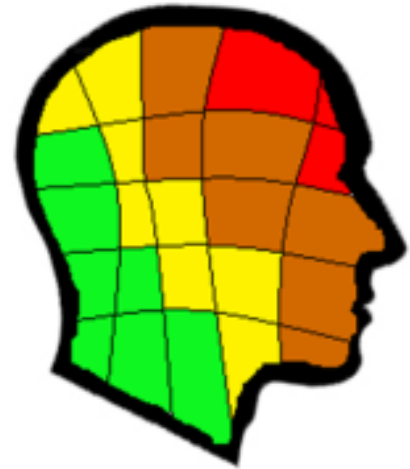


The Lightbulb Moment – *Understanding Human Risk Factors*



Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Extreme 5
Almost Certain 5	Medium 5	Medium 10	High 15	Critical 20	Critical 25
Likely 4	Low 4	Medium 8	High 12	High 15	Critical 20
Possible 3	Low 3	Medium 6	Medium 9	High 12	High 15
Unlikely 2	Low 2	Low 4	Medium 6	Medium 8	High 10
Rare 1	Low 1	Low 2	Low 3	Medium 4	High 5



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**SAFETY
LEADERS
SUMMIT**



Risk Management

“Risk Management is not, and will never be, a magic formula that will always give you the right answer.

It is a way of thinking that will give you better answers to better questions and by doing so helps you to shift the odds in your favour.....”

The Book of Risk – Dan Borge



The Lightbulb Moment

noun 1. (informal) a moment of sudden inspiration, revelation, or recognition

When you realise that Risk Management has more to do with ***Mindset*** than it does with ***Mathematics!***

Why?

The workplace is not a static, unchanging entity.

People aren't always predictable beings.

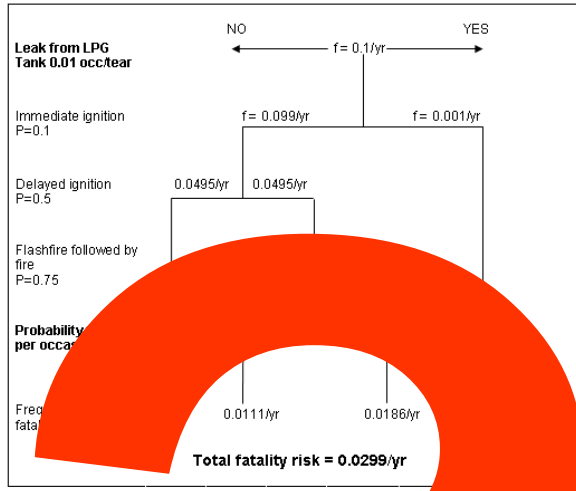
So RISK isn't static!

“Activity-based Risk...”

“Mindset over mathematics....”



Qualitative Descriptors		Likelihood				
		Rare	Unlikely	Possible	Likely	Certain
Quantitative Scales		< 0.0001	0.001	0.01	0.1	1
Consequence	Very High Severity	50,000,000				
	High Severity	5,000,000				
	Medium Severity	500,000				
	Low Severity	50,000				
	Very Low Severity	< 5000				

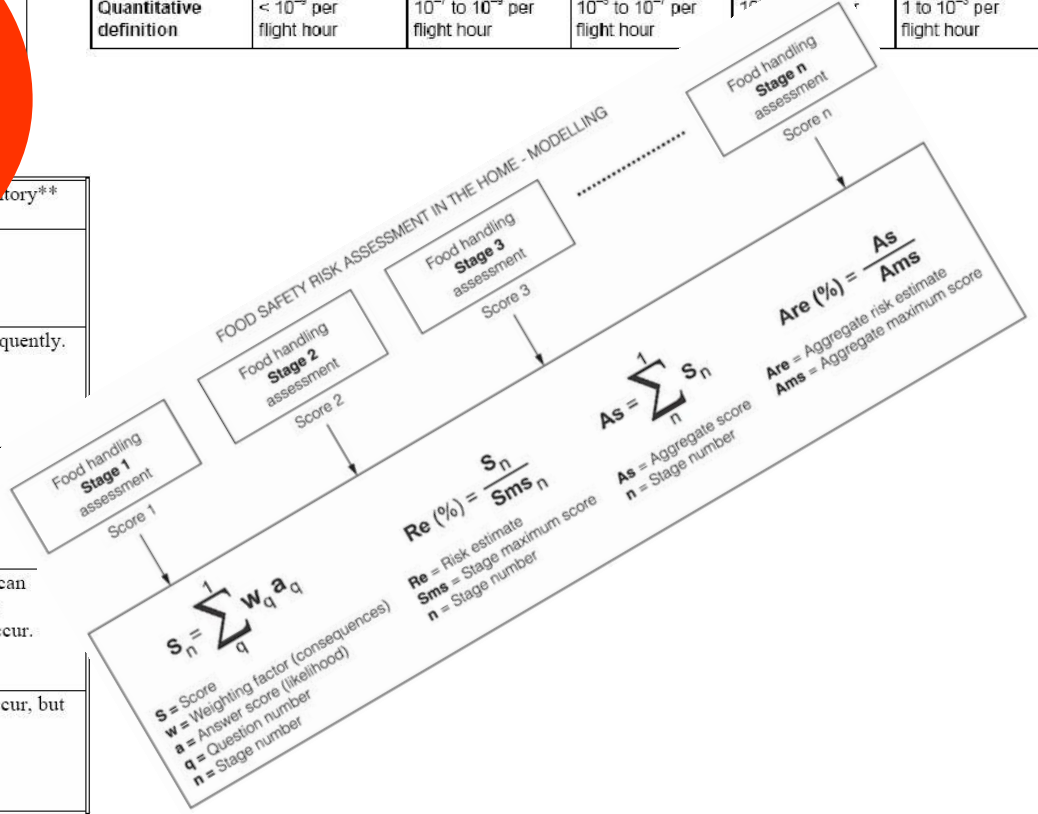


	Probability of Occurrence Definitions				
	Extremely improbable	Extremely remote	Remote	Reasonably probable	Frequent
Qualitative definition	Should virtually never occur in the whole fleet life.	Unlikely to occur when considering several systems of the same type, but nevertheless has to be considered as being possible.	Unlikely to occur during the total operational life of each system but may occur several times when considering several systems of the same type.	May occur once during total operational life of one system.	May occur once or several times during operational life.
Quantitative definition	< 10 ⁻² per flight hour	10 ⁻⁷ to 10 ⁻⁹ per flight hour	10 ⁻⁵ to 10 ⁻⁷ per flight hour	10 ⁻⁴ to 10 ⁻³ per flight hour	1 to 10 ⁻³ per flight hour

Figure 1: Example of a 5x5 risk matrix using log-log quantitative scales.

Likelihood Class	Likelihood of Occurrence (events/year)
Not Likely (NL)	<0.01% chance of occurrence
Low (L)	0.01 - 0.1% chance of occurrence
Moderate (M)	0.1 - 1% chance of occurrence
High (H)	1 - 10% chance of occurrence
Expected (E)	>10% chance of occurrence

Description*	Level	Specific Individual Item	Frequency**
Frequent	A	Likely to occur often in the life of an item, with probability of occurrence greater than 10 ⁻¹ .	Will occur frequently.
Probable	B	Will occur several times in the life of an item with probability of occurrence greater than 10 ⁻¹ but less than 10 ⁻² in that life.	Will occur frequently.
Occasional	C	Likely to occur some time in the life of an item, with a probability of occurrence greater than 10 ⁻² but less than 10 ⁻³ in that life.	Will occur frequently.
Remote	D	Unlikely but possible in the life of an item with a probability of occurrence greater than 10 ⁻³ but greater than 10 ⁻⁴ in that life.	Unlikely, but can reasonably be expected to occur.
Improbable	E	So unlikely, it can be assumed occurrence may not be experienced, with a probability of occurrence less than 10 ⁻⁴ in that life.	Unlikely to occur, but possible.



Accident

“An accident / incident is an undesired event generally caused by some combination of *unsafe act(s)* and *unsafe condition(s)* resulting in (or having the potential to result in) some form of loss ...”

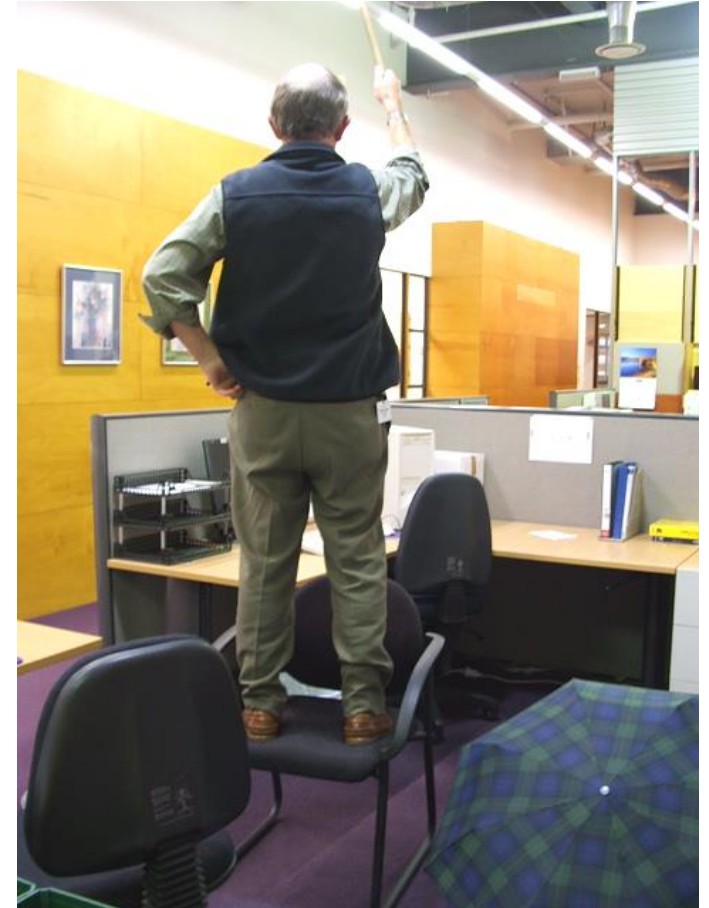


Hazardous Behaviour (*Unsafe Acts*)

A **hazard** is defined as ‘*an activity, arrangement, circumstance, event, occurrence, phenomenon, process, situation or substances (whether arising or caused within or outside a place of work), that is an actual or potential cause or source of harm;*

and includes-

- ❑ *A situation where a person’s behaviour may be an actual or potential cause or source of harm to the person or another person; and*
- ❑ *Without limitation, a situation described (above) resulting from physical or mental fatigue, drugs, alcohol, traumatic shock, or another temporary condition that affects a person’s behaviour.’*





Human Factors?

Human Factors is the scientific discipline concerned with the understanding of interactions among **humans** and other elements of a system.....

.....in order to optimize **human** safety, well-being and overall system performance.











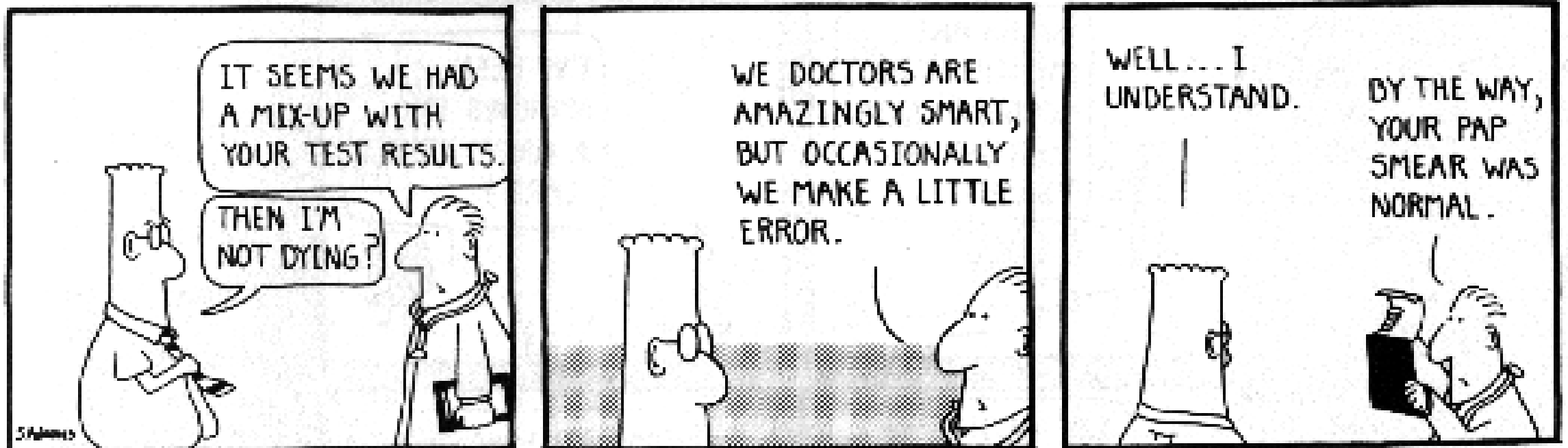
“I cannot accept that accidents only befall the incompetent and increasingly I find myself wondering...

...how it is that competent people in beneficial surroundings can make serious mistakes.”

Rod Johnson - U.K. Coastguard Agency Training Officer

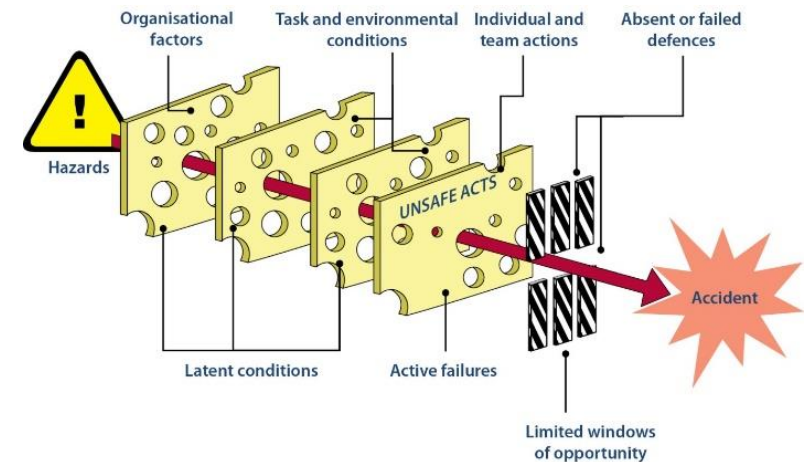
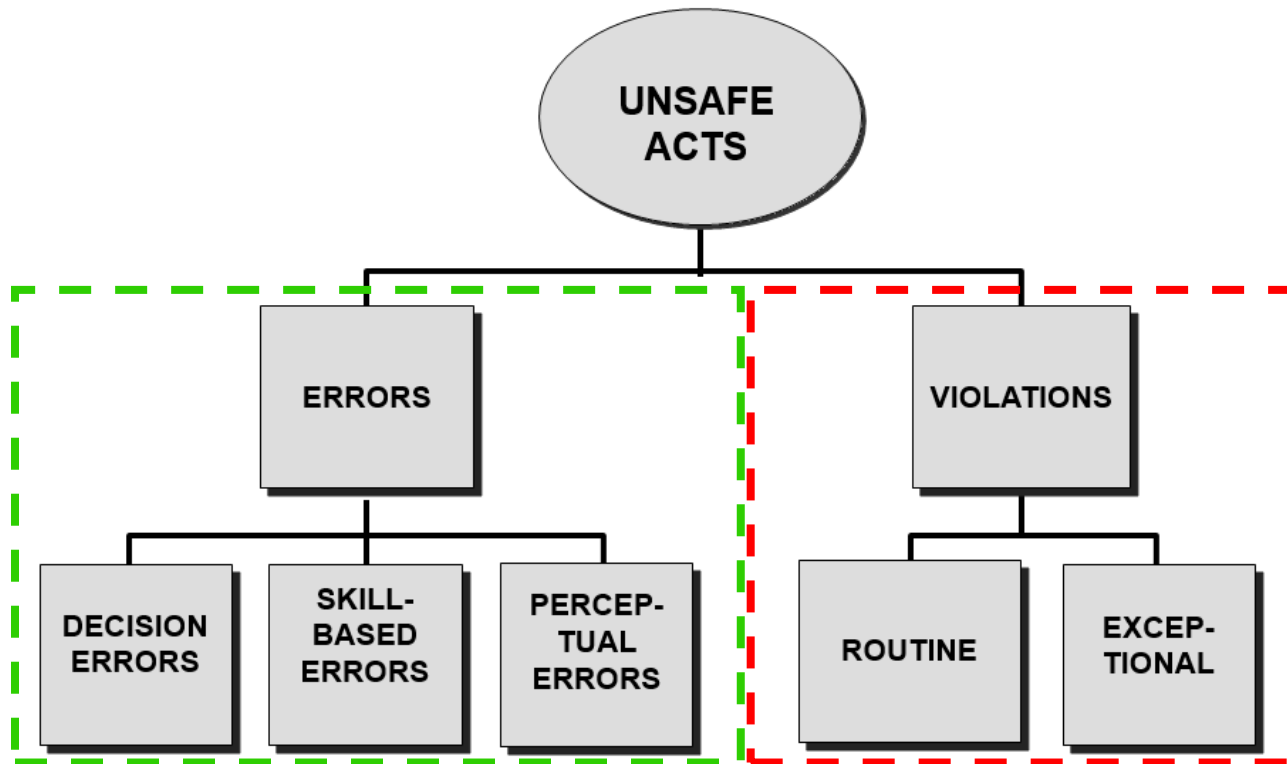


...estimated that up to 90% of all workplace accidents have human error as a causal factor!



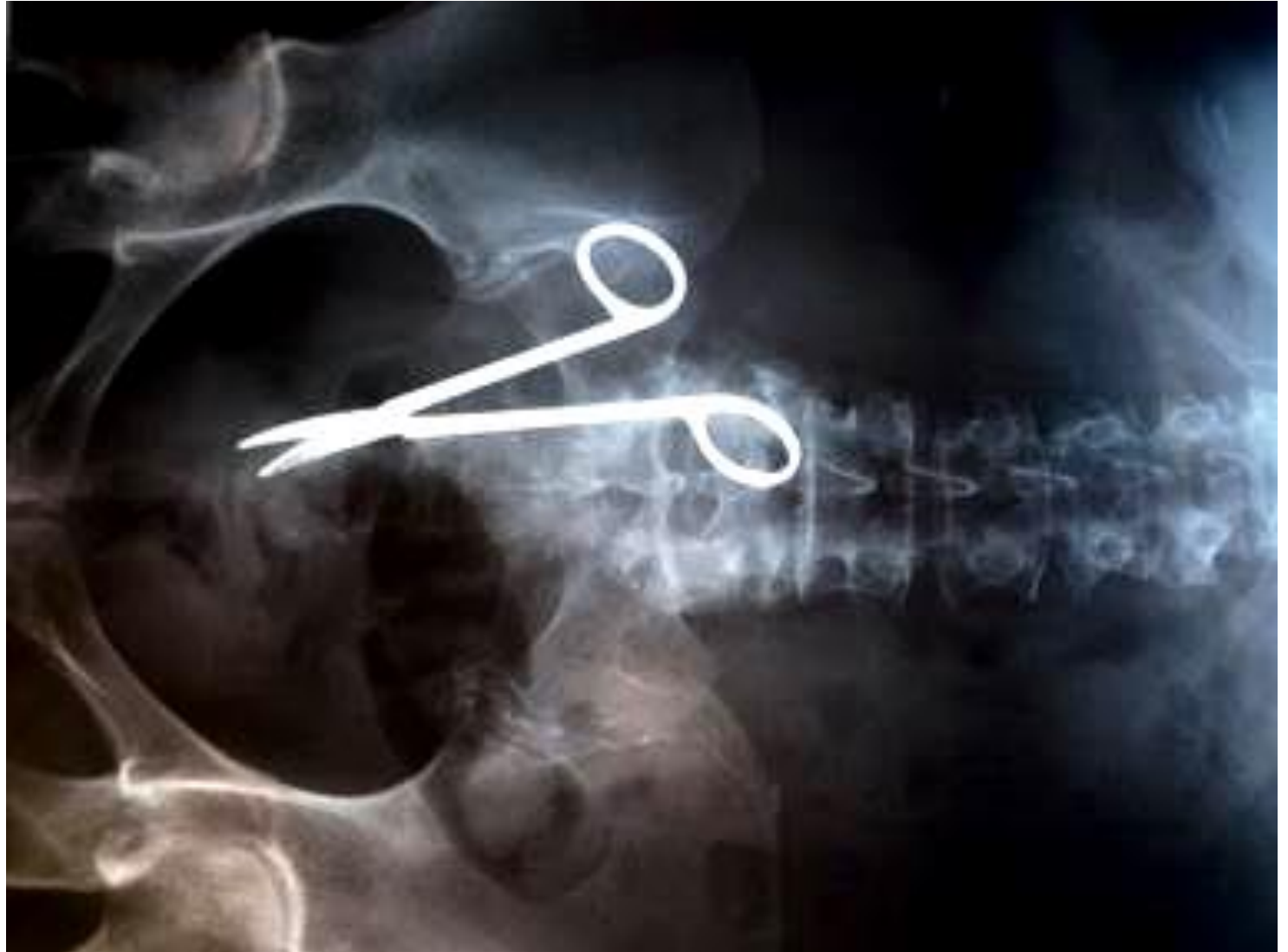
What does that mean?

...simply writing off accidents to “operator error” is a simplistic, if not naive, approach to mishap causation.

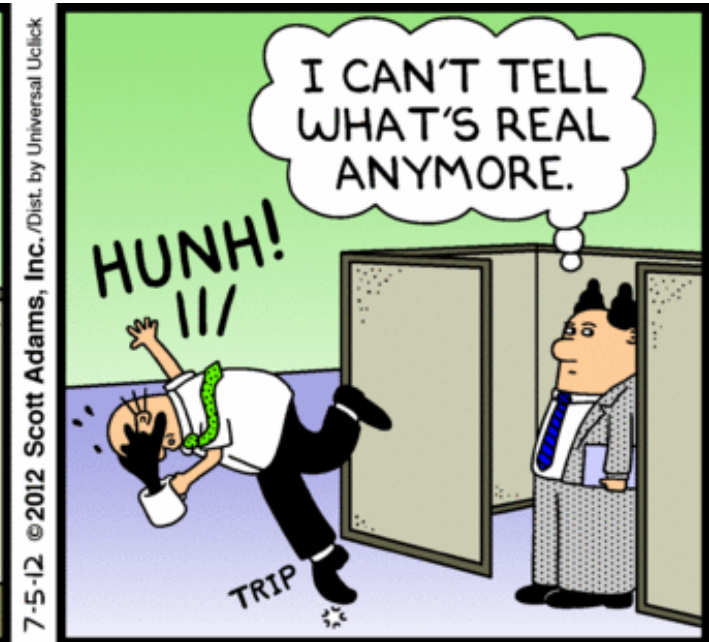


To understand accidents (and behaviour...), a number of questions need to be answered:

- ❑ How?,
- ❑ What?,
- ❑ Where?,
- ❑ When?,
- ❑ Who?, *and*
- ❑ **Why?**



Safety **Stress** **Bad Management** **Attitude**
Fatigue **Mistakes** **Drugs & Alcohol**
Human Behaviour **Human Error** **Culture**
Risk-taking **Wellness** **Hazard Interaction**

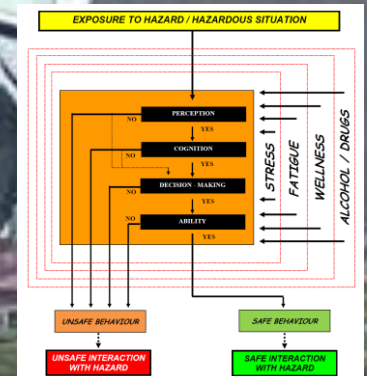
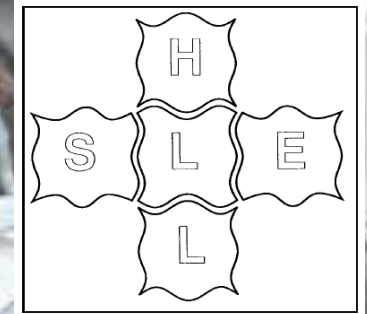
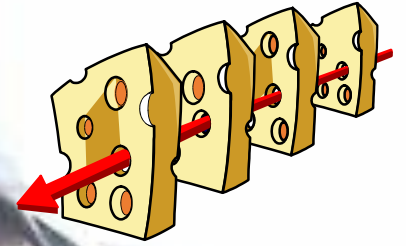


Dilbert.com DilbertCartoonist@gmail.com

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Human Factor Models

- Reason
- SHELL
- Ramsey





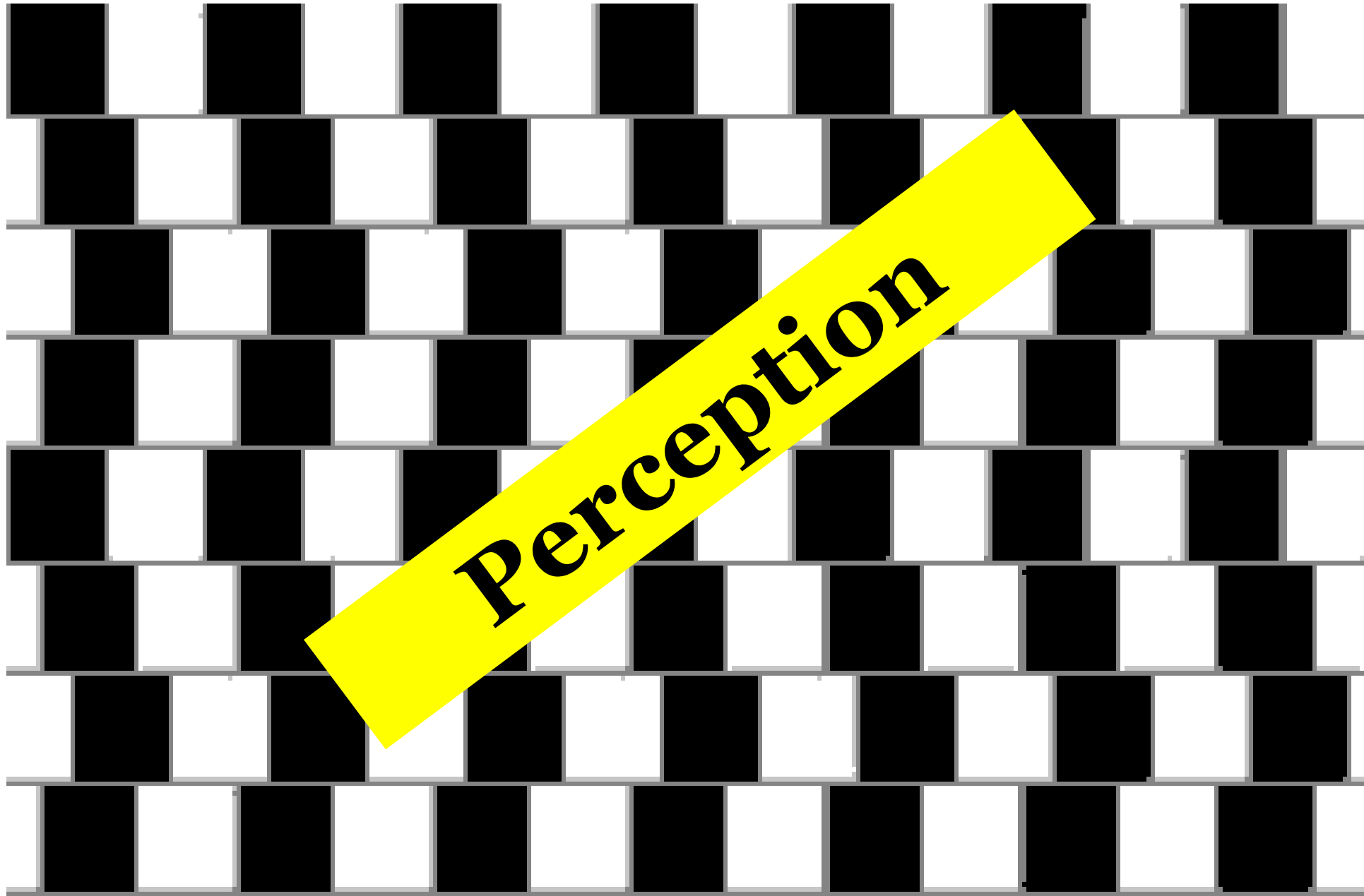
The Ramsey Model

“Human Factor” Accidents

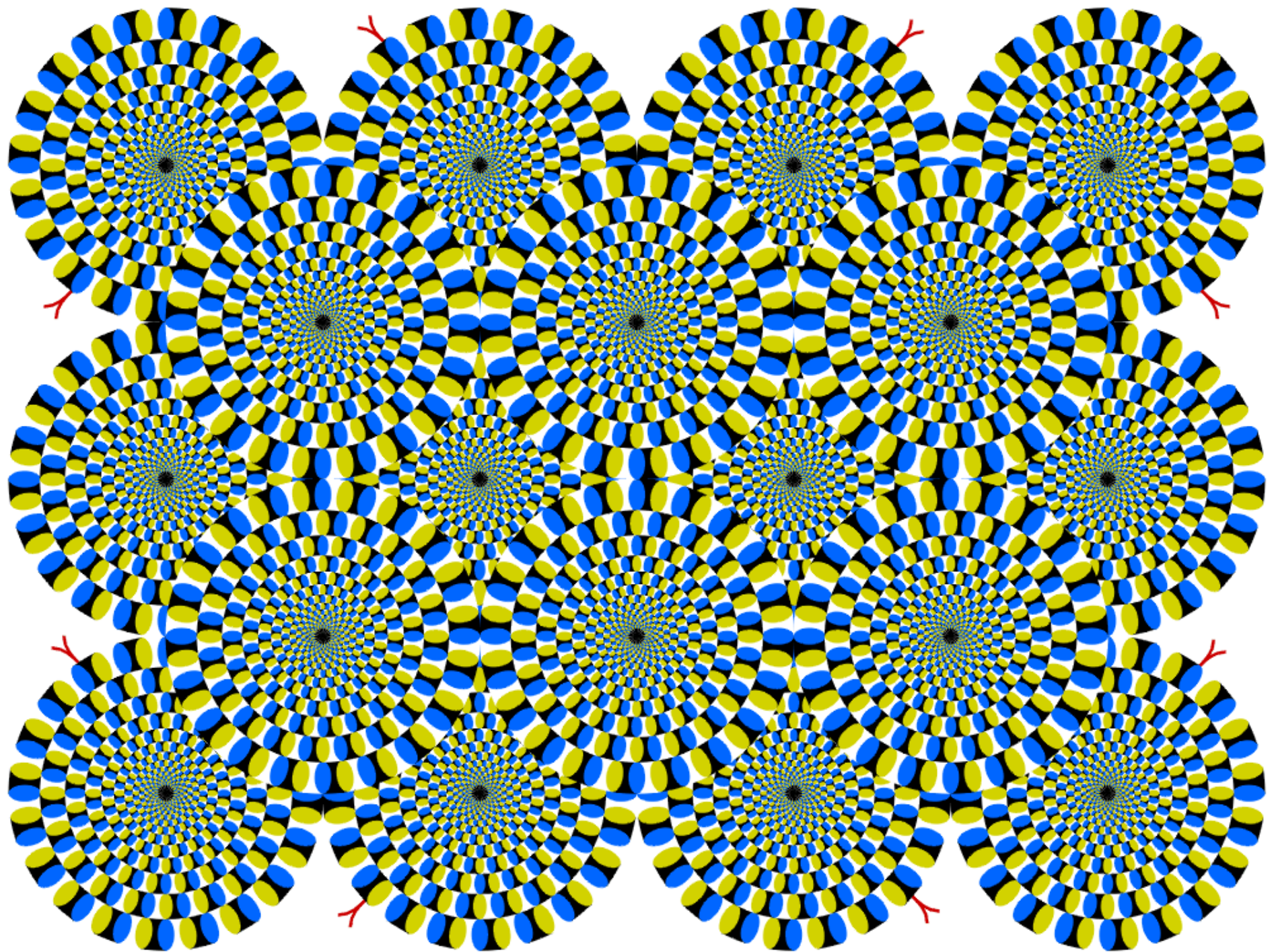
- Failure to Perceive the Hazard 36 %
- Underestimating the Hazard 25 %
- Failure to Respond 17 %
- Ineffective Response 14 %

Lawrence (1974) HSG (6) 48

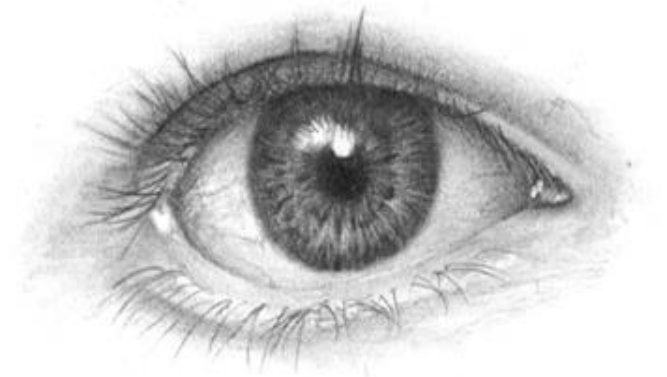




Perception

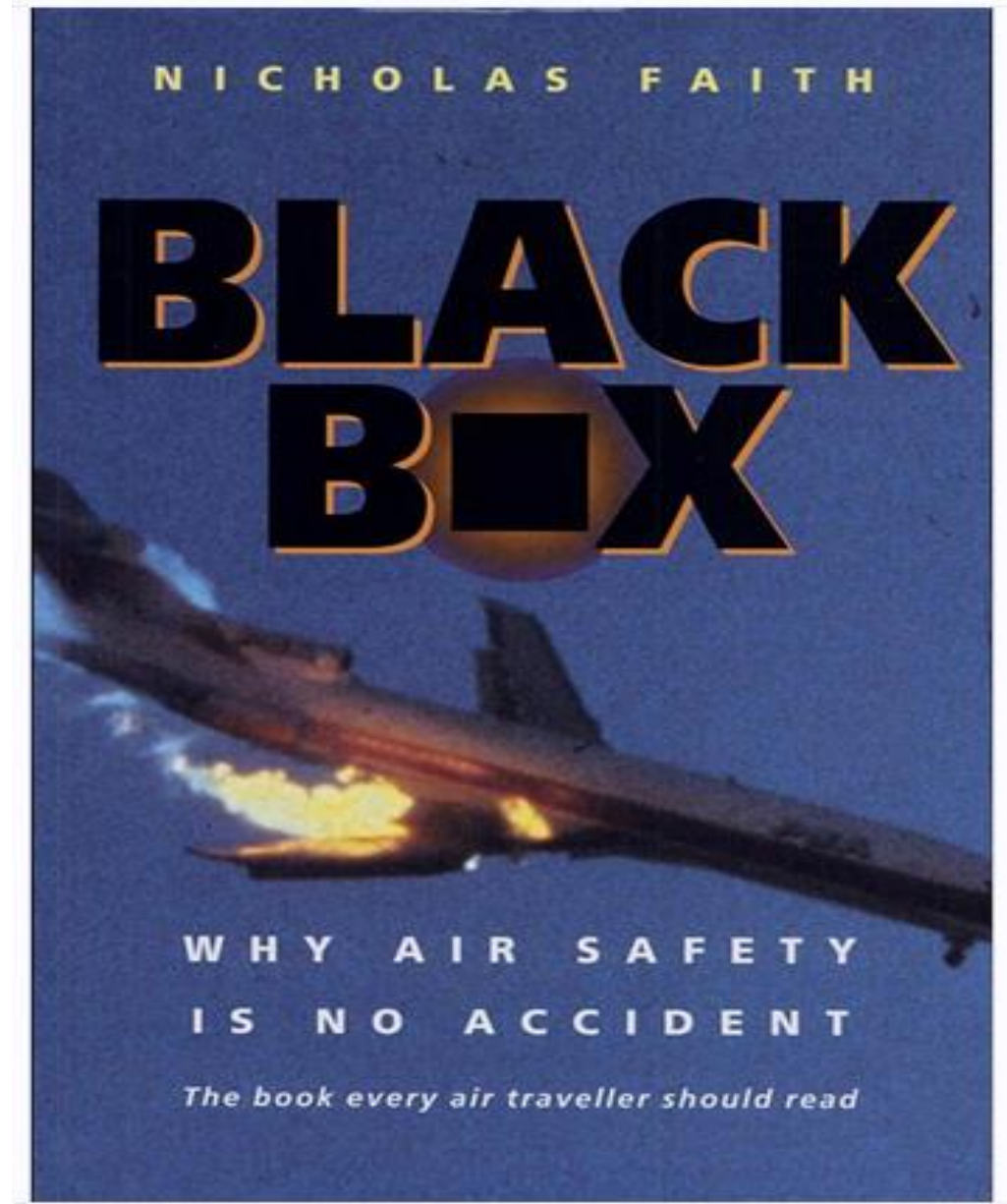


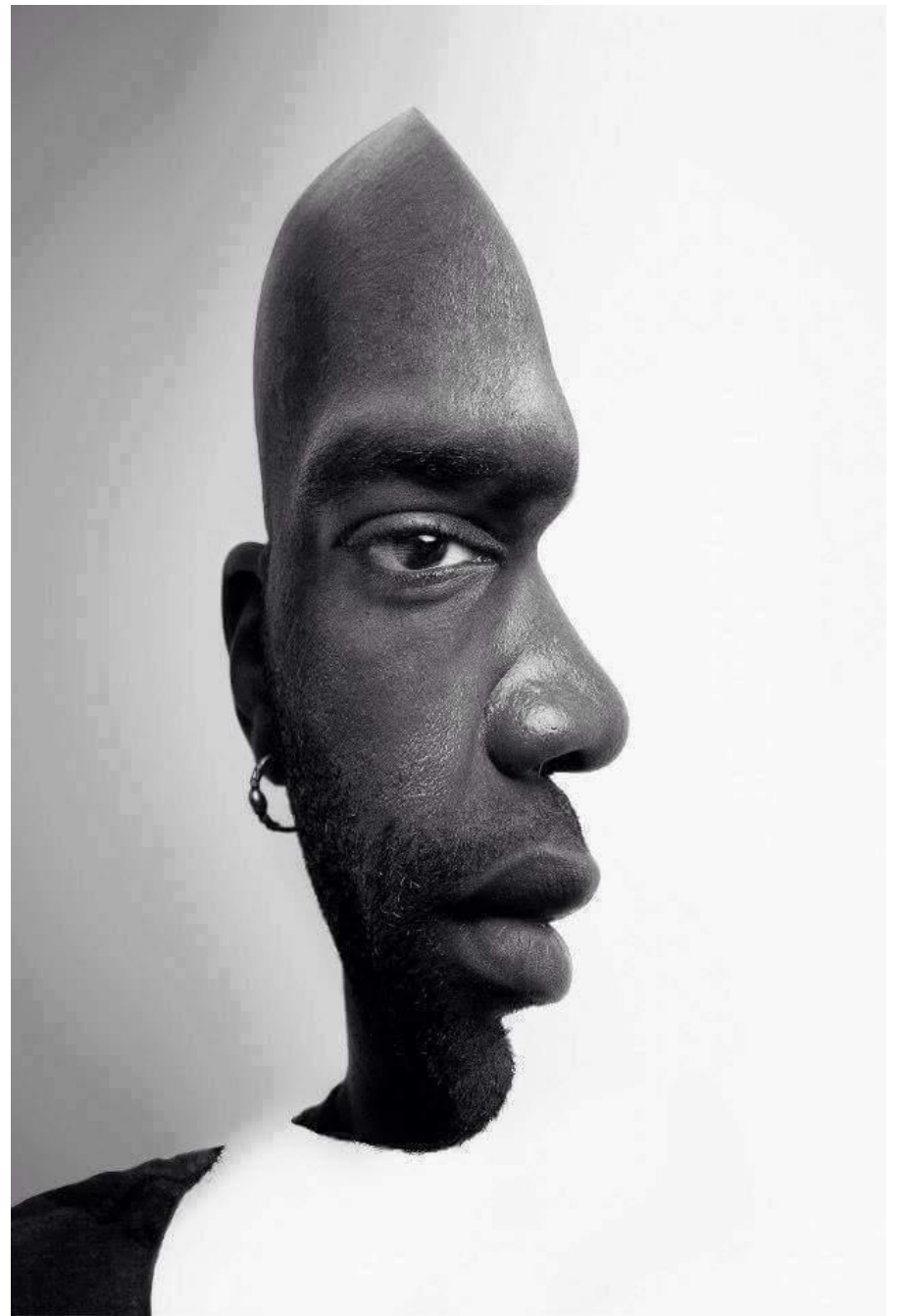
Perception

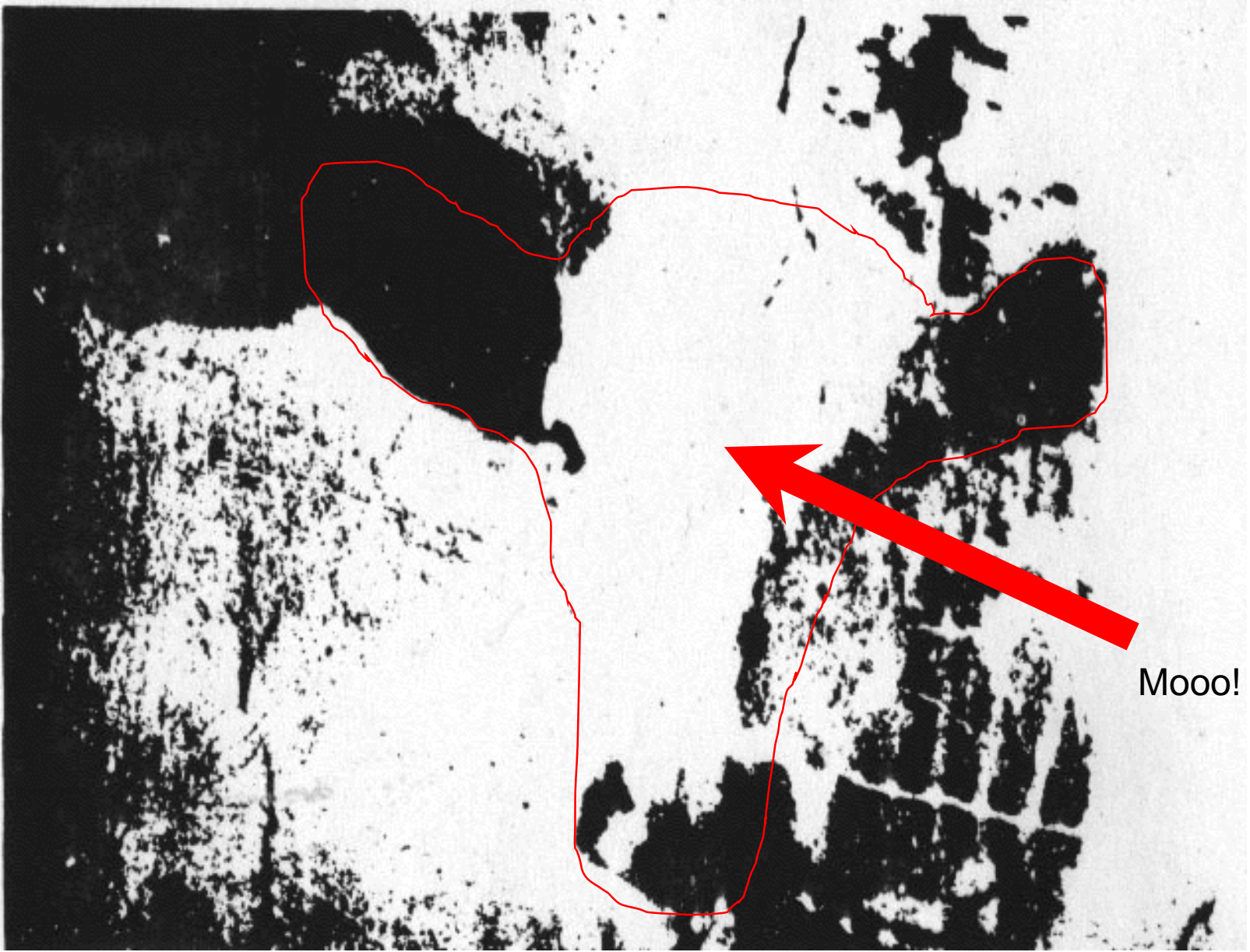


“the process by which an individual selects, organises and interprets stimuli into a meaningful and coherent picture of the world”

"We do not see reality; rather, we interpret what we see and call it reality"







Mooo!

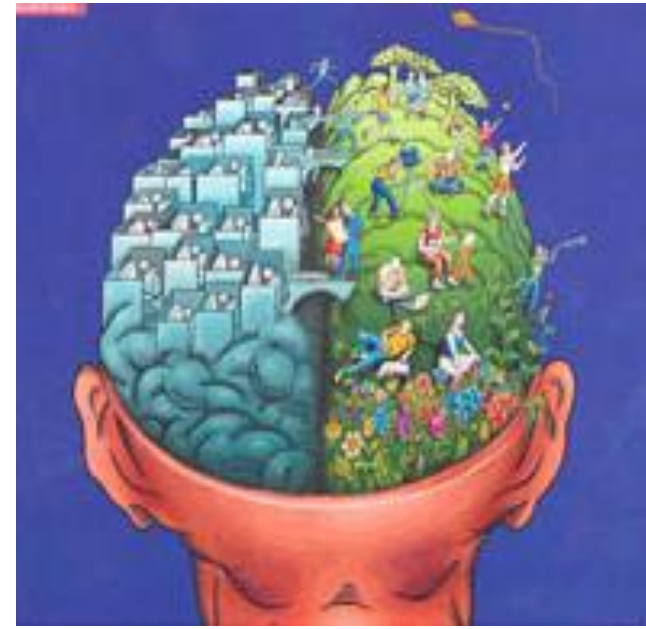


Cognition



Cognition

... involves the processes by which knowledge is acquired, stored, recalled and revised, and involves perception, memory and forms of thinking such as conceptualisation and decision making.





AREA OF EVACUATION ASSISTANCE

INSTRUCTIONS:

- 1) ALTERNATE EXIT TO THE LEFT
THEN RIGHT THEN LEFT THEN
RIGHT THEN LEFT TO EXIT
- 2) UNLESS ASSISTING OTHERS EXIT
USING STAIRS IMMEDIATELY
- 3) PICK-UP HANDSET ONLY TO RE-
QUEST EMERGENCY ASSISTANCE



CONSTRUCTION SITE

DANGER



**AUTHORISED
PERSONNEL ONLY**

**SAFETY INDUCTION MUST BE
OBTAINED PRIOR TO ENTERING SITE**

**IF THERE'S A
HUGE FU[☺]CK UP
CALL TODD
6751 1827**

**DEEP EXCAVATION
DEMOLITION IN PROGRESS
WORKERS OVERHEAD
EXPLOSIVE POWERED TOOL IN USE**



**FORKLIFT
IN USE**



**NAILING TOOL
IN USE
KEEP CLEAR**



**WELDING IN
PROGRESS**



**BEWARE OF
CRANE**

GET SERIOUS ABOUT WORKPLACE HEALTH & SAFETY



**SAFETY
FOOTWEAR**



**SAFETY
HELMETS**



**EAR & EYE
PROTECTION**



**SAFETY HARNESS
MUST BE WORN**



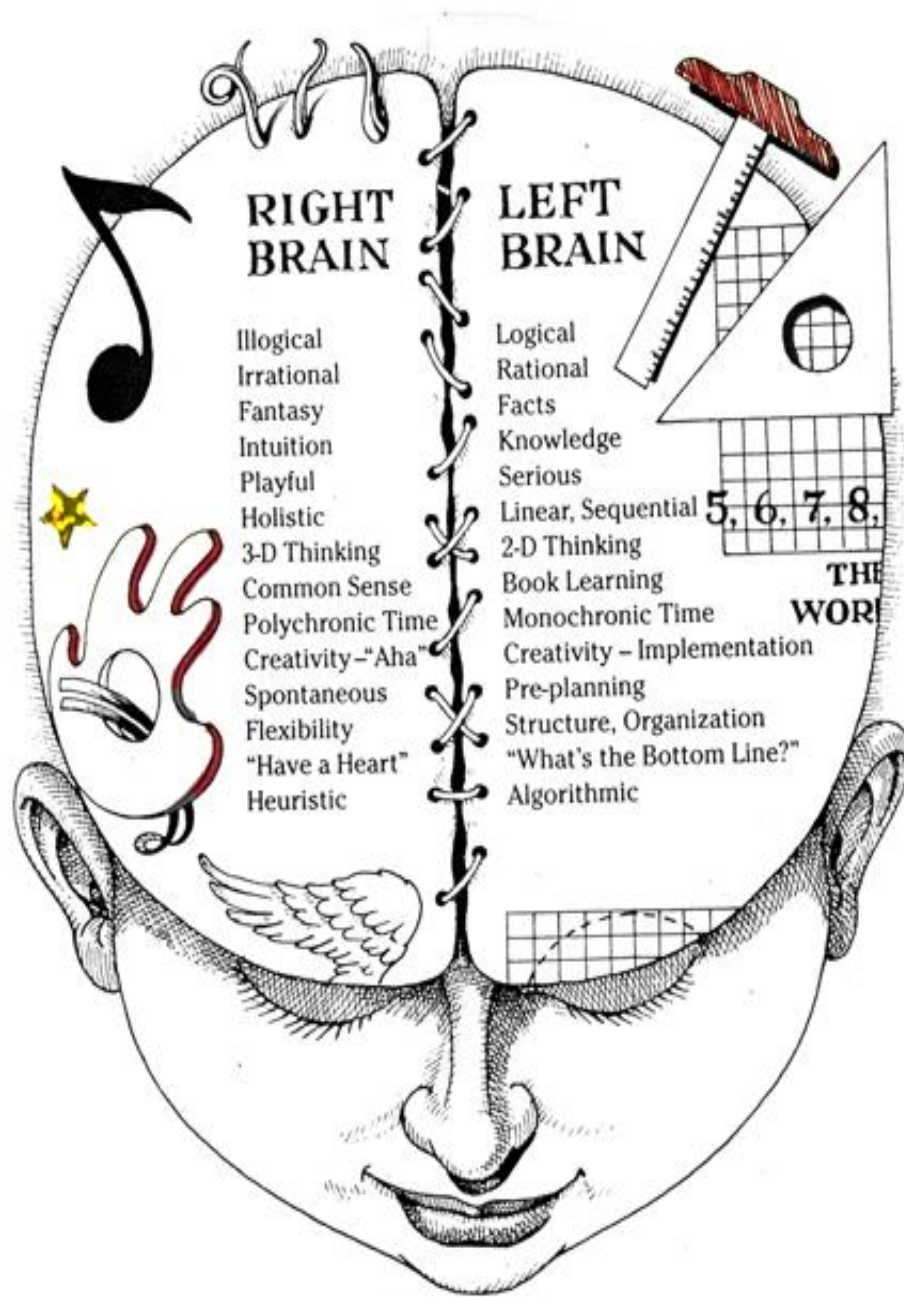
**FALL ARREST EQUIPMENT
MUST BE USED**

**ALL SUBCONTRACTORS
ARE TO PRESENT
ELECTRICAL TOOLS
AND EQUIPMENT TO
SITE FOREMAN BEFORE
COMMENCEMENT**

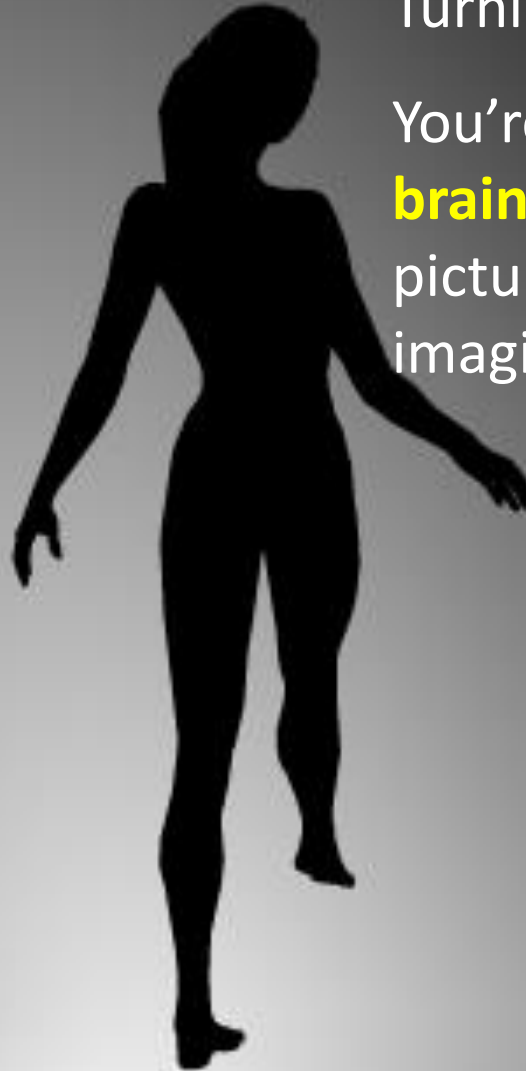
**NO ALCOHOL
PERMITTED
ON THIS SITE**

MUST BE WORN ON THIS SITE WHERE REQUIRED

CAUTION BOBCAT & HEAVY MACHINERY OPERATING



Turning **anti-clockwise**?
You are using your **left**
brain. (logic, detail
oriented,
facts rule.....)



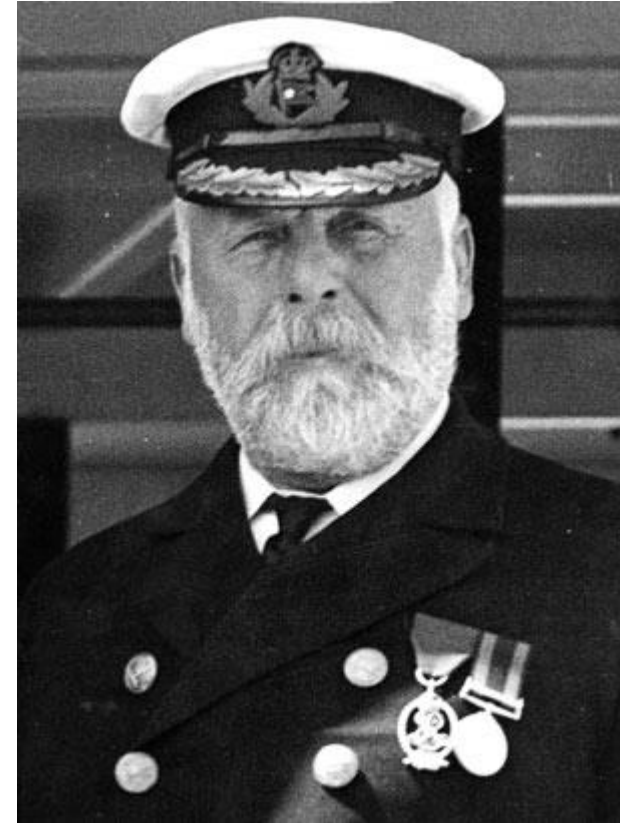
Turning **clockwise**?

You're using your **right**
brain. (feelings, "big
picture" -oriented,
imagination rules....)

See if you can make her go one way & then the other.....

"When anyone asks how I can best describe my experience in nearly 40 years at sea, I merely say, uneventful. Of course there have been winter gales, and storms and fog the like, but in all my experience, I have never been in any accident of any sort worth speaking about.

I never saw a wreck and never have been wrecked, nor was I ever in any predicament that threatened to end in disaster of any sort".



*Edward J. Smith,
Captain
RMS Titanic.*







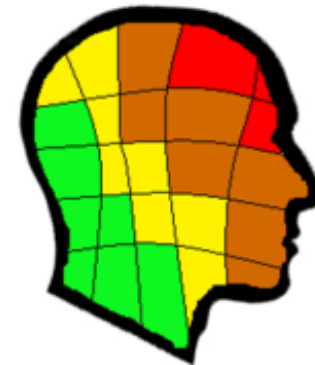
The problem with *understanding* RISK

Likelihood	Almost Certain	Medium	Medium	High	Extreme	Extreme
	Likely	Low	Medium	High	Extreme	Extreme
	Possible	Low	Medium	Medium	High	High
	Unlikely	Low	Low	Medium	Medium	Medium
	Rare	Low	Low	Low	Low	Medium
		Negligible	Minor	Moderate	Major	Catastrophic
		Consequences / Impact				

Our perceptions about risk varies tremendously...

...our brain automatically compares the present situation against a "standard" created in the mind through past experience.

However, it's critically important that the information you hold as *true* (as the "standard"), is in fact correct.....







Live with a smoker – 6 months	1
Five X-rays at local hospital in one day	3
Fly around world in 747 – 3 stops	9
Work 4 shifts in underground mine	4
Do tandem skydive – from 14 000ft	6
Nuclear reactor in Europe – live 50 years	10
Swim one day at beach – after shark attack	8
One bottle of red wine in one day	7
Travel 5 km (3.1 miles) by car in local area	2
Eat 1 jar of peanut butter in one month	5

General biases.....

Confirmation bias

- Seek to confirm rather than try to disprove

Groupthink

- Tendency for team to move towards agreement

Risky shift

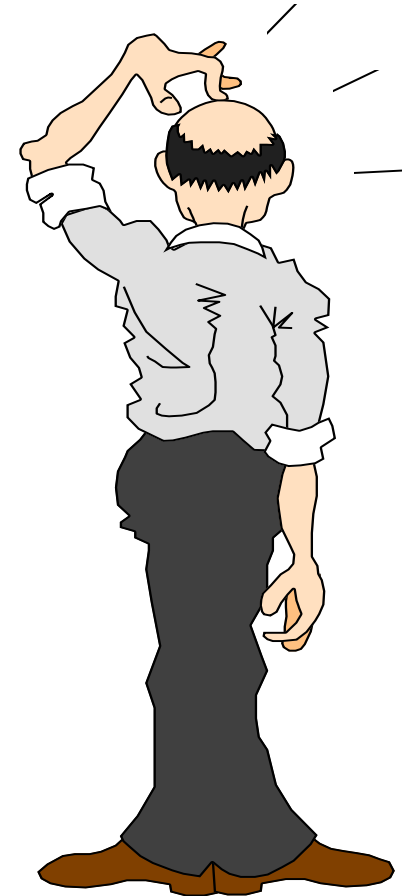
- Decision by the team less cautious than members would make on their own

Hindsight bias

- Perceive past events as being more predictable than they would have been at the time

A thought for you!

*Don't believe
everything
you think.....*





Decision-making

Decision-making

"one choice taken from a range of options, and once taken may, exclude those other options"



Making a Decision

Making a decision is a complex process that only the human mind can do well & draws on:

- **Workplace Safety Culture**
- **Risk Motivation**
- **Training**
- **Experience**
- **Information**
- **And much more!**



Culture

A pair of hands, one light-skinned and one dark-skinned, are shown holding a small, colorful globe of the Earth. The hands are positioned as if cradling the globe, with fingers gently gripping it. The background is a soft, out-of-focus light color.

“the way we do things around here”

(when the boss isn't watching...)

“the virus you catch when you join us”



**Risk
Motivation**

KLM. From the people who made punctuality possible.

Building an airline of KLM's standing requires a special kind of dedication like making a commitment to punctuality. A quality that's very much part of the Dutch.

It was a business philosophy after all, who gave it their encouragement when he invented the spring balance that made business transactions possible. A tradition without which our incomparable SX air travel for that matter. And you that determine that punctuality. It's not about the doing things well. As usual, however, when you fly KLM, you'll find your flight smoothly incorporated. With efficiency, punctuality and friendly understanding.

For that is the way the people of Holland are. They're always concerned with a high quality, international service. As your travel agent will confirm.


KLM



A right royal time is what you have in KLM's Royal Class service in punctual and privacy. Dinner for instance, is always touched off with a choice of seven different soups. But then, it's only in keeping with that stylish class far too good to be called just food.

Best of all, you can enjoy Dutch hospitality on every trip to Europe. Because KLM has you thought for the heart of Europe—Amsterdam—is the only daily morning T&T service to Amsterdam from New York and Chicago. With direct flight service from Houston. Call your travel agent for all the details.




KLM

The reliable airline of those surprising Dutch.

Terminal



Tower



*Los Rodeos Airport,
Tenerife, Canary Islands*

March 27, 1977

Runway 3,500 meters x 45 meters
(not to scale)



KLM

Pan Am

Apron

Collision

C-1

C-2

C-3

C-4

12

30



Ability

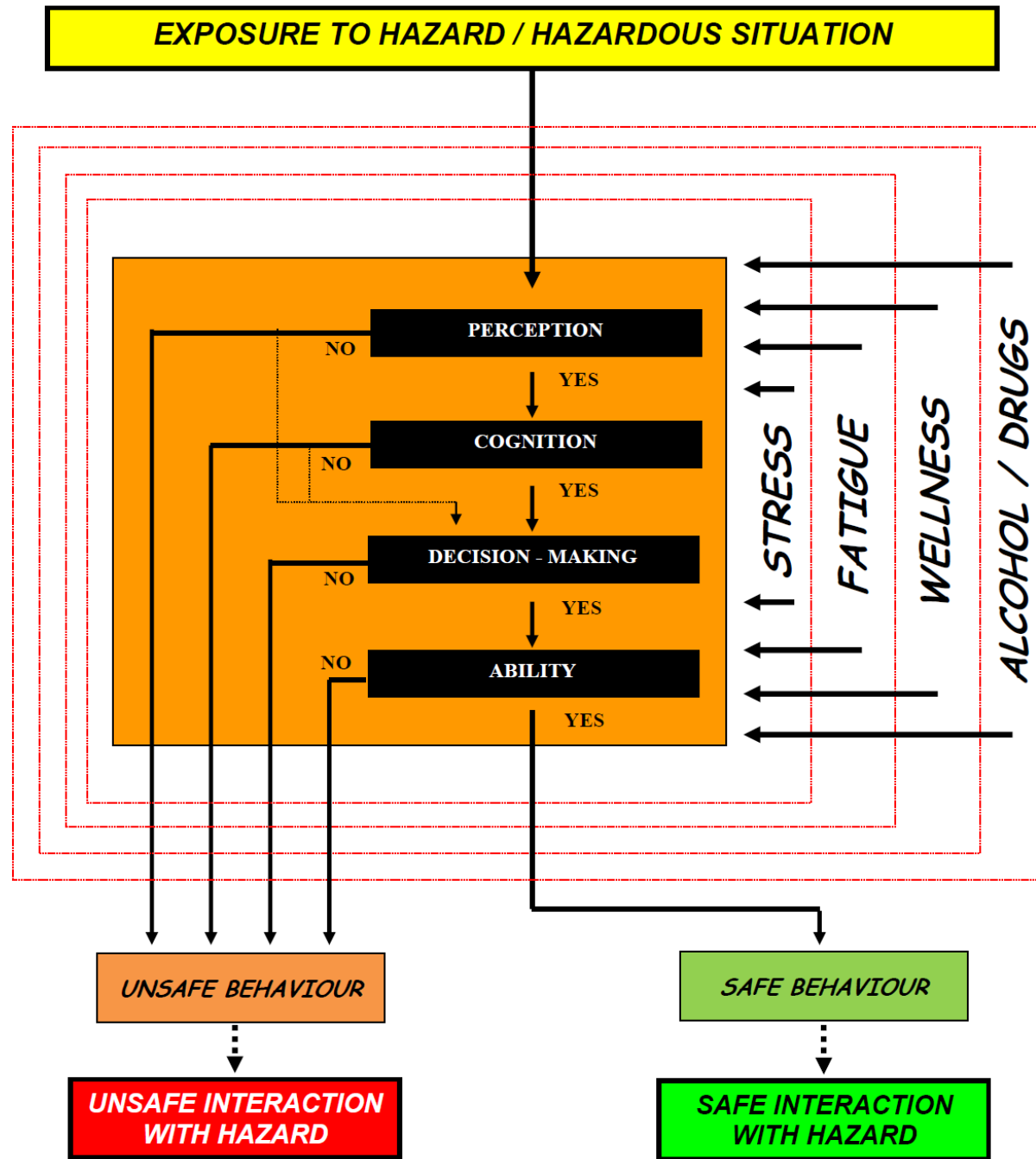


Fatigue.....

After 17 hours of sustained wakefulness, psychomotor performance decreases to the same level of impairment that is produced by a blood alcohol concentration of 0.05 percent.

After 24 hours of sustained wakefulness, performance decreases to a level equivalent to that observed in people with a blood alcohol concentration of roughly 0.10 percent.







“The accident starts in the office...”

Understanding Human
Risk Factors is just
common sense

Yeah right.

