

MINIMUM COMPETENCE IN SCIENTIFIC ENGLISH

nouvelle édition

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2. FREQUENCY

Frequency is the expression of repetition. It refers to events that occur more often than once and less often than always. Frequency is, of course, related to measurement and consequently you will meet certain expressions already seen in Unit 1 for a second time. This function can be expressed by:

- lexical items (particularly adverbs),
- grammatical structures (particularly word formation),
- certain fixed adverbial phrases.

Self evaluation – entry test

■ Fill in the blanks using appropriate expressions. The first two letters of the answer are printed.

Example:

The batteries must be recharged **tw** a month. (two times)

→ The batteries must be recharged **twice** a month.

1. Under stress, the heart **be** faster. (*pulsates*)
2. Over the past 100,000 years, the polar ice sheets have advanced or retreated depending on periodic **sw** in the climate. (*variations, oscillations*)
3. The famous 19th century millionaire, Carnegie, emigrated to the US from Scotland and began work in a factory for \$1.20 **pe** week. (*each*)
4. There will be a **re** of epidemics as soon as natural immunisation dies out. (*they will happen again, repeated incidence*)
5. The Ebola virus produces a mortality **ra** which can be as high as 88% in human beings. (*a measure of frequency*)
6. Over the past 300 years, the average height of Europeans has increased **st** (*regularly*)
7. The world population is growing fast. A new child is born **ev** 60 seconds. (*each minute*)
8. The **se** of earthquakes that struck Missouri in 1811 were among the most powerful ever experienced in the United States. (*succession, repeated incidents*)
9. It is estimated that the **ho** flow of water of the Amazon river is between 12,000 and 44,000 million litres. (*every 60 minutes*)
10. The strength of a steel alloy depends on the **ra** of iron to carbon. (*mathematical relationship of proportion*)

Functions & Grammar

KEY POINTS – ORGANISING TIME: THE PRESENT & THE PAST

→ *There are four present tenses and four past tenses.*

PRESENT TIME

1. Present simple

Example

*The newspaper **says** ...*
*He likes Ann. She **drinks** coffee.*
*She **lives** in Turin.*
*He **leaves** for work at 7 o'clock.*
*Water **freezes** at 0°C.*

Meaning

The "general" present.
 Opinions and habits.
 The "status quo".
 Habitual actions.
 Scientific facts.

TYPICAL TIME MARKERS

(N.B. – Time markers may be implicit)

every day • usually • often • sometimes

2. Present continuous

Example

*Look! It **is raining**.*
*Mary **is trying** to finish her work.*
At the moment**, he **is working
in London.

Meaning

On-going present time.
 Actions happening now.
Temporary actions in the present.

TIME MARKERS

now • at the moment • currently • at present • temporarily

3. Present perfect simple

Example

*She **has already finished** her work.*
*He **has broken** his leg.*

Meaning

It is important **now** / a surprise.
 The **result** is important – he can't walk **now**.

3. Nouns

■ Cause

cause • reason • origin • source

➤ The real **cause** of his resignation was bad health.

■ Consequence

• consequence • result • outcome • effect
• by-product • spin-off

➤ The final **outcome** of the illness was the minister's resignation.

starter

Examples in context

THE SCANNING ELECTRON MICROSCOPE (SEM)

■ Read the description and find synonyms for the words in **bold**.

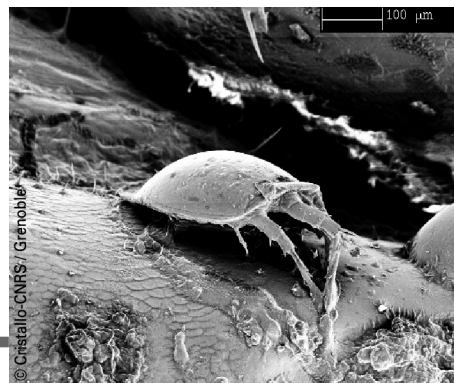
• Ask your neighbour questions about scanning electron microscopes.
How? – what for? – who? – when?

As the wavelength of visible light is approximately 4,000 angstrom, this means that there is a lower limit to the resolution of optical microscopes. To obtain higher resolution, shorter wavelengths are required. Electrons used in SEMs have wavelengths of 0.5 angstrom, **hence** it is possible to visualise molecules and even atoms.

Samples cannot be scanned unless they are dry (to prevent vaporisation) and electrically conductive. **As a result**, organic materials must be coated with a metallic layer, such as gold.

Thanks to the scanning pattern, a 3-dimensional image of the surface structure can be obtained.

The suggestion that electrons might be regarded as a form of wave motion and used for microscopy **stems from** the work of Louis de Broglie (1924), as an **outcome** of his research into quantum mechanics. The first SEM was built in 1933.



Dust mite (Acari)

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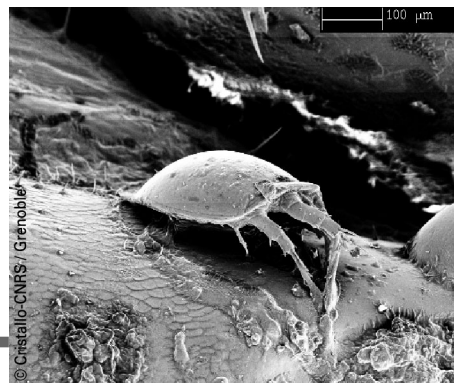
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Dust mite (Acari)

Exercises

11.1. Exercise

A. "All generalisations are dangerous, even this one", said Alexandre Dumas fils. We can make them more acceptable by qualifying them.

Match the phrases.

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. It is hardly ever acknowledged that ... 2. It is sometimes claimed that ... 3. It is commonly thought that ... 4. It is seldom admitted that ... 5. It is widely believed that ... 6. It has often been suggested that ... | <ol style="list-style-type: none"> a. the rich are too rich and the poor are too poor. b. efficient government is impossible in a democratic society. c. after the age of 55, the accident rate of surgeons increases sharply. d. the stars influence our health. e. incest is not uncommon in Western Europe. f. university examination procedures are unreliable. g. simple people are more honest than intellectuals. |
|--|---|

B. Make qualified generalisations about the photos.



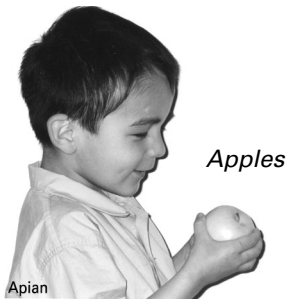
© F. Henry / UJF Grenoble

Women



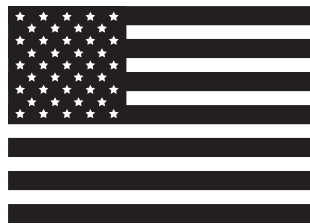
Julie Ricard

Dolphins



Apian

Apples



Americans



Scientists

C. Make two qualified generalisations of your own.

10.2. Sleeping pilots and chaos theory

starter

Why are there accidents? Where does the responsibility lie? One of the uses of technology is to devise ways and means of reducing the consequences of human error.

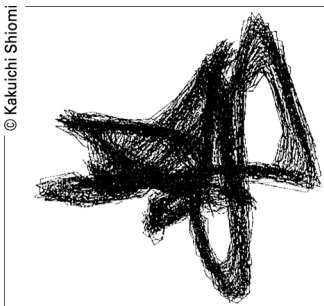
■ Fill in the gaps with the following words:

- SO THAT ▪ OBJECTIVES ▪ BY MEANS OF ▪ ENABLES ▪ DESIGN ▪ DEVISE ▪ PROVIDE ▪ MAKES IT POSSIBLE TO ▪ IS RESPONSIBLE FOR

- Give examples of both major and minor accidents.
- Were they brought about by faulty technology or human error?
- Was any action taken as a result of the accident?
- Give examples of how technology can be used to increase safety.

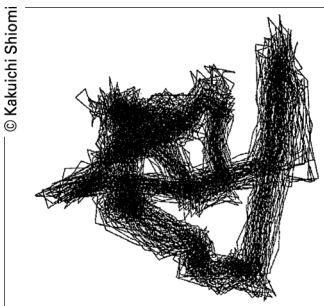
Despite the thousands of parts which are used in the construction of aeroplanes, very few air-crashes are caused by component failure. It is, in fact, human error that 80% of air accidents. This explains why one of the primary of the aircraft industry today is to ways of improving these figures. One area of particular concern is pilot fatigue. This problem is far more widespread than is commonly realised and Dr. Mark Rosekind

claims that "70% or more pilots say that they have fallen asleep at least once while piloting". Fatigue is particularly linked to the crossing of time zones which can severely disturb the circadian rhythm.



Normal voice pattern

The Japanese company, Electronic Navigation Research Institute (ENRI), is currently in the process of developing a monitoring system which will be able to early warning of fatigue voice recognition techniques.



Fatigued voice pattern

Biological functions, such as blood pressure, heart-beat and voice, have a fractal structure which can be identified. Under stress or fatigue, these physiological manifestations undergo change and consequently, as can be seen in the figure, the pattern alters, gradually losing its structure and becoming chaotic. By using the mathematics of chaos theory, Kakuichi Shiomi, chief researcher of ENRI, has been able to software which these minute distinctions to be identified the pilot's voice pattern can be matched with a control model of an alert voice. It takes no more than 10 seconds for data samples to be processed which means that fatigue can be measured in real time without interfering with the normal activity of the flight crew.

According to Shiomi, the system detect tiredness in test subjects 10 to 20 minutes before they become aware of it themselves.

2.4. Checkpoints

IN OTHER WORDS

Definitions – relative clauses: "which / that"

Make a definition using the pattern:

"An X is a Y **which** does Z."

Example: "A bat is a mammal which flies by night."

■ Define these words used in Exercise 2.2:

predator ▪ sonar system ▪ skin ▪ food

BACK TO BASICS



"Actually": do you use this word correctly?

■ Is the following sentence correct or not?

"Actually, the number of illiterate people in the world is increasing steadily."

■ Check in the answer section.

THE WORD WEB – MULTI-WORD VERBS

The meaning of many verbs depends on the preposition or adverb that follows. These are called multi-word (or phrasal) verbs.

■ *Match the meaning of the verb with the definition and then write in the correct particle for each verb: IN ▪ OF ▪ UP ▪ OUT ▪ FOR ▪ ON.*

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. When visibility is reduced, airports rely radar control. 2. In 1830, Babbage designed a machine to carry complex arithmetical calculations. 3. A protein may consist several polypeptide chains held together by weak molecular bonds. 4. In 1937, four Soviet scientists set temporary scientific stations on drifting icebergs in the Arctic. 5. Chemists can work the number of carbon atoms from the weight of the object. 6. Testosterone is involved the development of secondary sex characteristics such as the growth of body hair, and changes in the larynx. 7. It is the ability to use the Sun and the stars to navigate which accounts the migration of birds. 8. The level of pH depends the strength of the acid. | <ol style="list-style-type: none"> a. to do / to perform b. to be made of / formed from c. to be determined by d. to calculate / find the solution e. to create / establish f. to use because you have confidence g. to be linked / a necessary part of h. to provide an explanation |
|---|--|

FRAMING
 Good morning. Well, what I would like to discuss with you today is the problem of rising medical expenses, and with particular with reference to the situation in France.

TOPIC & FOCUSING

RELEVANCE OF TOPIC
 As you know, over the last 40-50 years, there has been a steep increase in medical expenditure and governments are now faced with a major political problem of finding ways of financing the health services.

ORGANISATION & SEQUENCING
 To begin with, we will look at a line graph, giving comparative data for male and female expenditure during a normal life span. This will be followed by a short commentary and finally, I will go on to discuss some of the causes and consequences of this state of affairs.

The line graph in the figure is adapted from INSEE 1999 and gives comparative data for the average annual per capita expenses for men and women in France. As can be seen, age is indicated at 10 years intervals on the horizontal axis, while annual costs are shown in euros on the vertical axis on the left hand side – here.

SOURCE
REFERENCE TO VISUALS

GENERALISATION & APPROXIMATION
 Basically, what the graph shows is that, in the first few years of life, there is a tendency for medical costs to be similar for the two sexes.

COMPARISON
REFORMULATION
 That is to say, the younger people are the more medical care they need so, as can be expected, immediately after birth spending is high (roughly 200 euros).

LINK WORD
 However, over the next 5 years, the curve drops steeply for both sexes and then levels off until the age of 10.

DETAILED DATA DESCRIPTION

CHRONOLOGY
 At this stage the two curves separate. The bottom curve – here – for males, continues to drop until the age of 20, where it reaches its lowest point of approximately 80 euros.

MODIFICATION
 From then on, it rises slowly but steadily in function of age, with a slight acceleration after the age of 55.

- to take out a tooth – remove
- to step up production – increase
- to step in to prevent a conflict – intervene
- to cut up meat – divide into small pieces
- to cut off the electricity – stop the supply

Exit test

1. might / may (have)
2. should
3. must have
4. could / can
5. may / could / might have
6. will
7. assume
8. feasible
9. expected
10. likely

**UNIT 10****Entry test**

1. target
2. supplying
3. so as to
4. aim
5. thereby
6. designed / devised
7. by means of
8. enables
9. allowed
10. through

Examples in context

1. What does the human being provide?
2. How does the machine operate?
3. How does the man keep his balance?
4. What do the counterweights do?
5. What is the water pipe for?
6. What do the steel springs do?

7. In what way is the pressure transmitted?
8. What do the valves control?
9. What was responsible for industrial stagnation?

Exercises**→ 10.1. – A**

1. designed
2. provides
3. responsible for
4. make it possible
5. in order to
6. so that
7. purpose
8. aims

→ 10.1. – B

1. / f • 2. / a • 3. / b • 4. / e • 5. / g •
6. / d • 7. / c

→ 10.2.

- ... human factor that is responsible for 80% of air accidents...
- ... the primary objectives of the aircraft industry ...
- ... is to devise / design ways of improving these figures...
- ... will be able to provide early warning ...
- ... by means of voice recognition ...
- ... has been able to design / devise software ...
- ... which enables these minute ...
- ... be identified so that the pilot's voice ...
- ... the system makes it possible to detect tiredness ...

→ 10.3.

- What has it enabled them to do?
- What was the primary aim?
- Why do they adopt unusual behaviour?
- Why did she shift position?
- What was the objective?
- What made it impossible to gain access?
- What were the counter measures devised to do?
- Why did he walk away?

