

**HEALTH EFFECTS
OF NOISE EXPOSURE
AT WORK**

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- **Le silence est la qualité des machines parfaites
(P. VALERY)**

« Silence is the quality of perfect
machines »

- **Sans bruit, on s'entend bien !!**

« Noiselessly, we get along well »

- **O Bruit doux de la pluie**

Par terre et sur les toits (VERLAINE)

« O sweet noise of the rain,
On the ground and on roofs »

- ⇒ **Noise pollution : Most often quoted by French population (54 %)**
 - ⇒ **About 50 % of French people cannot enjoy acoustic comfort [= 55 db(A)]**
 - ⇒ **In towns, 40 à 50 % of inhabitants complain**
 - ⇒ **Noise invades :**
 - **tourist areas**
 - **countryside**
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⇒ **Noise related to transports is by far one of the most significant acoustic pollution**

- **car park** : **x par 3**
 - **mobility** : **x par 4**
 - **air area** : **x par 10**
 - **urban population** : **↗ de 50 %**
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- **In Europe**

- **Over 60 millions workers are exposed to noise (29 %)**

- **About 13.5 millions workers consider that work may damage health (7 %)**

- **In Spain**

- **1 million workers (7 %) consider that noise at work bring about pathology**

SUMER RESULTS (1994-2003)

(France)

- ⇒ 3 out of 10 workers suffer noise pollution**
 - ⇒ 18,2 % of workers sup. at 85 db(A) in 2003**
 - ⇒ 59 % have hearing protectors at their disposal**
 - ⇒ According to occupational doctors, $\frac{3}{4}$ of workers (exposed to over 85 db) risk a pathology**
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Sectors presenting most risks :

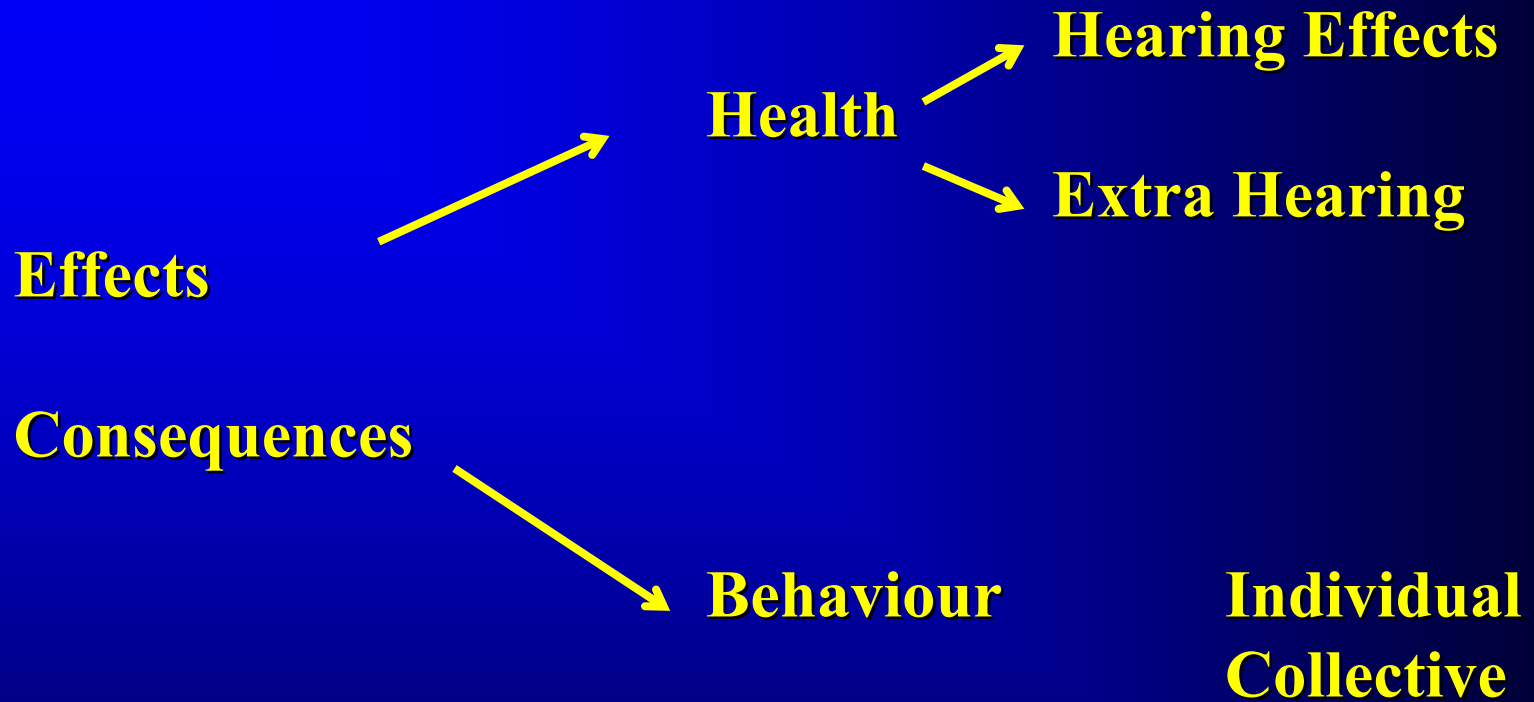
- Construction**
- Agriculture**
- Call Centers (acoustic shock)**
- Entertainment**
- Food manufacturing**
- Metal manufacturing**
- Transports**
- Education**

...

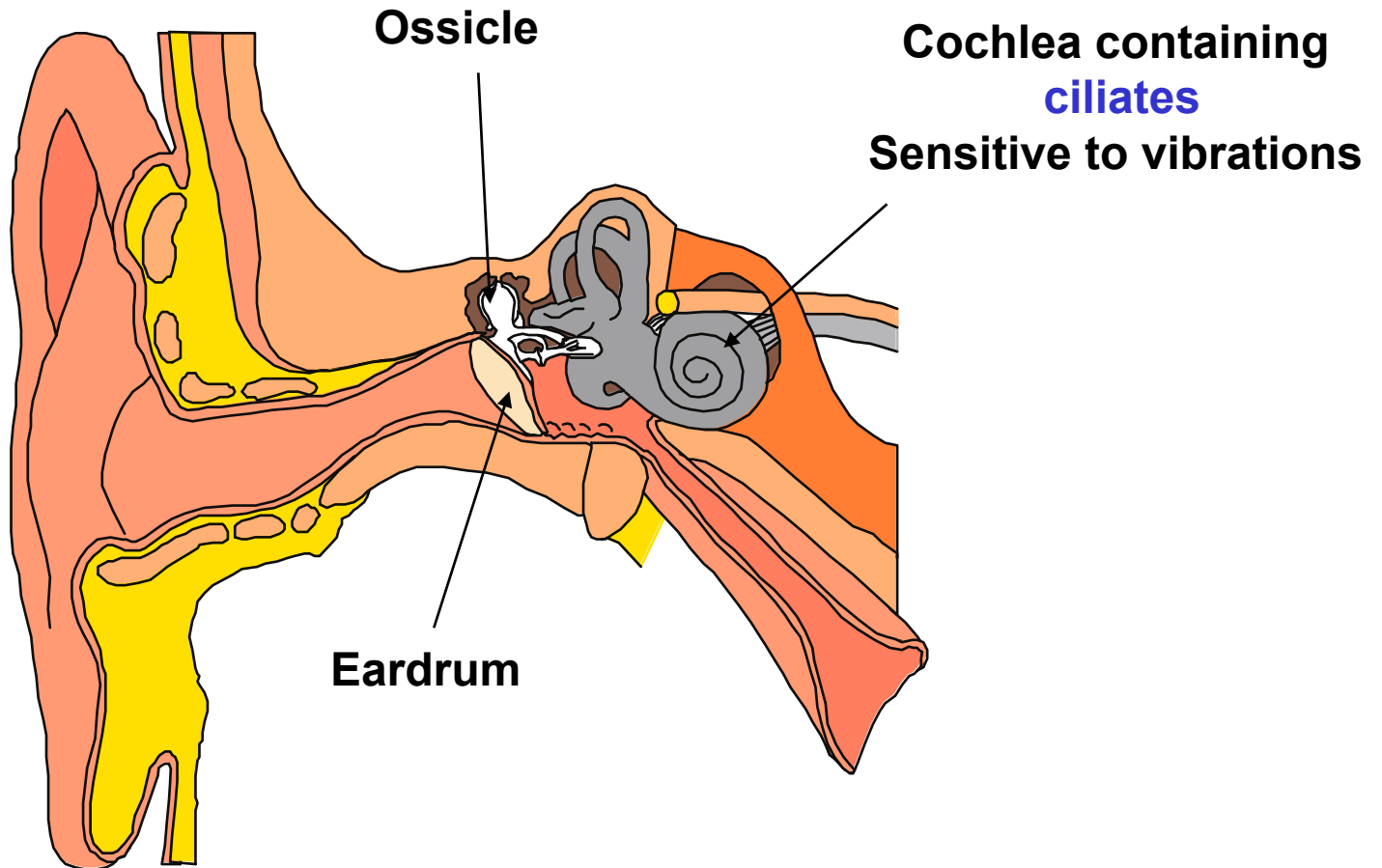
(source : Ergonoma Journal, February 2006)

Noise is everywhere :

- ⇒ Digital audio player and car audio
« Turn sound down ! »**
 - ⇒ Cafeteria, lunch room, swimming pool
very often over 85 db(A)**
 - ⇒ Music, leasure, disco...**
 - What consequences ?**
 - What costs ?**
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Ear Anatomy



The inner ear

- Cochlea → 20 000 cilia

- Air Vibration

- Liquid Displacement

- . Vibration amplification

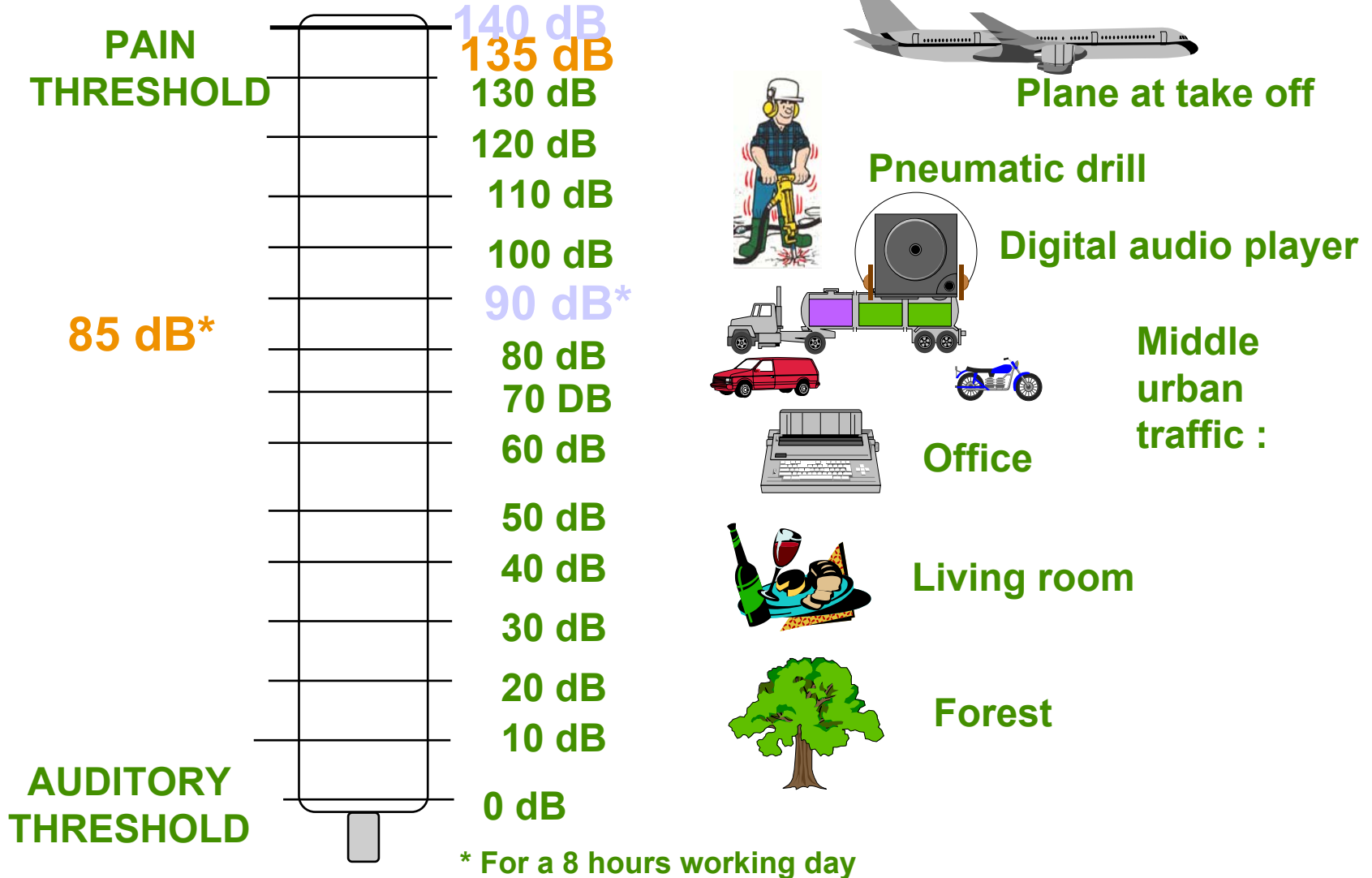
- . Selection per frequency

- Neurotransmitter : glutamate

⇒ Mechanical energy → nerve impulse

Noise pollutions

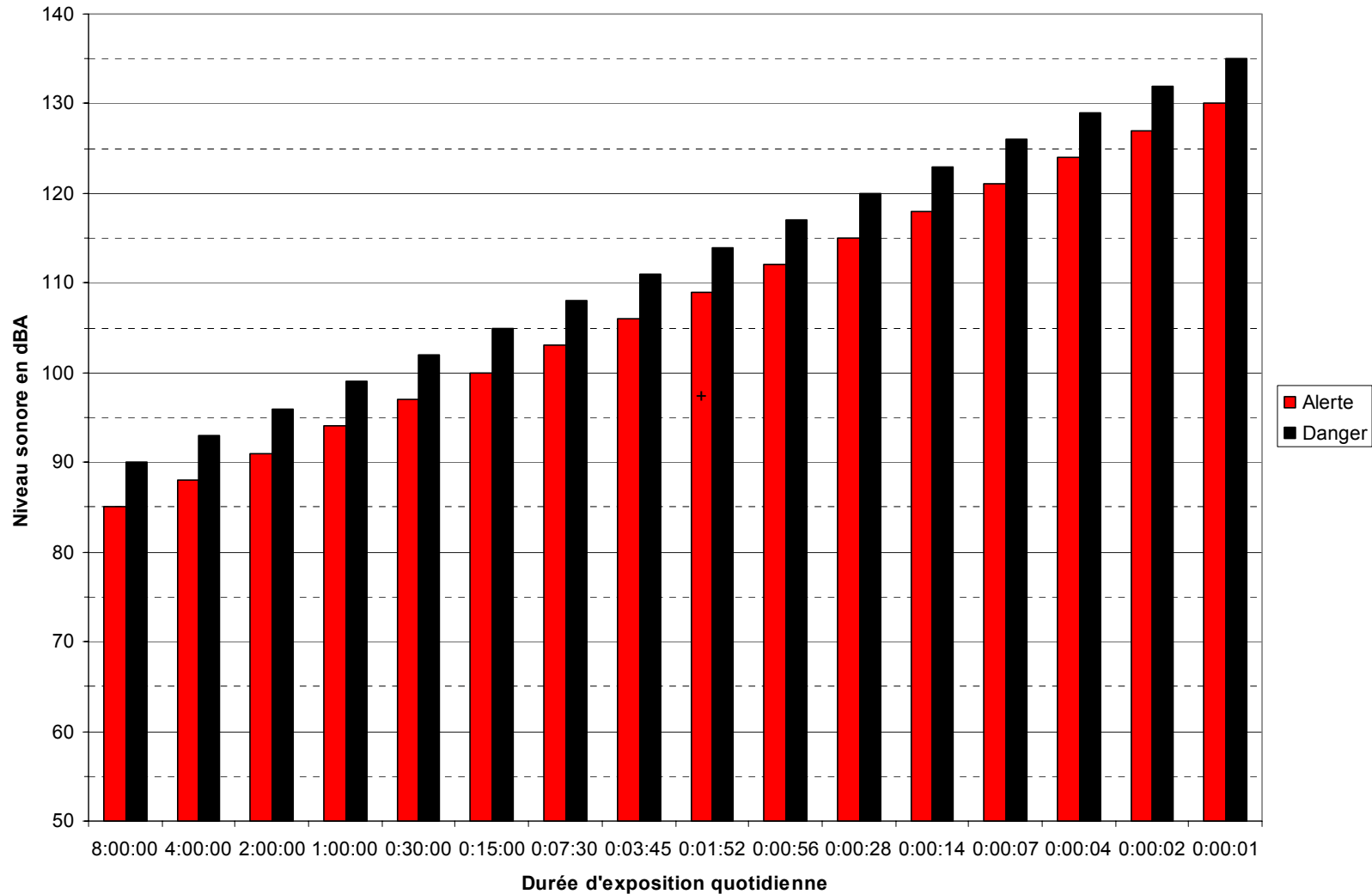
Some noise levels :



SOME NOISE LEVELS :

- **Supersonic Bang :** **129 db**
 - **Boilerworks :** **de 100 à 130 db**
 - **Pop or rock Orchestra :** **110 db**
 - **Fire alarm :** **101 db**
 - **Souped up motorized bike :** **100 db**
 - **Building site :** **95 db**
 - **Road Traffic(including heavy goods vehicle) :** **de 90 à 95 db**
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HEARING RISKS AS REGARD WITH DAILY EXPOSURE LENGTH



I/ HEALTH CONSEQUENCES



Development through several stages :

- **At the beginning, Reversible (hearing strain)**
 - . 16 hours rest for 112 minutes exposure at 100 db

 - **Then, Irreversible noise-induced hearing loss**
 - . Perception deafness
 - . Focused on 4000 Hz
-
-

**Jean! on ne peut rien
faire contre ce bruit?**

**Hein!!
Quok'té dis T'chiot?**



⇒ **Screening significance**

⇒ **Audiometry significance**

. **Sometimes complex clinical examination**

. **Often late clinical examination**

⇒ **Social, domestic, industrial noise**

⇒ **Handicap, Ageing**

“It’s always time to get hearing protection”

Extra hearing effects

⇒ **Sleep disturbance**

 ↗ **Medicines treatment**

⇒ **HTA, cardiovascular effects**

⇒ **Stress**

⇒ **Pregnancy problems**

Psychological noise effects

- Annoyance**
 - Mental health**
 - Performance**
-

Noise and ototoxic agents

- **Double - exposure :**
 - . Noise
 - . Chemical agents
 - **Many experimental studies are currently being led**
 - Medicines :**
 - . Antibiotics (aminoglycosides)
 - . Diuretics
 - . Aspirin
 - Working agents :**
 - . CO, aromatic solvent
 - . styrene
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III/ CONSEQUENCES - BEHAVIOUR

→ Individual Behaviour

Agressiveness, isolation...

→ Collective Behaviour

. At work : ↘ Vigilance
 ↘ Quality

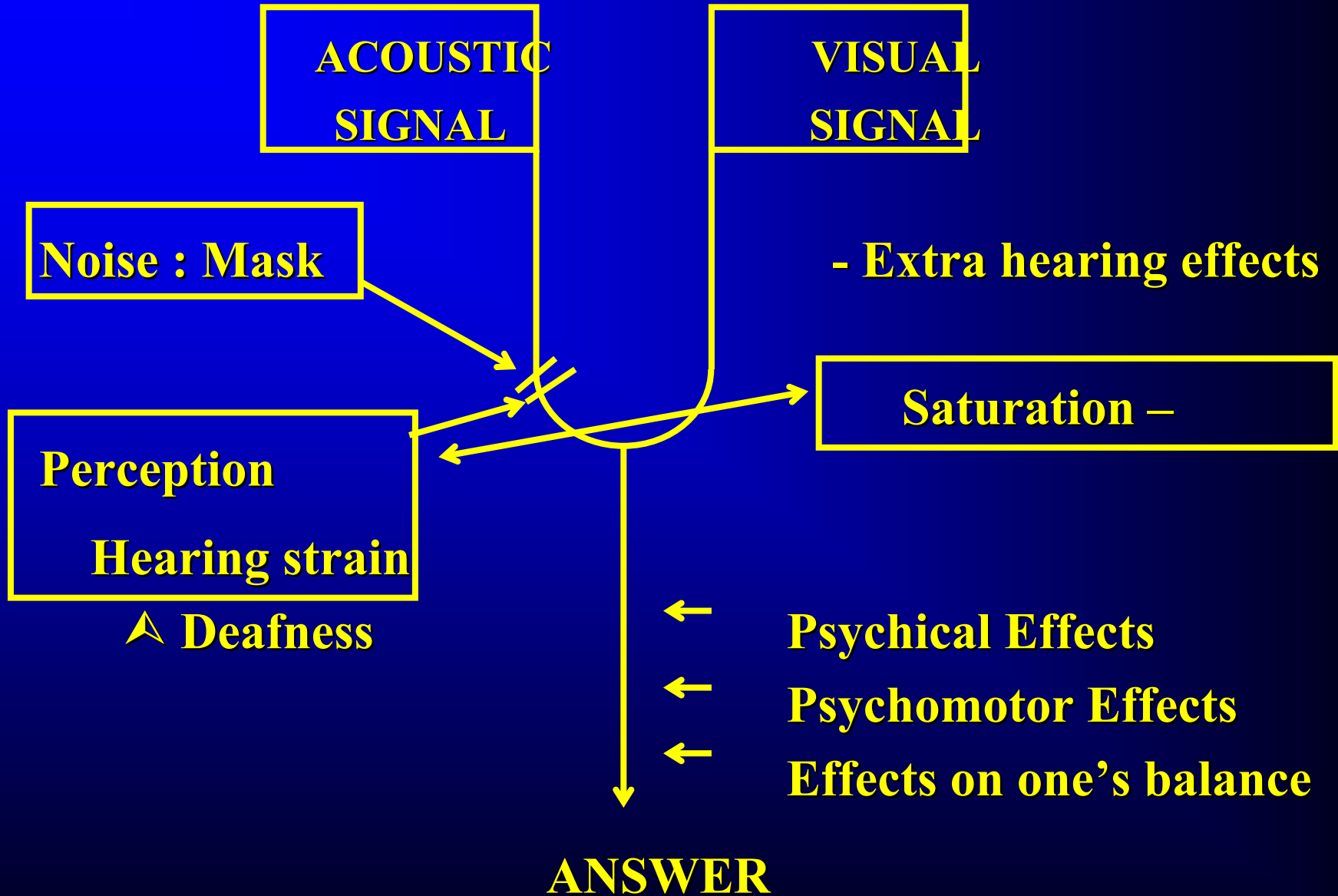
. Accident

→ Human relationship troubles

In the family, at school,

In society, at work

Noise effects on Human/Work system



III/ SOCIOECONOMIC CONSEQUENCES

A – ON GENERAL POPULATION

- ⇒ Noise-induced hearing loss (10 %)**
- ⇒ Digital audio player consequences**
- ⇒ Information**

B – ON SOCIETY

- ⇒ Airport, Teaching place**
- ⇒ Means of transports**
- ⇒ Noise Map (directive CE 25/02/02)
applicable in 2007**

C - AT WORK

⇒ Directive CE 6/02/03 application

⇒ In France : Decree of 19/07/06

. Action levels lower than : 80 db(A)

→ Hearing protectors

. Action levels over : 85 db(A)

→ Prevention Program

→ Hearing protectors

. Noise Exposure Limit : 87 db(A)

IV/ WHAT PREVENTION

- ⇒ The role of the occupational doctor
of the industrial hygienist**
 - ⇒ First of all : a collective prevention**
 - ⇒ Individual hearing protectors
(lowering from 20 to 30 db)**
 - ⇒ Medical aftercare with audiometry**
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CONCLUSION

- **Noise Prevention**

 - ⇒ **Profitable for all**

 - ⇒ **Skate in public health**

- **Significance of public awareness campaign**

**Tout comme la peau
dispose d'un « capital Soleil »
L'oreille possède
un « capital Bruit » limité**

**As well as
Skin has limited sun resistance,
Ear has limited noise resistance**

« Stop that noise »
