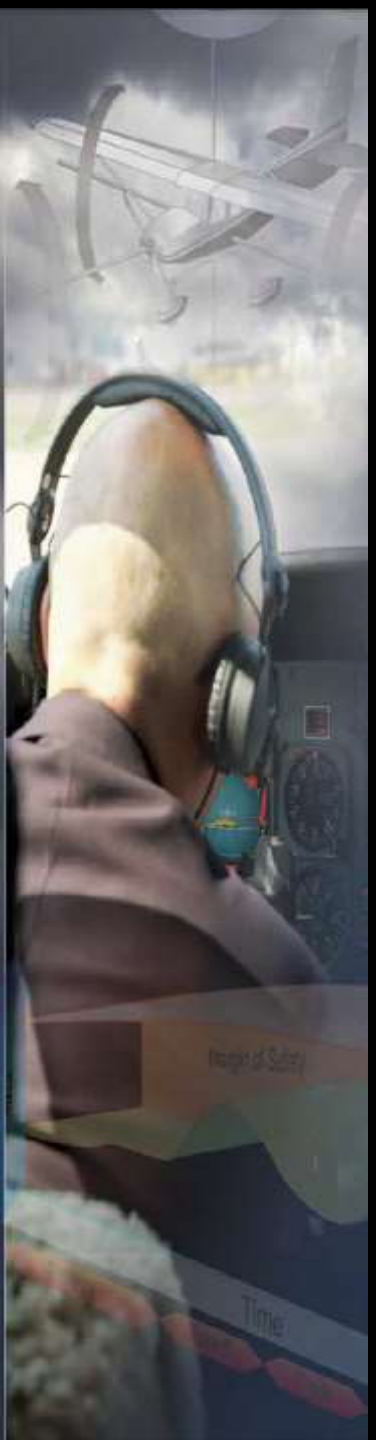
Black Hole Illusion(BHI) and Accidents

Course instructor：Chang Ming
E-mail：changming@snnu.edu.cn

School of Psychology,
Shaanxi Normal University

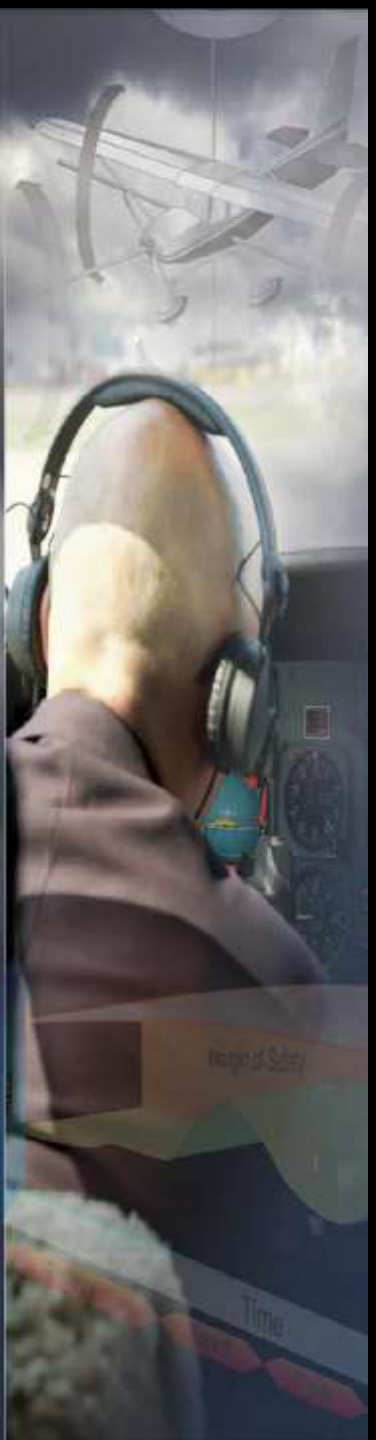


The accident happened not because people tried to fail, but people did not believe that the accident was going to happen.

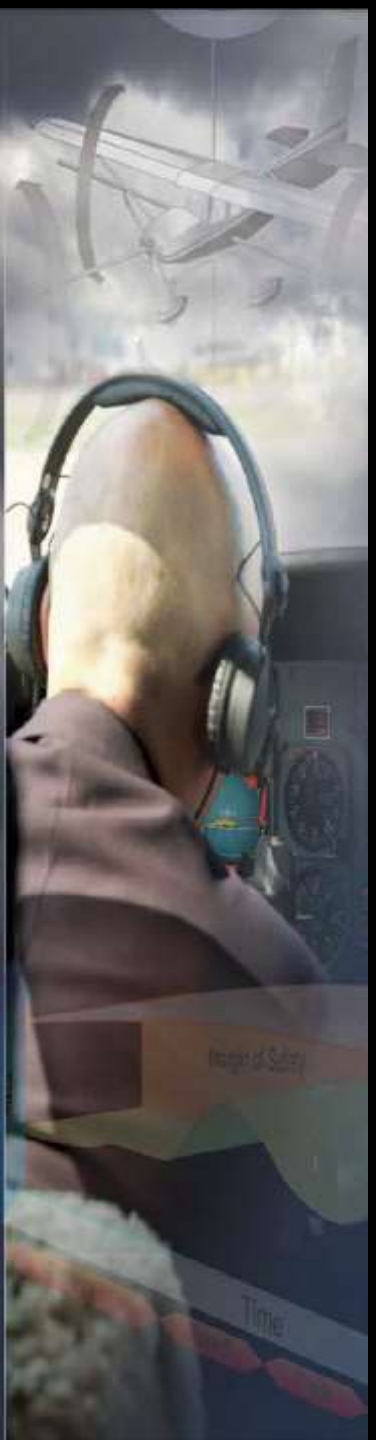
--Wagenaar & Groeneweg

Forced landing on Hudson River 2009.1.15

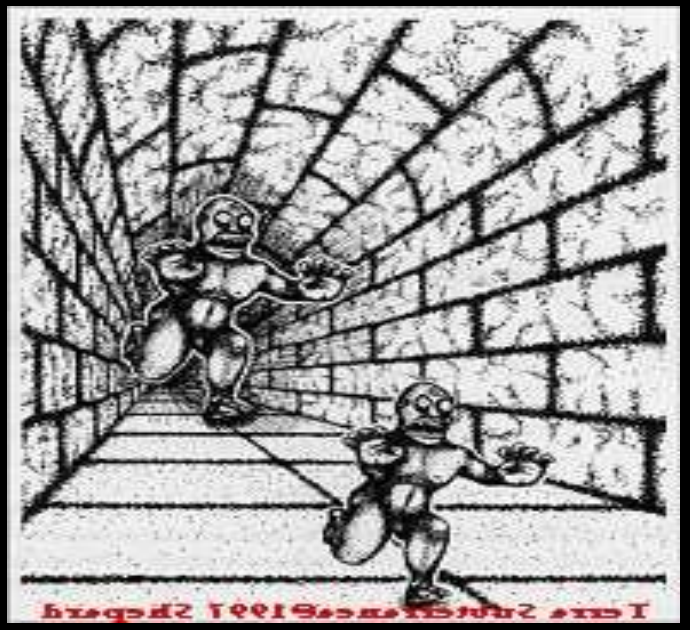
(video 1)

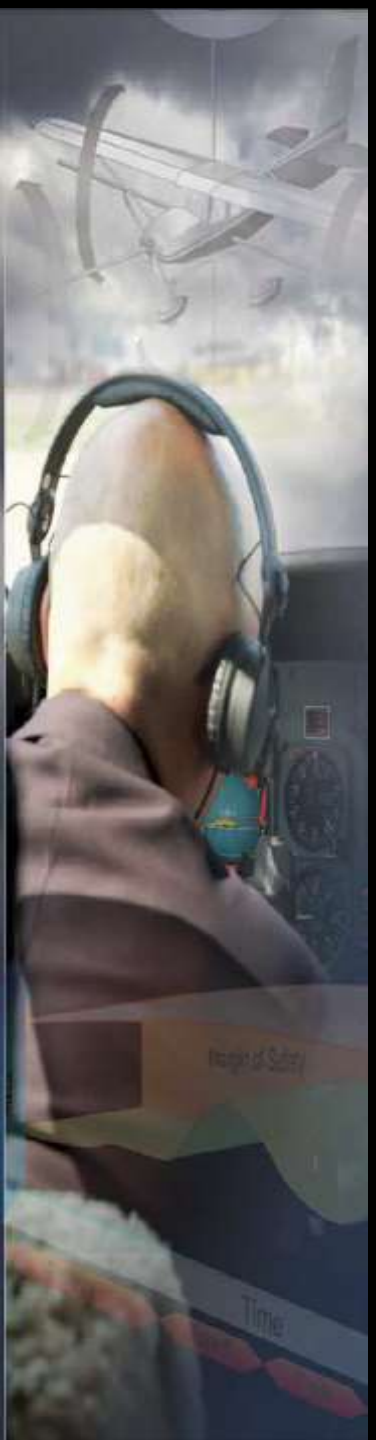


Warm up。。。

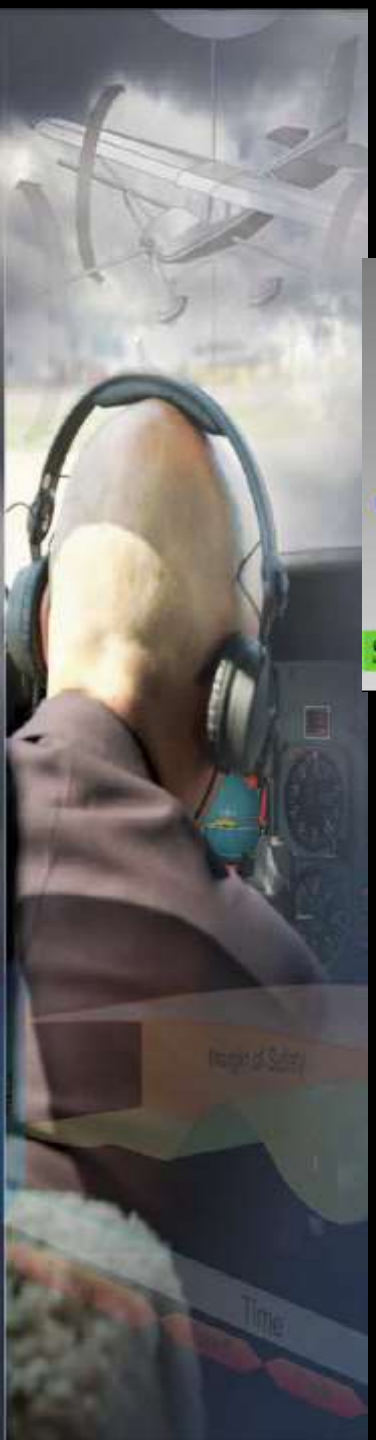


ILLUSIONS：Are you sure?





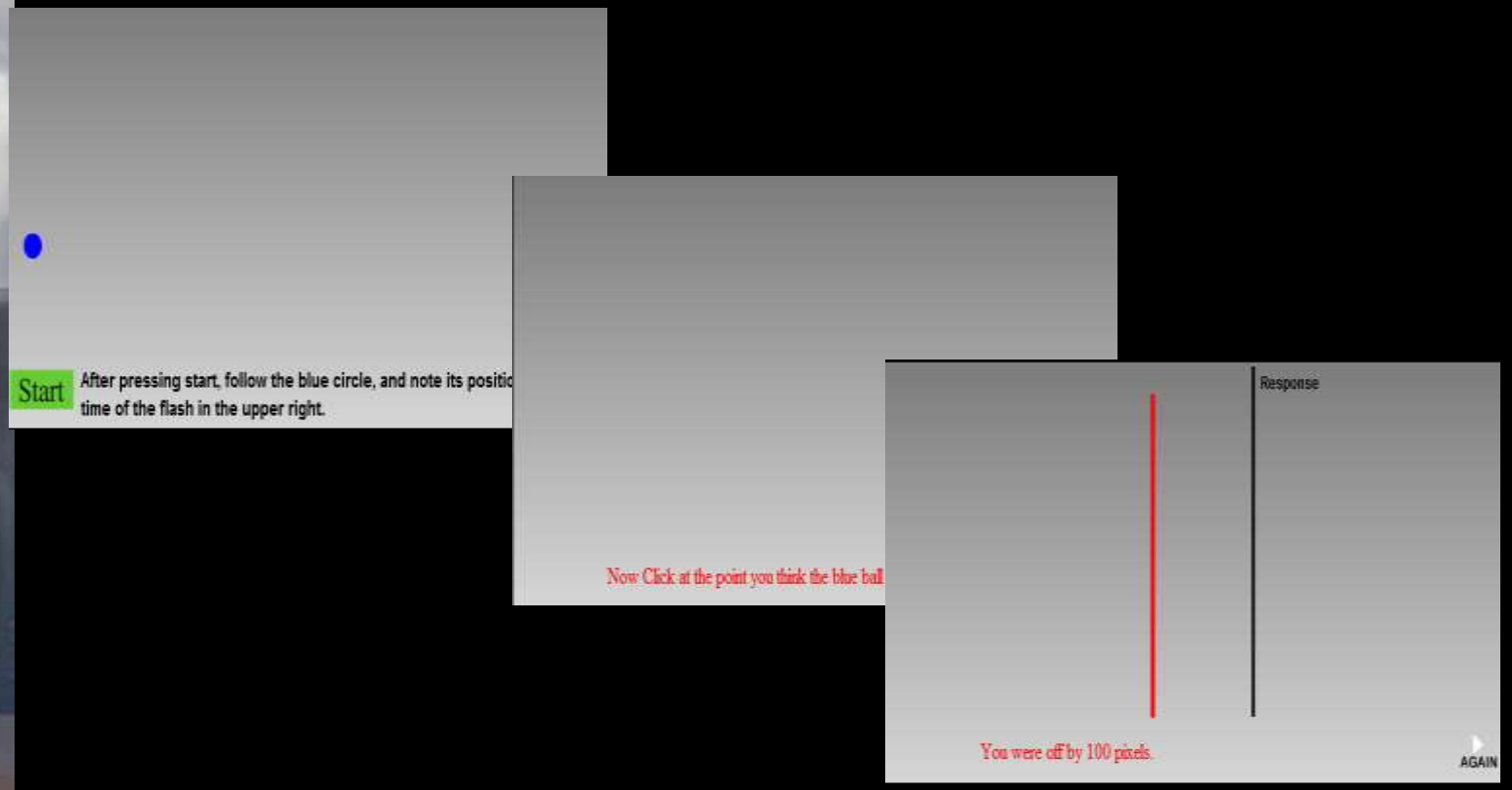
ILLUSIONS：again？



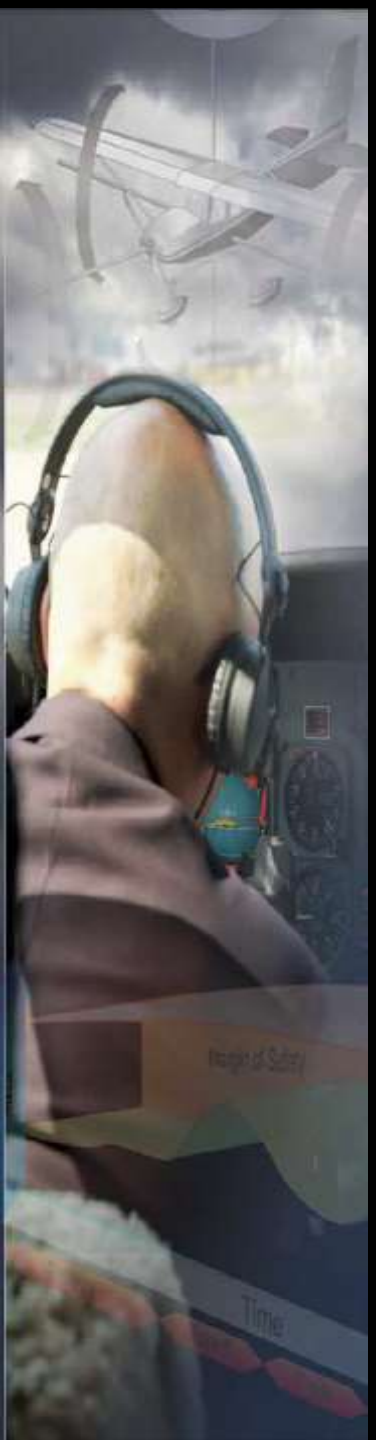
How about this？ Believe or not?

Flash Lag Effect：

http://www.brainbugs.org/FlashLagEffect.php

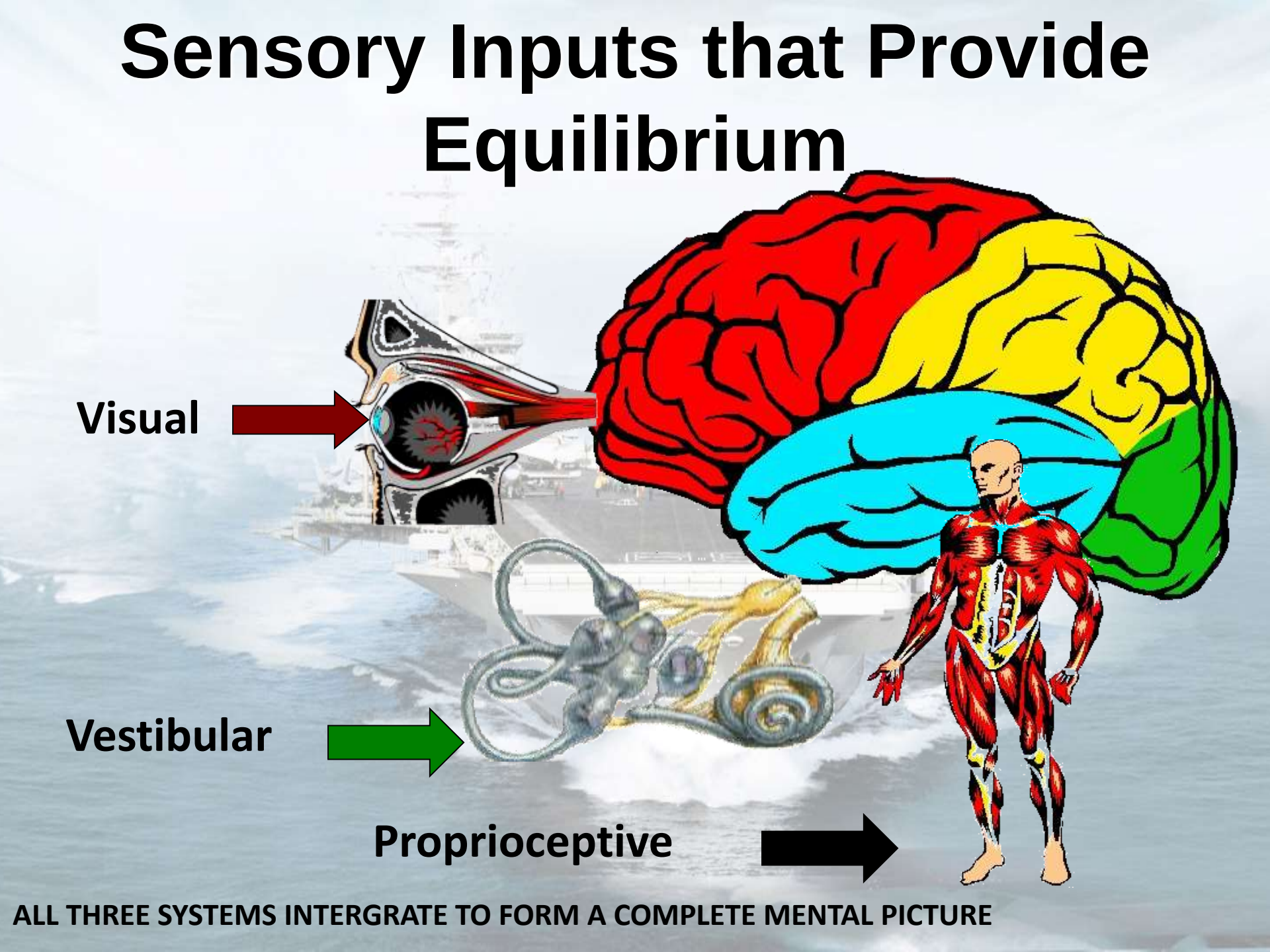


The flash lag effect is an illusion that demonstrate the perceptual difficulty in accurately detecting the position of an object at the time of another event.

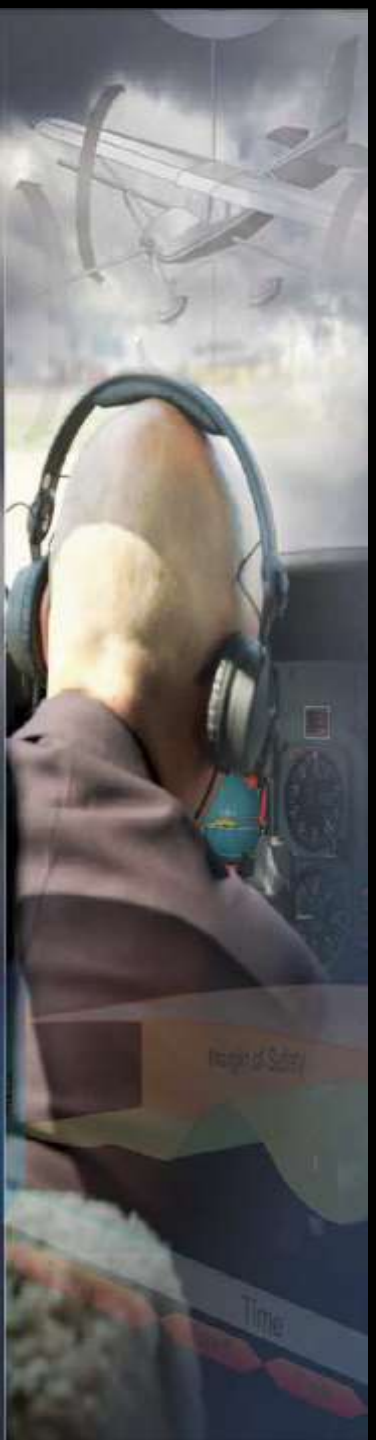


ILLUSIONS,WHY IT HAPPENS?

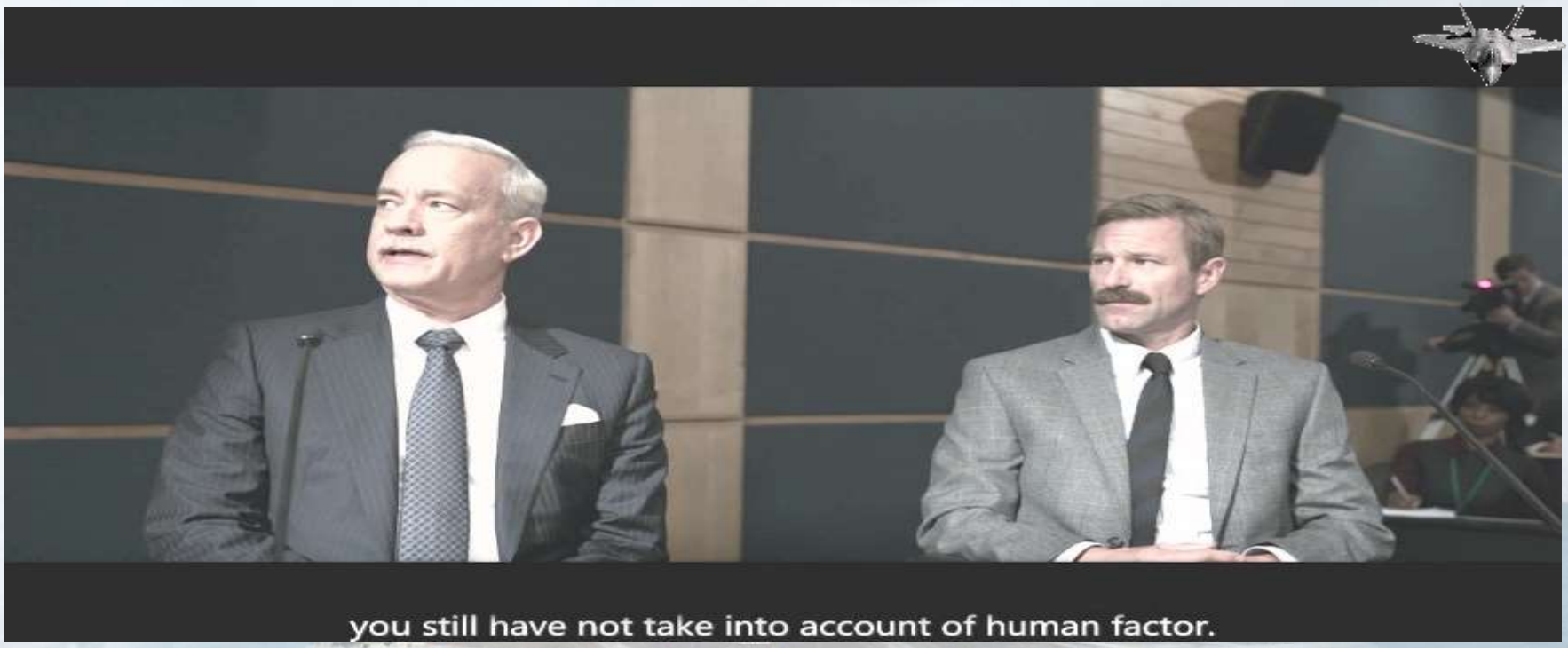
Sensory Inputs that Provide Equilibrium



ALL THREE SYSTEMS INTERGRATE TO FORM A COMPLETE MENTAL PICTURE



ILLUSIONS AND AWARENESS, CAN IT BE AVOIDED?



(Video 2)

The aircraft pilots need to receive many separate information or data of consciousness and perception, it is more important to establish the understanding of the current situation in a high level according to the operator, and to make accurate judgment on the working state of the system in the future. When pilots face many complex flight information and unable to make effective judgment on the situation, they will lose the decision-making

ILLUSION AND ACCIDENTS

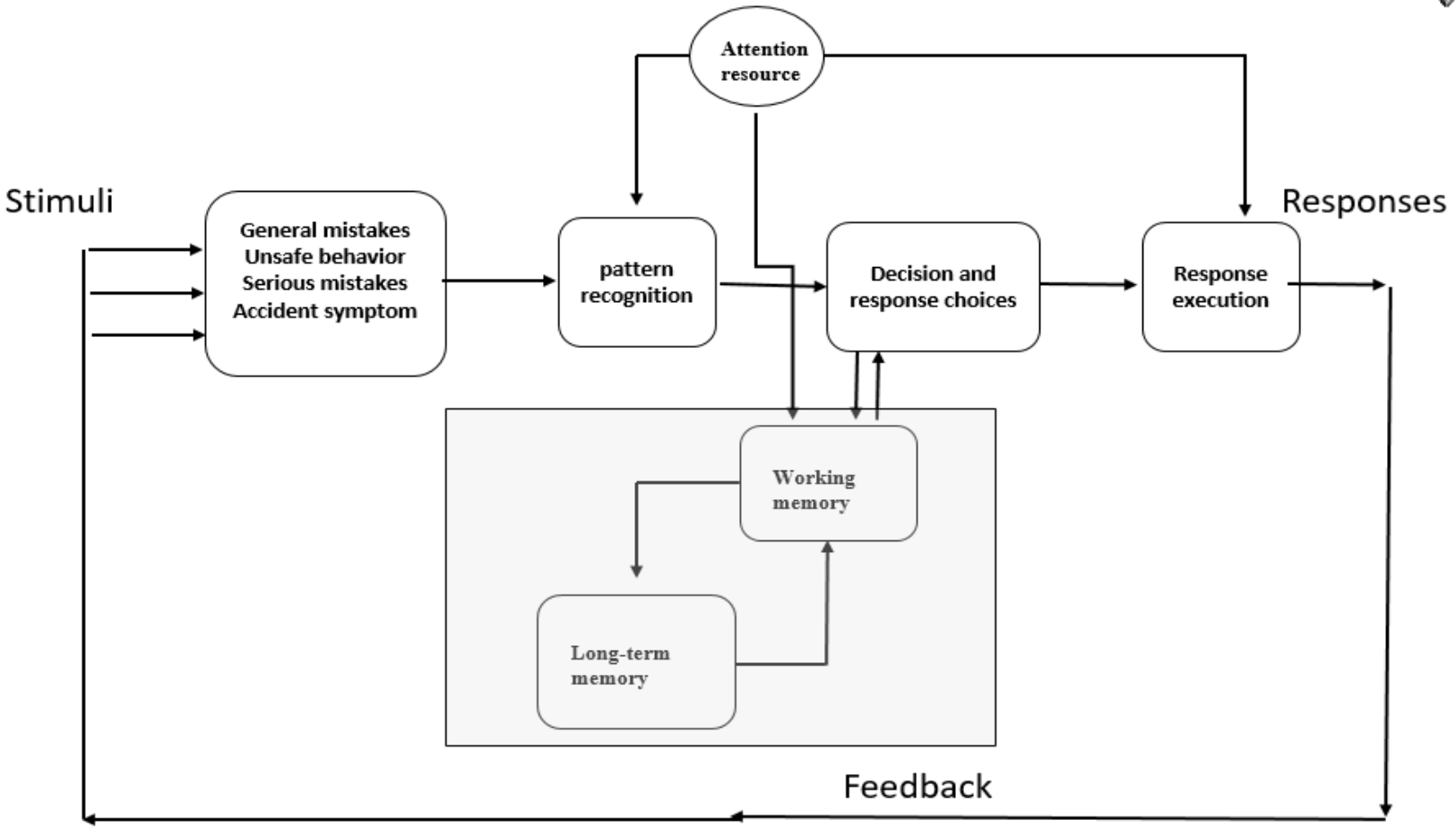
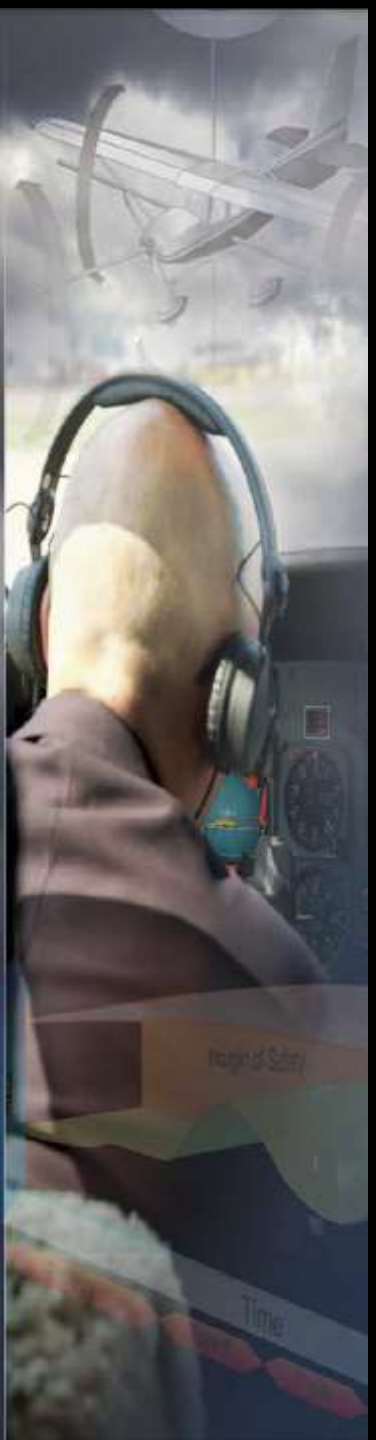


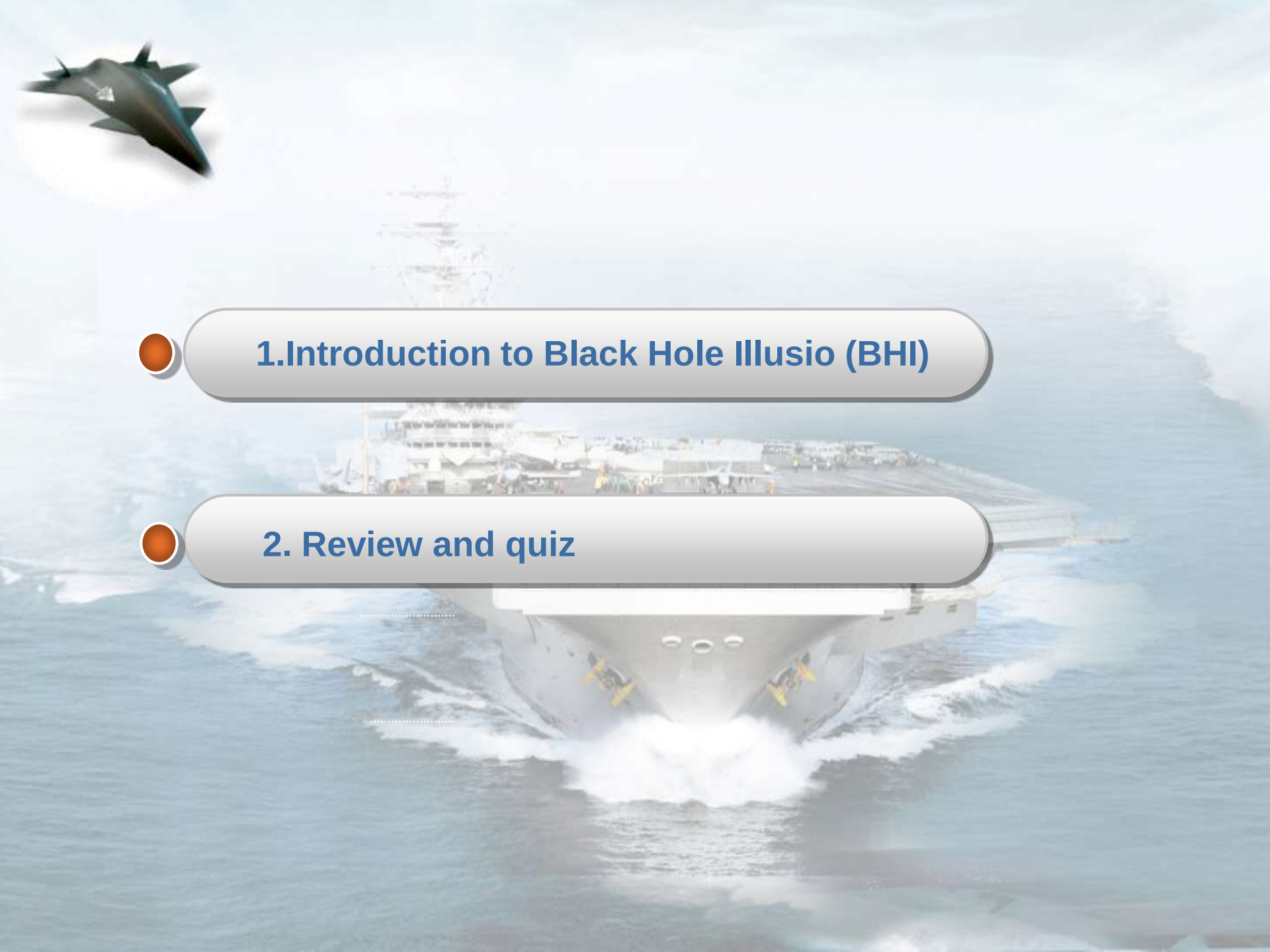
Figure 1-5 four-stage information processing model
(Wiener & Nagel. Human Factors in Aviation.1988)

Flight illusion is a typical case Spatial Disorientation. According to the internationally used definition, this kind of disorientation describe a contradictory situation about flight status between pilot and the reality.



ILLUSIONS,
BLACK HOLE ILLUSION

OK,HERE WE GO!

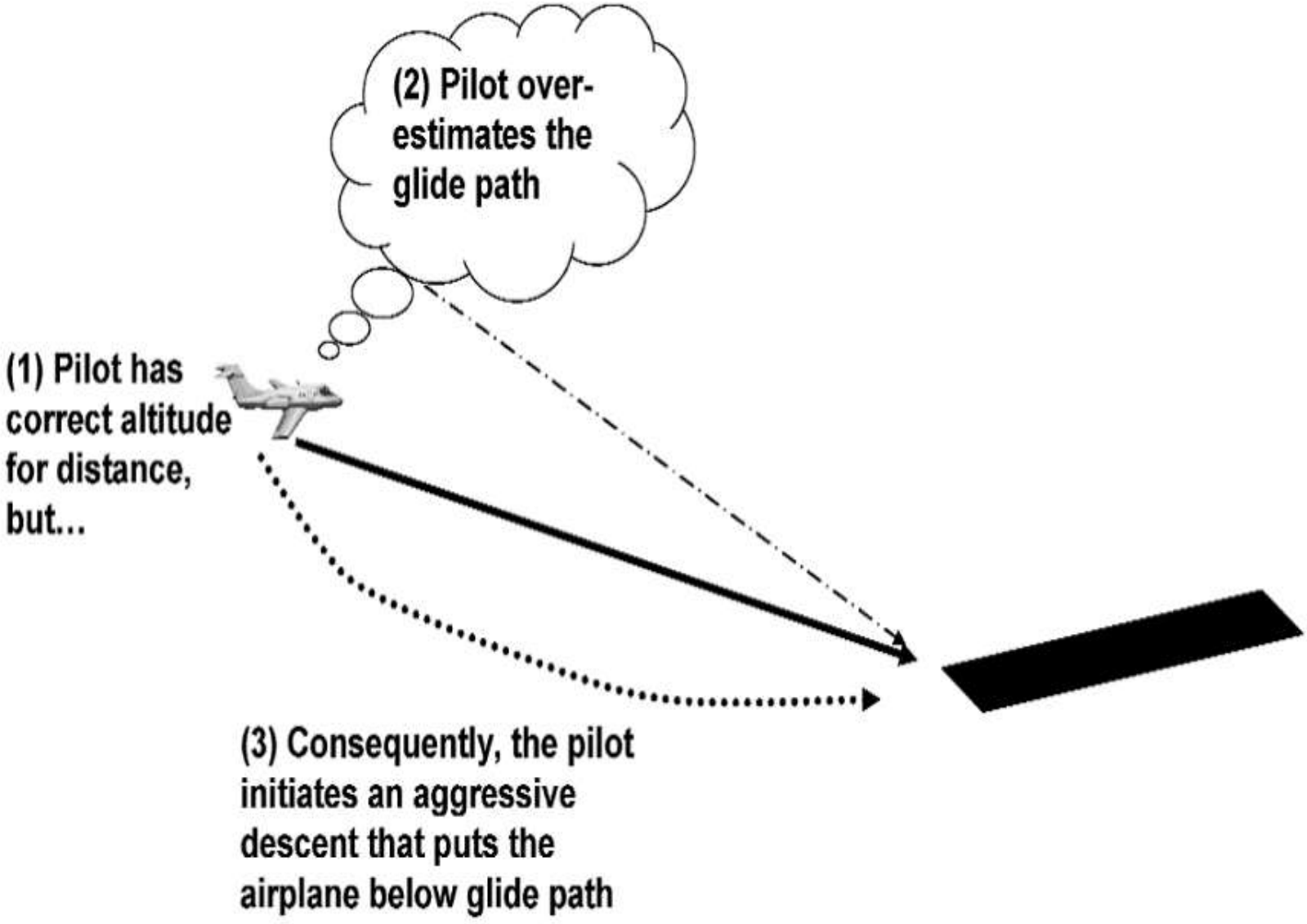


1.Introduction to Black Hole Illusio (BHI)

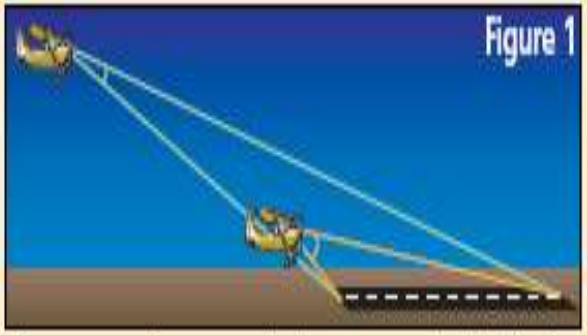
2. Review and quiz

Introduction to Black Hole Illusion(BHI)

Definition of Black Hole Illusion

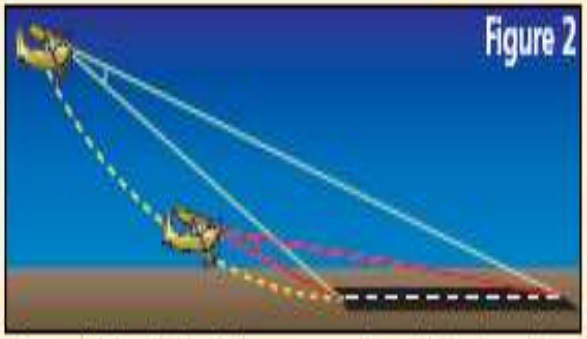


NORMAL APPROACH TO LANDING ON THE NUMBERS



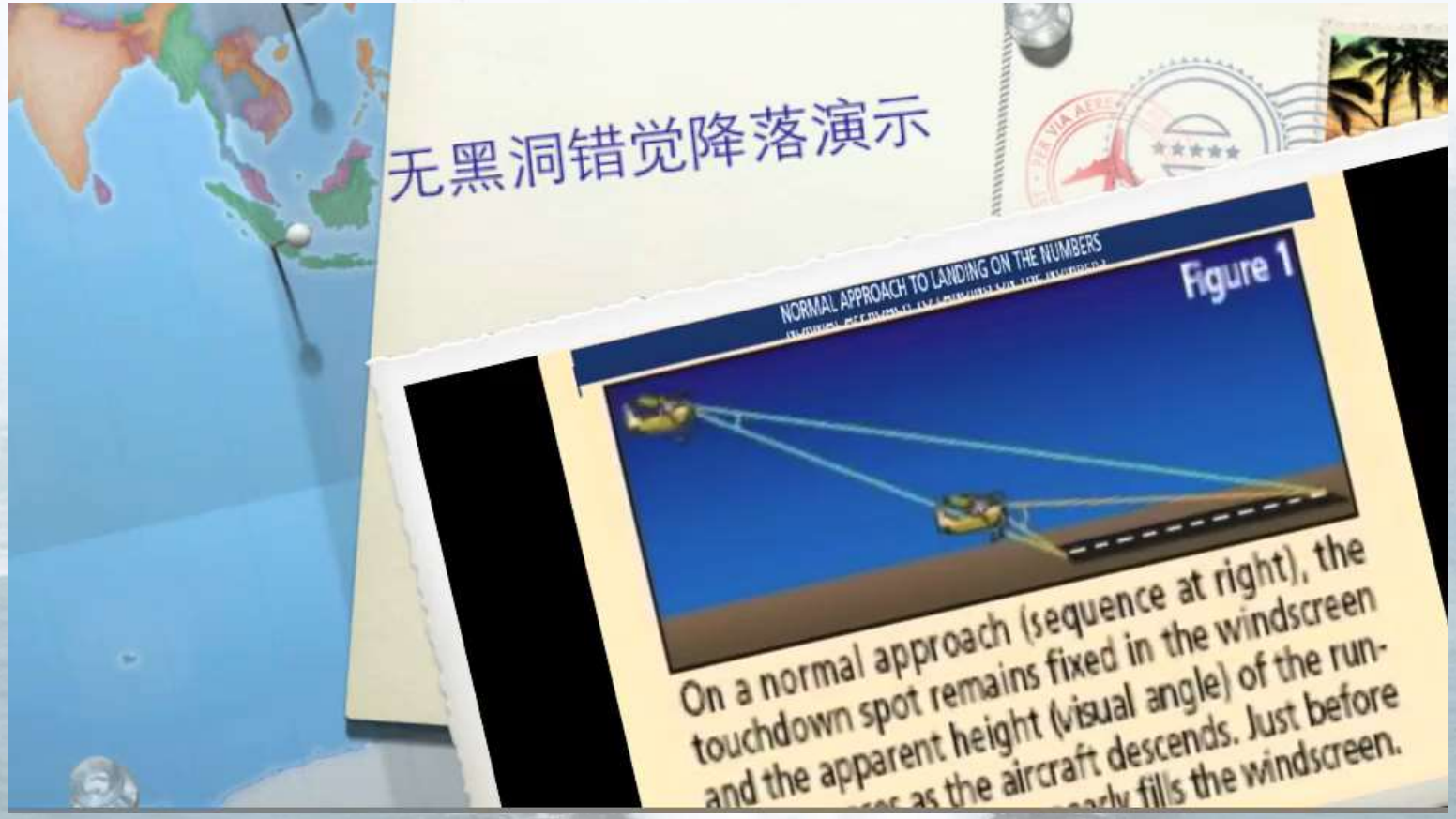
On a normal approach (sequence at right), the touchdown spot remains fixed in the windscreen and the apparent height (visual angle) of the runway increases as the aircraft descends. Just before touchdown, the runway nearly fills the windscreen.

BLACK HOLE APPROACH TO A LANDING SHORT OF THE RUNWAY

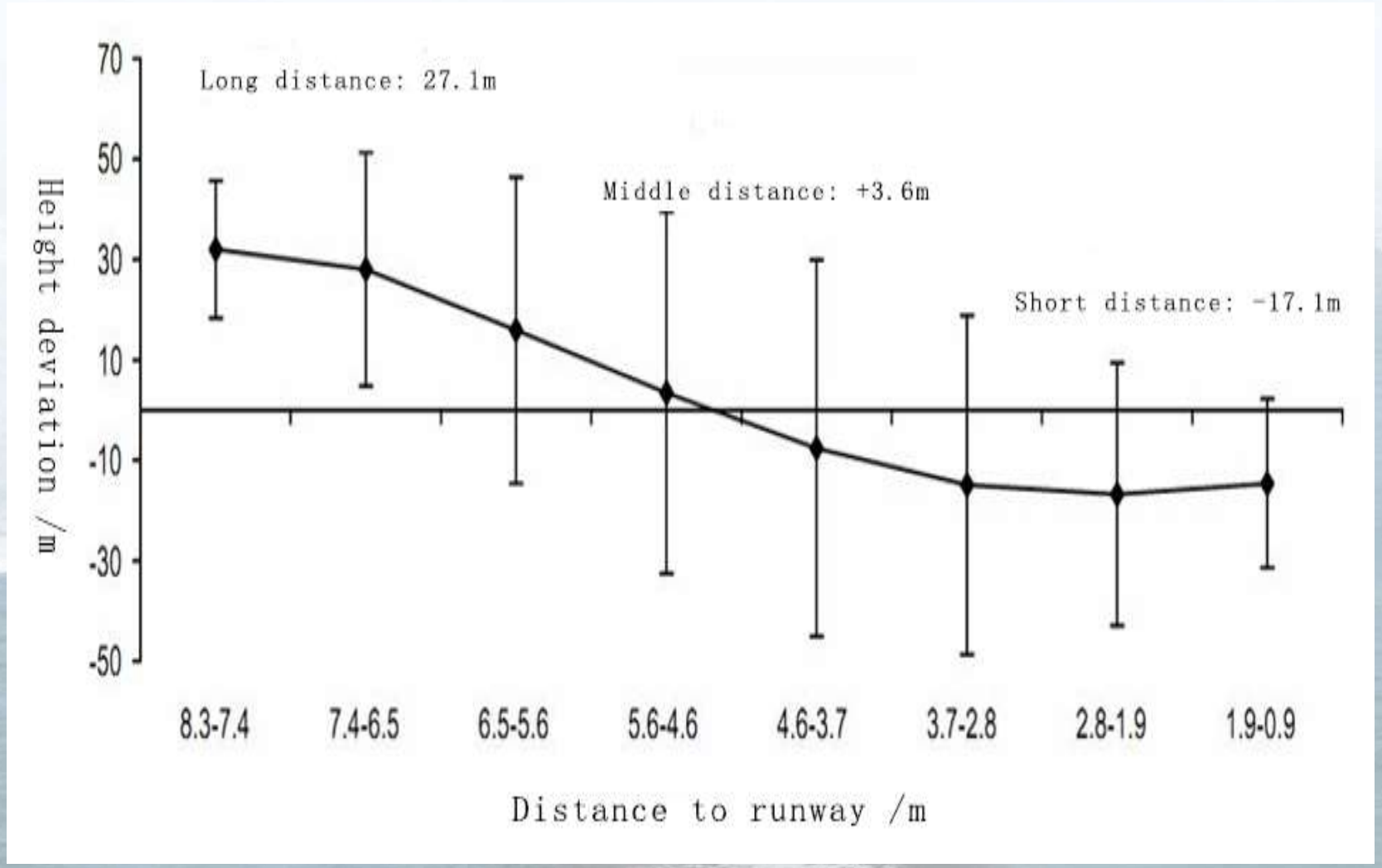


On a "black hole" approach, pilots tend to maintain a constant visual angle (apparent height) of the runway. They descend below glidepath to achieve this. A pilot who sees the far right image is dangerously close to the ground.

Normal approach (video 3)



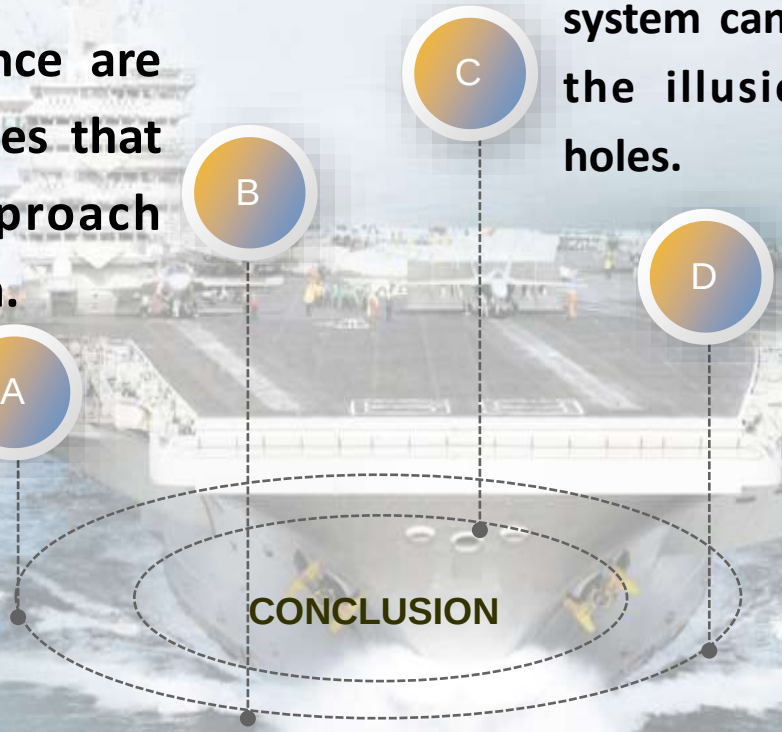
Approach with the occurence of BHI (video 4)


Long distance: 27.1m
Middle distance: +3.6m
Short distance: -17.1m
70
50
30
10
-10
-30
-50
Height deviation /m
8.3-7.4
7.4-6.5
6.5-5.6
5.6-4.6
4.6-3.7
3.7-2.8
2.8-1.9
1.9-0.9
Distance to runway /m

Conclusion

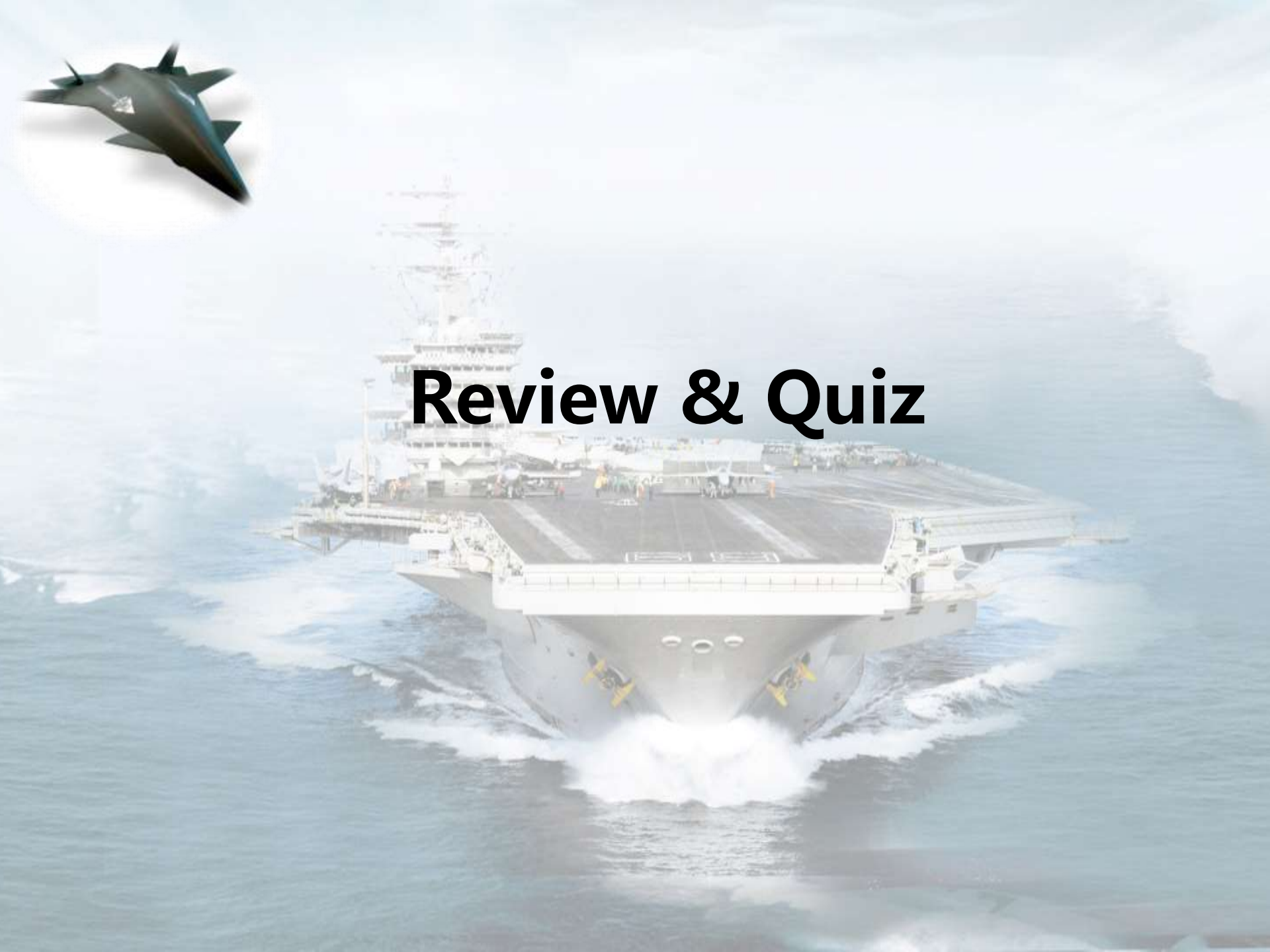
The spatial clues and approach distance are the two variables that affect the approach height deviation.

The time-task sequence approach light assist system can also lead to the illusion of black holes.



The occurrence of black hole illusion and the illusion amount are related to space and time cues patterns of subjects' perception.

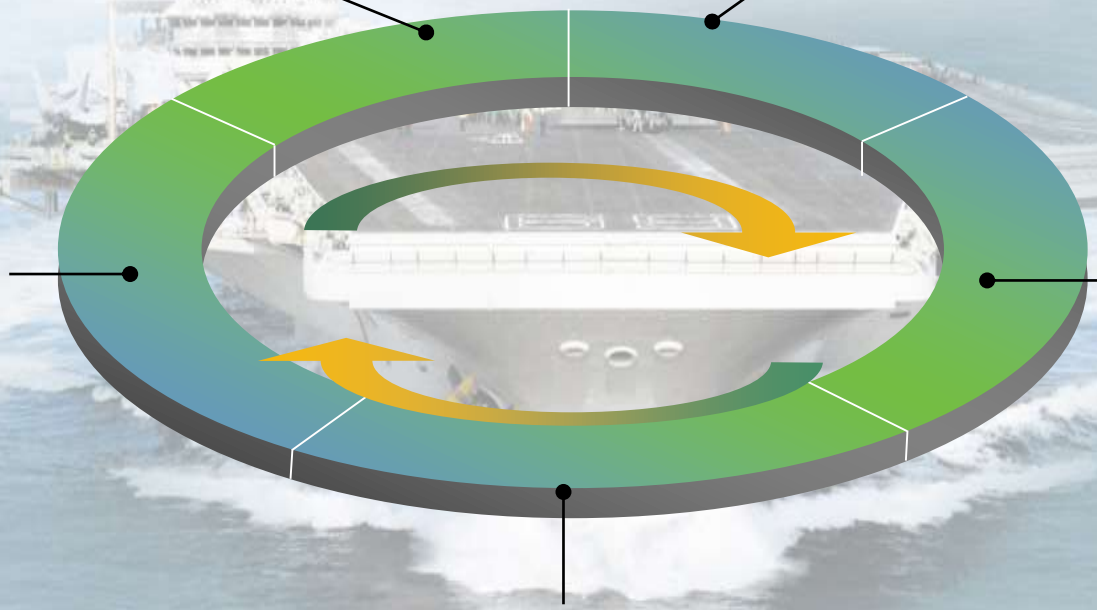
The amount of illusion induced by the flight experience is contrary to the common sense: “new one” has more illusions than "expert".



Review & Quiz

(1) Spatial and Temporal cues

(2) Black Hole Illusion and accidents



(5) The influence of spatial and temporal cues affect on BHI

(3) Flash Lag Effect

(4) Simulated Situation Experiment

QUIZ

Click on the link below to access the Spatial Disorientation(BHI) Quiz

http://ang.quizstarpro.com


THANK YOU!