



**АНГЛИЙСКИЙ ЯЗЫК ДЛЯ
ПРЕПОДАВАТЕЛЯ
ИССЛЕДОВАТЕЛЬСКОГО УНИВЕРСИТЕТА**



МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ

Нижегородский государственный университет им. Н.И. Лобачевского

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Учебно-методическое пособие

Рекомендовано методической комиссией филологического факультета
для преподавателей и сотрудников ННГУ

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Учебное пособие включает в себя 11 частей, в которых представлены задания на тренировку и совершенствование навыков письменной и устной речи в различных сферах и жанрах повседневной, деловой и научной коммуникации. Особое внимание в пособии уделяется методам проектов и кейсов, необходимых для успешного решения коммуникативных задач в ситуациях общения. Учебно-методическое пособие предназначено для преподавателей ННГУ, слушателей программы повышения квалификации по английскому языку.

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Part I BREAKING THE ICE

WARM-UP

- a. Have you ever had any experience of attending an event where almost all the attendees were strangers, for example:
 1. a large conference;
 2. an external training course (i.e. not one organised within a single company);
 3. a formal party.
- b. If you have limited experience of such events, what events you might attend in the future careers.
- c. Discuss with your partner how easy / difficult it was/ would be to start conversations with strangers. Discuss also how it might be easier or more difficult to do this in English.

QUIZ

- **In pairs, look at the headline and answer the question.**

What is the meaning of the phrase *breaking the ice*?

- **Do the quiz. Answer the questions. If you agree with none of the answers to a particular question, choose the answer that is closest to you. Explain your answer to your partner.**

Quiz: Breaking the ice.

1. You decide to attend an international conference. You have never attended such an event before. What is your main reason for attending?
Choose one option.
 - a. I'm going to attend lots of presentations so I can keep up-to-date with developments in my industry.
 - b. I'm hoping to meet lots of interesting people –maybe some of them will be useful for my future career.
 - c. I have a target of twenty people that I want to meet, so I can persuade them to buy our products.
2. On the first evening, you attend a 'welcome party'. You arrive in a large hall filled with about 500 people. They all seem to be talking to each other in groups.
 - a. Go up to one of the groups, introduce yourself and ask if you can join them.
 - b. Go up to one of the groups and listen to the conversation. Maybe you can join in later.
 - c. Find where the food is being served and try to start a conversation with someone in the queue.
 - d. Walk around the hall, pretending to be looking for someone. Avoid eye contact with other people.
 - e. Turn around and go home.
3. At the conference party, which of these problems would be worse for you?
 - a. No-one wants to talk to you.

- b. A really boring person wants to talk to you ... and you can't escape from him/her.
- 4. Where is the best place to stand if you want people to talk to you?
 - a. In the middle of the hall.
 - b. By the wall.
 - c. Outside.
 - d. By the buffet / bar.
- 5. Which topics of conversation could you use to break the ice with someone?
 - a. How much you hate parties like this.
 - b. The conference.
 - c. Your work.
 - d. Sport.
 - e. The weather.
 - f. Politics.
 - g. How bad the food is.
 - h. Where you're from.

READING

1. Read the texts and find which questions of the quiz are discussed in them.
2. Go through the quiz again and discuss which part of the text mentioned and what it said about them.
3. Do you agree with all the advice in the texts?

Breaking the ice (part 1)

Everyone knows that conferences are great for networking. Of course, you might also learn some new things at the presentations and workshops, but it's what happens during the coffee breaks and the evening events that make conferences such a good use of your time and money. Conferences are all about meeting people and, yes, making friends. Of course, some of those new contacts may become customers for your company too, but don't try to sell to them at the conference unless you really have to. Most of the people you meet won't want to buy from you – but they might be able to point you in the direction of some potential customers that they know. In other words, relax – don't try too hard. Just be yourself, and allow any business partnerships to appear naturally.

The most difficult part of networking is always breaking the ice: starting a conversation with a stranger and then keeping it going for those important first five minutes. It can be incredibly daunting to walk into a room full of

people, all of whom seem to know each other and are involved in deep conversations. How on earth do you join in? Well, the most important thing to remember is that most of those people are in the same position as you. Half the people in the group conversations also don't know anybody and are nervously trying to get involved. The busy-looking people who are walking around the hall are probably just pretending to be busy so they don't have to admit that they're alone.

The best thing to do is to try to get involved in one of the conversations. It's polite to introduce yourself and ask if you can join the group, but there's nothing wrong with standing and listening for a few minutes first. Don't worry that the group are discussing top-secret business deals: they almost certainly aren't! And if they are, they should expect people to interrupt them from time to time – it's a networking event, after all.

The worst thing to do – apart from standing in the middle of the hall by

yourself – is to walk around looking busy. This is like holding up a sign saying ‘Please don’t talk to me’. If you really feel too embarrassed to talk to strangers, perhaps you should go home and try to network at the conference tomorrow, where it should be much easier. A much better solution, though, is to move slowly around the room, make eye contact with people, smile and say ‘hello’. That way, even if you’re too nervous to start a conversation, other people will understand that they can start a conversation with you.

Sometimes, we’re our own worst enemies: we feel bad when no-one wants

to talk to us, but then when someone tries to engage us in conversation, we can’t wait to get away. If someone has made the effort to come up to you, they deserve at least five minutes of your time, no matter how boring that person seems. Even if you decide at the end of that time that the person is too boring to talk to, perhaps they can introduce you to someone else who you can talk to.

And if you’re lucky, perhaps more people will join your conversation group, and suddenly you’ll find yourself in the middle of the action.

Reading: Breaking the ice (part 2)

I don’t smoke, and I don’t intend to start, but I’ve noticed that smokers seem to have a natural advantage at networking events: they hang around outside, where it’s quieter, there are fewer people and it’s easier to talk, and they have an easy way to start a conversation (*Do you have a light? It’s cold out here, isn’t it?*). Of course, you don’t have to smoke to get these advantages: you could simply step outside for some fresh air and try to strike up a conversation with someone who is standing alone out there. You may find that half of the ‘smokers’ aren’t actually smoking, just taking advantage of the natural opportunity to start conversations.

Another natural place for starting conversations is the buffet or bar, even if the conversations are very superficial: *Do you know where I can find the spoons? Could you pass me the milk?* Of course, you need to be ready to follow up these ice-breakers with something much more engaging.

So what can you talk about? The obvious thing to mention is the party itself – but whatever you do, don’t start moaning about how much you hate parties.

Nobody likes listening to moaners. Why not ask if the other person knows a lot of people at the party, or if they are enjoying the party. Another great topic is the conference: did you attend any good presentations today? Are you giving a presentation yourself? Have you travelled a long way to get here? Topics like sport and the weather are fine for keeping a conversation going, but might not be suitable as an opening discussion. The same goes for work: by all means find out what the other person does for a living, but perhaps try a little small talk about the party, the conference or the food first.

Finally, you may think that socialising in a foreign language would be harder than in your first language. In fact, in many ways it’s easier. You’ve got a great topic of conversation which other people will always find interesting: where

you're from. Many people will also treat you with more patience when they know you are a foreigner, and you are having problems with the language. Of course, you can't just walk up to someone and say "*Hi, I'm from Brazil*". It's always better to start with a question about the other person, rather than a statement about yourself. But by choosing the topic,

you're making it much easier for the other person to follow up with a question about you: "*And what about you?*"

So don't hide, don't walk around looking busy, and don't try to escape from the first boring person who tries to talk to you. If you make an effort, you'll find the experience a lot more enjoyable – and successful for your professional career

VOCABULARY

networking	point sb in the direction of sth	a potential customer	daunting
pretend to do sth	admit sth	get involved in sth	polite
embarrassed	your own worst enemy	engage sb in conversation	interrupt sb
effort to do sth	deserve sth	hang around	strike up a conversation
superficial	engaging	moan	small talk
		patience	hide.

- 1) **Work in groups and match the beginnings with the endings to make phrases for starting conversations. Note that many of the phrases are taken from the reading text. The first group to finish is the winner.**
- 2) **Which of the phrases/strategies would you choose to use in an international conference?**
- 3) **Work in pairs, one student reads the beginning of the phrase and another one gives the ending.**

USEFUL LANGUAGE

Match phrases 1-20 with their ends a-t.

Ice-breakers

- | | |
|---|---------------------------------|
| 1. Excuse me. Do you ... | a. ... a long way to get here? |
| 2. Hello. My name's XXX. Is it ... | b. ... for a living? |
| 3. Are you here alone ... | c.... good presentations today? |
| 4. And what about you? ... | d. ... have a light? |
| 5. It's cold out ... | e. ... have you tried it? |
| 6. I just came out for some fresh air – ... | f. ... here, isn't it? |
| 7. Sorry, do you ... | g. ... I can find the spoons? |
| 8. Are you giving a ... | h. ... me the milk? |

- | | |
|---------------------------------|--|
| 9. This salad's delicious – ... | i. ... mind if I join you? |
| 10. Do you know many ... | j. ... morning's lecture? |
| 11. Are you enjoying ... | k. ... OK if I join your group? |
| 12. It's a great ... | l. ... or with a group? |
| 13. Is this your first ... | m. ... party, isn't it? |
| 14. Did you attend any ... | n. ... people here tonight? |
| 15. Do you know where ... | o. ... presentation at the conference? |
| 16. Did you enjoy this ... | p. ... round here? |
| 17. Have you travelled ... | q. ... the party? |
| 18. What do you do ... | r. ... there are too many people in there. |
| 19. Are you from ... | s. ... time at the conference? |
| 20. Could you pass ... | t. ... Where are you from? |

SPEAKING

Leaving a conversation

- Answer the questions.
 - What strategies are used for leaving a conversation?
 - Is it better to lie about your reason for leaving?
 - Is it acceptable to simply walk away?
- Complete the three short speeches using the words from the box at the side. Compare your answers with your partner.
- Which of the three speeches or which combination of the sentences from the speeches—would you use?
- Give a short leaving-a-conversation speech from memory.

- | | |
|--|-----------|
| 1. Well, I've just _____ someone that I need | card |
| to speak to _____. It was very _____ meeting | chance |
| you. Let me give you my _____. I'll _____ | couple |
| you when I get back home, so we can stay in | email |
| _____. Maybe we can have a _____ talk later | excuse |
| in the conference. See you _____. | free |
| | have |
| 2. I'm really _____, but I've just | hopefully |

had an _____ SMS from my
husband, so I need to go _____
and call him. _____ we'll have a
_____ to talk later.

later
mine
need
nice
on
outside
pleasure
proper
rest
sorry
spotted
touch
urgent
urgently

3. Right, so if you'll _____ me, I _____ to go
and talk to a _____ of other people. Do you
_____ a business card _____ you? ... Great,
thanks. And here's _____. Feel _____ to
email me. Well, it was a _____ meeting you.
Enjoy the _____ of the conference.

ROLE-PLAY

1. Write your name, job title and institution name on each slip. This could be real information or you could make up the information about yourself.

Name: Job title: Company: Institution:	Name: Job title: Company: Institution:	Name: Job title: Company: Institution:	Name: Job title: Company: Institution:	Name: Job title: Company: Institution:	Name: Job title: Company: Institution:
---	---	---	---	---	---

2. Study the rules of the role-play very carefully.

There is a strict time limit of ten minutes – but you should not look at the clock or watches all the time.

During the role-play, you should pretend you are strangers at a conference.

You should start conversations with the other people in the class, exchange business cards at an appropriate time, and leave the conversation politely in order to continue meeting people.

The aim is to talk to five different people and to collect exactly five different business cards from the people they have spoken to. If they collect too many business cards, it means you are going too fast. If they don't collect enough, it means they are too slow. You can use the information on the business cards to help make conversation.

The maximum group size is three people. If a fourth person joins, one member of the group needs to make an excuse and leave.

You should try to make their conversations as natural as possible, and not simply treat it as a game.

Pay attention to the accuracy of language and the effectiveness of ice-breaking strategies.

Part II CULTURAL AWARENESS. LANGUAGE AND COMMUNICATION.

USEFUL LANGUAGE. Expression of your opinion, agreement/disagreement and refusal (British variant)

Expressing Opinion:

I think that...	To my mind,
I don't think that...	In other words,
I've always thought that...	I believe
In my opinion,	What do you think about..?
From my point of view	What about... (going to the cinema)?
As far as I can see...	Really?
I strongly believe that...	
I have my doubts about...	
I doubt about...	
I guess	

Agree or disagree:

I agree with you	I don't agree with you
I think you are right	I'm afraid , you are not right
I absolutely agree with you!	It seems to me it's not quite true
I'm with you here.	I don't believe it
I am of the same opinion	I'm not at all sure about it
	I don't think...
	Personally I don't agree

Refusal:

I'm afraid I can't..	I'd love to but...
I'm sorry but I have no time	

That'll do, thank you	
I would like but...	
I wish I could	
No more thank you	
I don't think that I can...	
Maybe not this time....	

SPEAKING

1. Answer the questions of the quiz in pairs. Express your opinion using different conversational formulae. Discuss your answers with the group.

1. What does the word "home" suggest to you?
 - 1) It's really important and everything that's in it. It's the place where I feel happy and safe.
 - 2) It's important, but not as much as my job or friends.
 - 3) It's a place to sleep and sometimes to eat, but I had to sleep and eat somewhere else, it wouldn't bother me.
2. Which of the following would you choose to have?
 - 1) A big spacious detached house with high ceilings, wooden floors and a fireplace but no money left to spend on holidays, going out, little luxuries etc.
 - 2) A medium-sized flat on the third floor, with quite a good view but noisy neighbours and a bit of extra money to spend on going out sometimes.
 - 3) A cramped apartment on the first floor and lots of extra cash to spend on yourself.
3. Which of the following statements best describe your house or flat?
 - 1) It's always in very good condition and clean and tidy as I spend a lot of time looking after my home.
 - 2) It's in fairly good condition and usually quite clean and tidy although sometimes I don't look after my home as much as I should.
 - 3) It's in quite bad condition and usually untidy.
4. Where would you prefer to live?
 - 1) In the countryside or a very quiet residential area.
 - 2) In a lively suburb, but one with plenty of shops, restaurants and pubs.
 - 3) Right in the centre of town where everything's happening.
5. On average, how much of your free time (when you are not sleeping) do you spend at home per week?
 - 1) More than thirty hours.
 - 2) Between twenty and thirty.
 - 3) Less than twenty.
6. Which of the following statements best describe your lifestyle?

- 1) Quiet. I take things calmly and don't get stressed about everyday matters.
- 2) Sometimes quiet and sometimes hectic. It depends on the time of year and day of the week.
- 3) Usually hectic. I spend most of my time running from one place to the next, doing a hundred different things at the same time.

7. What do you enjoy doing most in your free time?

- 1) Reading, listening to music and relaxing at home.
- 2) A mixture of things, a bit of sport, reading, cinema and occasionally clubbing.
- 3) Being out with my friends, clubbing, socializing and keeping busy. I get bored if I spend too much time alone at home.

8. Which of the following types of holidays would you prefer?

- 1) Rural tourism. You can get away from the crowds and relax, walking or cycling in the countryside.
- 2) A tourist resort with some entertainment facilities, but reasonably quiet and relaxing.
- 3) A busy, lively tourist resort, where I can go clubbing all night long.

2. Calculate how many A, B and C answers you have got. Read the results below.

1) Mostly As: What a quiet, relaxed life you lead. Home is definitely where the heart is for you. Your idea of paradise is a little cottage in the country, far away from the stress of the big city. Don't forget, though, there may be something else out there that's interesting.

2) Mostly Bs: Well, you seem to have a very balanced approach to life. You like doing exciting things but you also know when to relax and take it easy. You value your home, but not too much as other things interest you too.

3) Mostly Cs: What a life! You love to be in the centre of it all, running around and socializing. Do you remember where your home is? It sounds fun, but be careful not to get too stressed. Everybody needs to relax sometimes.

LANGUAGE IN USE

1. Use the correct adverbs in the sentences:

QUIETLY	CAREFULLY	USUALLY	PROBABLY
REALLY	COMPLETELY	SURPRISINGLY	ACTUALLY

WELL	QUICKLY	HARD	GENTLY
UNFORTUNATELY	DEFINITELY	HARDLY EVER	BASICALLY

- 1) I _____ want to see Peter tonight. There's something important I need to tell him.
- 2) She did the exam very _____ and the teacher gave her a good mark.
- 3) I _____ see my family as they live in another country.
- 4) She drives very _____. She's never had an accident.
- 5) I _____ have a piece of toast for breakfast. In fact, every day during the week, but at weekends I have something else.
- 6) She was _____ exhausted after walking all day in the countryside.
- 7) If you work _____ you should pass all your exams without any problems.
- 8) She speaks very _____ and it's difficult to hear what she's saying.
- 9) _____, the worst student in the class got the best mark.
- 10) We'll _____ arrive around 6 o'clock but I can't be sure.
- 11) Peter said it started at 6, but _____ it starts at 6.15.
- 12) If we walk _____ we should get there on time.
- 13) If you touch the animals _____, they won't hurt you.
- 14) _____, I said something that I shouldn't have said and my friend felt very upset.
- 15) _____, all you need to do is bring some warm clothes and a packed lunch.

SKILLS PRACTICE

1. **Work in groups of three or four. You must define the word in bold on the card using relative clauses but without saying the word stated. Use the following phrases:**

- 1) It's a person who/ whose.....
- 2) It's a place where.....
- 3) It's a thing which.....
- 4) It's a time when.....

Millionaire
<i>money</i>
<i>luxury</i>
<i>rich</i>

E.g. It's a *rich* person who can spend a lot of *money* on *luxurious* things.

2. **Read the statement and express your opinion:**

1. Everybody should go to University.
2. Children over the age of 12 don't have to go to school if they don't want to.

3. People mustn't smoke in any public places.
4. People shouldn't tell lies under any circumstances.
5. Politicians must take very difficult exams before they can stand for election.
6. Young people have to spend at least one year living in a foreign country.
7. People shouldn't make sexist or racist comments or jokes.
8. People don't have to pay taxes.
9. Holidays should be a lot longer than they are now.
10. Governments shouldn't spend money on weapons.
11. People don't have to show identification when passing from one country to another.
12. Factories shouldn't pollute the atmosphere under any circumstances.
13. Everybody has to take turns in looking after children and old people in a community.
14. Drivers shouldn't use their cars more than twice a week.
15. People mustn't eat or drink more than they need.
16. Everybody must earn the same amount of money if they work for the same number of hours.
17. Wealth must be divided equally between countries.
18. English should be the international language.

3. Situation

1. Read the situation. In your opinion, what big construction projects might impress foreign visitors?

A country in Asia wishes to become better known in the world. It would like to attract more visitors from abroad and to encourage more people to use its conference facilities. However, it has no special advantages to do this.

The Government feels that it needs to have a big project which will capture foreign people's imagination and also be good for its citizens. After some discussion, the Minister of the Environment, Susan Lau, has come up with an interesting idea.

LISTENING

1. ► 2.11 Listen to an extract from a television news programme.

Discuss the questions:

- a. What is Susan Lau's new idea?
- b. Why will the project probably appeal to foreigners?

2. ► Listen again and complete the information.

The Sky-High Project

Type of project: _____

Height: _____

Width: _____

Number of people living in the city: _____

Number of people working in the city: _____

Facilities in the city: _____

Future action by the Minister: _____

SPEAKING. DISCUSSION

1. Read the facts below prepared for the project. Work with the partner to discuss the questions.

1. How might each factor affect the design of the new city?
2. What do you think will be the benefits and the problems of building the vertical city?
1. The capital city is overpopulated and polluted. There is a serious housing problem in the city. Many people live in overcrowded apartments and houses.
2. Traffic moves slowly, so commuters spend a long time travelling to work.
3. In the area chosen for vertical city, there are many poor and homeless people, and a high crime rate.
4. There is a high rate of unemployment in the city especially in the construction industry.
5. Many businesses have closed down in recent years in the area chosen for vertical city.
6. There are strong winds and even hurricanes at times in the country. Also, the area is at risk from earthquakes.
7. People in the north of the country wish to create an independent state, against the wishes of the Government.
8. There's hot weather throughout the year. Temperatures often reach +45C.

LISTENING

1. ► 2.12 Listen to two engineers talking about the benefits of the project. Note down the benefits they mention. Compare them with the ones you discussed in 3

2. ► 2.13 Listen to four conversations about a name for the vertical city and complete the gaps.

- a. A: What _____ the present name, the Sky-High project? It's easy to remember.

B: I'm not too sure about that. _____ is Tower City. It's short and easy to pronounce.

b. A: I think Hope is a good name for the city. It'll give accommodation for a lot of poor and homeless people.

B: That's _____.

c. A: Tower City? I think that's the best name. Why don't we suggest it to the Minister?

B: Yes, _____. It's the best solution, I think.

d. A: We _____. We'll call it Sky-High City.

B: OK, let's put the name in our report to the Minister.

SPEAKING. DISCUSSION

1. You're studying at the capital city's biggest university. Susan Lau has sent the university a list of questions about the new project for discussion. Look at the questions and choose FIVE which interest you. Discuss the questions in groups and make decisions.

1. What is the best name for a new city?
2. Which material should be mainly used to construct the city? Glass? Concrete? Steel? Other?
3. Who should be the new city for? Poor people? Rich and poor people? Anyone who can afford it?
4. What style would be suitable for the apartments? Classical? Modern? Futuristic? Other?
5. Should there be many or few restaurants?
6. Should the new city have closed circuit television? Where?
7. What should transport inside the building mainly consist of? Lifts? A monorail and minibuses? Bicycles? Other?
8. How can the building protect the city against fire, hurricanes and very hot weather?

2. In your groups, tell another group which questions you chose and what your decisions were, with your reasons.

3. As a class, decide whether the Sky-High project is good for the country? Is it feasible?

Other useful phrases

What about...
Why don't we....
I suggest...
That sounds good
I don't think that's a good idea.
OK, that's what we'll do.

Fill in the table:

Educational issues: agree/disagree.

Mark one of the columns with an X for the ten statements you hear.

	Totally agree	Partially agree	Depends	Partially disagree	Totally disagree
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

- 1) You should always plan first what you are going to say in English in order to avoid making mistakes when you speak.
- 2) Governments should spend more money on scientific research.
- 3) Everybody should be given the opportunity to do a university degree.
- 4) Some subjects like religion or physical education should never be obligatory.
- 5) It's a good idea to take a sabbatical year after graduating from university and before looking for a job.
- 6) If a student always gets good marks it shows that he or she is intelligent.
- 7) It is better to evaluate students on coursework and participation in class rather than make them do exams.
- 8) When you take notes, you should try to write own everything the teacher says.
- 9) Students learn more when they go to small classes or tutorials rather than when they attend big lectures.
- 10) The best way of making progress in a language is to live in a country where it's spoken.

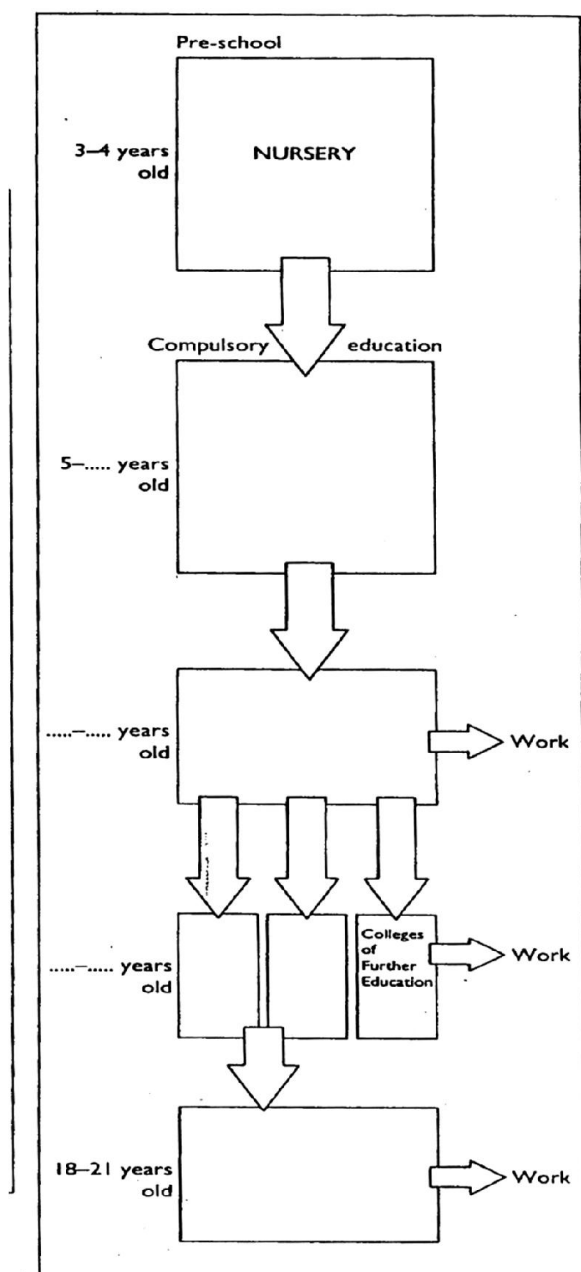
READING

TEXT I

Pre-reading

Answer these questions for your own country in pairs.

1. Do boys and girls go to the same schools?
2. Do you have to go to school by law?
3. At what age do children start school?
4. At what age can children leave school?
5. What type of education is there after school?



State Education in Britain

All state schools in Britain are free, and schools provide their pupils with books and equipment for their studies.

Nine million children attend 35,000 schools in Britain. Education is compulsory from 5-16 years.

Parents can choose to send their children to a nursery school or a pre-school play group to prepare them for the start of compulsory education.

Children start primary school at 5 and continue until they are 11. Most children are taught together, boys and girls in the same class.

At 11 most pupils go to secondary schools called comprehensives which accept a wide range of children from all backgrounds and religious and ethnic groups. Ninety percent of secondary schools in England, Scotland and Wales are co-educational.

At 16 pupils take a national exam called GCSE (General Certificate of Secondary Education) and then they can leave school if they wish. This is the end of compulsory education.

Some 16-year-olds continue their studies in the sixth form at school or at a sixth form

college. The sixth form prepares pupils for a national exam called “A”-level (Advanced Level) at 18. You need “A” levels to enter a university.

Other 16-year-olds choose to go to college of further education to study for more practical (vocational) diplomas relating to the world of work, such as hairdressing, typing and mechanics.

Universities and colleges of higher education accept students with “A” levels from 18. Students study for a degree which takes on average three years of full-time study. Most students graduate at 21 or 22 and are given their degree at a special graduation ceremony.

SPEAKING. DISCUSSION

Compare systems of Education in Russia and Great Britain.

Part III THE WAYS OF SHOWING INTEREST IN ENGLISH

LANGUAGE IN USE

- a. Complete the following short proverbs and sayings, explain their meaning, and give their Russian equivalents. Say under what circumstances you would use them in speech:**

Knowledge	Pleasure	Pupil
Ill-taught	Nothing	Learn

- a. Live and _____
- b. Better untaught than _____
- c. Like teacher, like _____
- d. Little _____ is a dangerous thing.
- e. To know everything is to know _____.
- f. Business before _____

Showing interest

When we listen to other people, we often want to show them how interested we are in their conversation. We do this in different ways: smiling with our eyes; nodding; saying something encouraging. We also use special phrases.

Right/You're right	Indeed	
OK	Exactly so	
Yes?	Certainly	
And?	Sounds great	
Really?	Unbelievable	

And then?	Sorry/nice to hear that	

- b. Add more expressions and decide which of them are suitable for formal and informal conversation.**

We can also use auxiliaries. We repeat the auxiliary that the previous speaker has used. The effect is the same as using *Really?*

1. Match phrases in column A with their responses in column B:

Let's go out to eat,	haven't we?
We're still friends,	aren't we?
Those keys are yours,	shall we?
They've been here before,	haven't they?
We used to live in the same street	aren't there?
We have some bottles of cola in the fridge,	don't you?
You know how to get to the restaurant,	didn't we?
There are some oranges in the bowl,	aren't they?

SKILLS PRACTICE

2. Act out this dialogue. Underline expressions that show interest.

Mrs. Jones: I hear the new people at number thirty-five send their boy to a private boarding school instead of the local school. What snobs they are!

Mrs. Smith: They are, aren't they? I wouldn't dream of sending my little boy away to some strange institution for months. I think it's cruel.

Mrs. Jones: it is, isn't it? It would break my heart every term. And the thing is that these private schools are often not as good as free state schools.

Mrs. Smith: They are, aren't they? My nephew only went to his local school and he's just been awarded a scholarship to study classics at Oxford.

Mrs. Jones: Right. But the Williams only sent their boy away for the sake of appearance. They just like to show off.

Mrs. Smith: Yes, they do, don't they? Of course, some people say that a board – school education is good for children because it teaches them to have confidence in themselves and they learn to be less dependent on their parents...But I think it only turns them into snobs.

Mrs. Jones: it does, doesn't it? Still I don't know what I'll do with my Trevor next year. I don't want him to go to that big new school. The children of all commonest people in the area go there.

Mrs. Smith: Well, they are closing all the old schools. If you don't like the new state school, you'll just have to pay to send him to a private school, won't you?

Surprising news

If you say the right thing at the right time, other people will find you much easier to talk to and you will find your self more relaxed and fluent in conversation:

<p>Guess what! I've got news for you! Do you know what! Are you sitting down? You'd better sit down! You won't believe this but...</p>	<p>Surprise and astonishment can be expressed in various ways and different degrees of formality. Examples:</p>
<p><i>Response</i> <i>Neutral</i></p>	
<p>Really? What a surprise! That's a surprise! Oh, that's amazing/extraordinary! Good heavens!</p>	<p>1. -Are you sitting down? You won't believe this but our teacher is getting married! - Is she? What a surprise!</p>
<p><i>Informal</i></p>	
<p>What? Oh, no! No, I don't believe it! Are you serious? You must be joking! Well I never! Fantastic! Crazy! You don't say! Fancy that! You're kidding!</p>	<p>2. – I haven't seen him since we left school. He is a very important man no. Big fish, I'd say. - Just fancy! He was always bottom in every subject at school!</p>
<p><i>Formal</i></p>	
<p>I find that very surprising! Indeed? How very surprising! It's amazing!</p>	<p>3.- I am afraid the board hasn't accepted your recommendation. -Indeed? IO find that very surprising.</p>

1. Express your surprise at the following:

- 1) The professor praised Dobbin more than anybody else.
- 2) My English colleague complimented me on my English.

- 3) The speaker had fallen ill and thy cancelled the lecture.
- 4) Mr. Jones had 45 students to examine yesterday!
- 5) I hear Mrs. Woods is going to give you a mixer for your birthday.
- 6) Mrs. Morgan has written a successful novel and has become a popular writer.
- 7) If I got them right, they want to appoint Mr. Clarke head-master.
- 8) William set his heart on becoming an artist.
- 9) My daughter has been awarded a scholarship to study literature at Oxford.
- 10) I'm going to take part in that Scientific Conference in Sydney this summer.

2. Think of some good or bad news. Make a list. Each partner takes his/her turn presenting news to the group mates. Remember to use the phrases in the list:

<i>Good news</i>	<i>Bad news</i>
<i>Carol is getting married</i>	<i>Mike's father is in hospital again</i>
<i>Ben has passed his final exam</i>	<i>There has been a terrible earthquake-thousands of people are dead</i>
<i>I bought a new laptop</i>	
<i>Violet will take her post-graduate course when she graduates from the University</i>	

Part IV SUCCESSFUL CONVERSATIONS IN SOCIAL AND BUSINESS CONTEXT

Idioms

- Talk shop
- Idea hamster
- Stress puppy
- It doesn't take a rocket scientist to...
- Blind smb with science
- Have smth down to science

1. Guess the meaning of the idioms from the context.

- a. Martin wanted the professor talk shop and though he seemed averse at first, succeeded in making him do it. For Martin did not see why a man should not talk shop. (J. London "Martin Eden")
- b. He was employed for that company as a source of new idea, an idea hamster, to help solve company's problems.

- c. She was the only person in this company who could work under pressure. Actually, she seemed to enjoy it.
- d. It doesn't take a rocket scientist to know that if you don't fan the flame then the fire will eventually go. (Gackt - song "To Feel the Fire")
- e. Don't blind me with science; just let me know how long the computer repair will take.
- f. Jim was an experienced car mechanic and he was able to do the most difficult things very well. In other words, he had it down to science.

2. Use them in the sentences of your own.

USEFUL LANGUAGE

Starting the conversation

Hello, _____, nice to see you!	Hello, nice to see you too! Hello, I'm glad to see you too.
Hi, I haven't seen you for ages! How are things going on?	Everything is alright and what about you?
How are you?	I'm fine, thank you and how are you?

Responding

I've got news for you!	Really? What a surprise
You won't believe this but...	That's amazing! It's great!
	Are you serious?
	I can't believe it!

Expressing opinion

I think that...	To my mind
I don't think that...	In other words
I've always thought that....	I believe
In my opinion	What do you think about...?

From my point o view	What about going to the cinema in the evening?
As far as I can see (know).....	Really?
I strongly believe that...	
I have my doubts about...(or: I doubt about...)	
I guess...	

Agreeing /disagreeing

AGREE	DISAGREE
I agree with you.	I don't agree with you
I think you are right.	I'm afraid, you are not right.
I absolutely agree with you here!	It seems to me it's not quite true.
I'm with you here!	I don't believe it.
I'm of the same opinion	I'm not at all sure about it.
	I don't think...
	Personally I don't agree...

Giving appraisal

It's really really good!	It's fantastic!
He is an exciting person!	It's fascinating!
What a wonderful book!	Absolutely lovely (nice)!
What a charming girl!	

Trying to change someone's opinion:

But don't you think that...?	
------------------------------	--

Yes, but do you really think ...?	
On the other hand...	
I respect your opinion, of course but....	

Saying that something is not correct:

I'm afraid it's not quite true	I don't think...
I'm not sure you are right about...	I might have misunderstood you but...
I'm sorry, you must be mistaken	
Nothing of that kind	
Far from it.	

READING

TEXT 1

Article for discussion:

Parents and Teens at Peace

The evidence may not be obvious in some households but 4 out of 5 young people in Great Britain now get on with their parents.

A new study into teenage attitudes reveals that their family life is more harmonious than ever before: more than half of 13 to 18-year-olds get on with their brothers and sisters; and 1 in 3 has not argued with parents during the past 12 months. 85% of teenagers agree with the statement "I'm happy with my family life". Only 1 in 10 said they had very poor relationships with their parents.

The generation of parents is more likely than 30 years ago to treat their children as "friends", to discuss things and even make compromises.

Relaxation of controls on young people is reflected throughout the society. In the 1960s newspapers were scandalized when Prince Charles, a schoolboy at that time, ordered a cherry brandy in a pub. Forty years later Prince Harry confessed to drug use to generate a similar level of anxiety. (*Adapted from The Observer, 2009*)

Vocabulary:

Get on - дружить с кем-то, быть в хороших отношениях

Argue ['ɑ:gju:] - спорить, ссориться

Confess (v) - признаваться

Anxiety [æŋ(g)'zaɪəti] - беспокойство, тревога

1. Discuss in pairs the following problems:

- Do young people get on well with their parents?
- How can you prove that teenagers' family life is becoming more harmonious?
- How do parents treat their children?
- What do you think of relaxation of controls on young people?

2. Compare the situation with that in Russia.

TEXT II

Read the text. Answer the question: if you could travel in time, where and when would you go? Who would you like to meet? Why?

How Time Travel will Work

There may be no other concept that captures the imagination more than the idea of time travel – the ability to travel to any point in the past or future. You could jump into your time machine to go back and see the events in history and talk to the people who were there! Who would you travel back to see? Julius Caesar? Leonardo da Vinci? Elvis? You could go back and meet yourself at an earlier age, go forward and see how you look in the future. It's these possibilities that have made time travel the subject of so many science fiction books and films.

However, in some ways we are all time travelers. As you sit at your desk, doing nothing more than clicking your mouse, time is travelling around you. The future is constantly being transformed into the past with a present only lasting for a fleeting moment. Everything that you are doing right now is quickly moving into the past, which means we continue to move through time.

Understanding time

The author and astronomer Carl Sagan said that the time is "resistant to

simple definition". Lots of us think we know what time is, but it is hard to define. You cannot literary see or touch the time, but you can see its effects. The evidence that we are moving through time is found in everything – our bodies age, buildings weather and fall down, trees grow. Most of us feel the pressure of time as we are pushed to meet deadlines and make appointments.

Ask most people define time and they are likely to look at their watch or a clock. We see time as the ticking of the hands on these devices. We know that there are 60 seconds in a minute, 24 hours in a day and 365 days in a year. But time is also defined as being the fourth dimension of our universe. The other three dimensions are of space. Time cannot exit without space and, similarly, space cannot exit without time. This relationship of time and space is called the *space-time continuum*, which means that any event that occurs in the universe has to involve both space and time.

Ideas of time travel have existed for centuries, but when Albert Einstein

thought of his theory of special relativity, he laid the foundation for the theoretical possibility of time travel. As we all know, no one has successfully demonstrated time travel, but no one has been able to rule it out completely either.

Science or science fiction

While writers have produced some great ideas for time machines over the years, a real-life time machine has yet to be built. Most theories of time travel don't rely on machines at all. Instead, time travel will probably be done via natural phenomena that will transport us instantly from one point in time to another. These space phenomena, which we are not even sure to exist, include such things as black holes. If you are a fan of science fiction, then you know that *relativity* is a fairly common term in the genre. For example, the characters in TV series like Star Trek are always talking about space-time

continuum, black holes, time portals and other things that are based on the principle of relativity in some way.

If we were ever able to develop a workable theory for time travel, we would create very complicated problems called *paradoxes*. A *paradox* is defined as something that contradicts itself. Possibly the most famous paradox is grandfather paradox. What would happen if a time traveler went back and killed one of his or her ancestors before the traveler was born? If the person killed his or her grandfather, then how could that person be alive to go back and his or her grandfather? If we could change the past, we would create an infinite number of paradoxes.

Confused yet? Welcome to the world of time travel. Just imagine how complicated the ticket prices will be!

Part V PREPARING FOR AN INTERVIEW

READING

Preparing for an interview

- 1. Read the extract of an email to Eriko from Dr Caroline Hansford of SARF and then answer the following questions.**
 - a. How will Eriko be interviewed?
 - b. What does she have to do before the interview?
 - c. Why might this interview be particularly difficult?
- 2. Eriko has decided to write her presentation and then to memorise it. In pairs, make a note of the advantages and disadvantages of:**

1. reading your presentation from a script
2. memorising the script of your presentation
3. not using a script (using notes only)

LISTENING

1. ► 1.4 Eriko has asked Carlos to comment on her presentation. Listen to Eriko's first two attempts and answer the following questions.

- a. How do you think Eriko feels?
- b. What comment does Carlos make on her first attempt?

2. What advice do you think Carlos might give to Eriko on her second attempt? d

3. ► 1.5 Listen to Carlos's feedback. Complete the notes below.

Good:

Remembered everything

Spoke more (1) _____

Speed OK

Practise more:

Make important words (2) _____ and (3) _____

Ran when to (4) _____

Practise (5) _____ words many times

Ask an (6) _____ (7) _____ to record your presentation so you can copy them.

4. ► 1.6 Listen to Eriko practising the introduction to her presentation again.

- i. Has she followed all of Carlos's advice?
- ii. Does the presentation sound

better now?

5. ► 1.7 Listen to the following extracts from the presentation and mark the stressed words with a (•) as in the example.

1. Hello. My name is ... and I'm currently ...
2. My research focuses on ...
3. This is useful because ...
4. For example,...
5. However, there are a number of problems with ...

and we plan to hold interviews in the final week of July. Your interview has been scheduled for Thursday 28 July at 0900GMT. As you are currently based in the UK, we will be interviewing you by conference call. Please write back to us to confirm your availability for this date and time. We will be asking all interviewees to deliver a short presentation of their research proposal at interview. In your case, we would like to ask you to upload a video of yourself giving such a presentation no later than Wednesday 20 July.

6. Complete the phrases in Exercise 5 with information that is true for you. Then practise saying the sentences, paying attention to stress and intonation.

7. Imagine you are giving a short presentation like Eriko. *Either*: Choose a topic in your own research area and plan a short presentation (about 70 words). Plan where you will pause and which words you will stress, as in Exercise 5. Then memorise the text. *Or*: Using the audioscript, memorise the beginning of Eriko's presentation. Then take turns to deliver your presentation to a partner. Give feedback on each other's presentations.

LANGUAGE IN USE

1. Phone and video conferencing are both common for interviews and meetings nowadays. Complete the advice for interviews by conference call using the words and phrases in the box below.

application form ☐ comfortable ☐ position ☐ facing ☐ late
☐ phone number ☐ questions ☐ see ☐ shuffle ☐ thank ☐ tone
of voice

CONFERENCE CALL INTERVIEWS

Before your interview

1. Find out exactly who you will be talking to
2. Check whether they will be able to (1) _____ you or just hear you
3. Check the date, time, the (2) _____ to dial in on, and the right code to access the conference call
4. Read your CV and (3) _____ again
5. Practise answering questions you might be asked
6. Prepare (4) _____ to ask the interviewer

During your interview

- Don't be (5) _____!
- Use your (6) _____ to sound confident and enthusiastic
- Do not (7) _____ papers (this will make a noise)
- Sit in a (8) _____ - do not move about too much
- Speak very clearly, (9) _____ the microphone
- When the interview is over, (10) _____ the interviewer(s) and end positively

2. Look at the completed advice in Exercise 1. Which do you think are the three best pieces of advice? Why?

SPEAKING

- Imagine you are being interviewed for a job or a fellowship. In pairs, make a list of questions which you might be asked. Then take turns to interview each other.

Part VI THE SCIENTIFIC COMMUNITY

Communicating with scientific communities

VOCABULARY

1. Which of these ways do you usually use to communicate?

a. an academic journal	d. a popular science magazine
b. a conference	e. a popular science book
c. an online forum or science blog	f. a newspaper

2. Why is it important for scientists to keep in touch with:

1. other people in their field (e.g. biology)?
2. people in their specialism (e.g. molecular biology)?
3. people in other fields of science?

READING

1. In pairs, read the following statements and say which form(s) of communication from Exercise 1 the speakers should use to find the information they want.

I'm having a problem with one of my protocols. I've tried a few different things, but with no luck - I could do with some suggestions from other people of what to try next.

I'm trying to learn more about the Hadron collider because it's big news, but it's not even close to my area so I'm finding the papers on it heavy-going.

At my university, I don't meet enough people in my field - I really need to network and build some connections with people working around the world.

2. Read the following five extracts and then say which form (or forms) of communication from Exercise 1 each one comes from. Which form(s) of communication are *not* included in these extracts?

1. ... more people were pain-free when using the handheld device than those who had used an identical dummy device. Although the study by Lipton *et al.* (2010) has reliable results, there are some points to consider when putting these findings into context. Importantly, the results will need to be verified in larger trials that directly compare ...
2. Tea and coffee drinkers have a lower risk of developing type 2 diabetes, a large body of evidence shows. And the protection may not be down to caffeine since decaf coffee has the greatest effect, say researchers in *Archives of Internal Medicine*. They looked at...
3. ... can be rapidly generated by lentivirus-mediated transgenesis. RNAi also holds great promise as a novel therapeutic approach. This report provides an insight into the current gene silencing techniques in mammalian systems.
4. Hi! Has anyone had any experiences with nanopartides sticking to glassware :-
(? If so, does anyone know if there's a suitable silylation protocol to pre-treat the glassware to do something about this annoying non-specific adsorption? Thanks!
5. Animal and *in vitro* studies suggest that aspirin may inhibit breast cancer metastasis. We studied whether aspirin use among women with breast cancer decreased their risk of death from breast cancer. This was a prospective observational study based on ...

3. How easy was it to decide where extracts came from? How did you decide on the right answer?

LANGUAGE IN USE

1. The language we use changes according to why we are writing (the purpose) and who we are writing for (the reader). It is important to notice the different styles of language used in English. Complete the second column of the table below, carefully reading the appropriate extract (A-E).

Feature	Examples	Extract
1. Asks the reader questions	Has anyone had ... ? _____	D D
2. Uses multi-word verbs (a verb with an adverb or a preposition)	_____ do something about	B D
3. Uses exclamation marks and emoticons	Hi! _____	D D

4. Uses non-specific references to the work of other researchers	_____	B
5. Uses specific references to the work of other researchers	_____	A
6. Uses impersonal phrases to avoid saying 'You' there are some points to consider	There are some points to consider _____	A E
7. Uses passive verbs to avoid saying who carries out a process	_____ can be rapidly generated	A C
8. Uses Latin language expressions	et al. _____	A E

2. Which of the features in the table (1 -8) are appropriate for formal for scientific research papers? Which are appropriate for personal communication (such as email)?

SPEAKING

1. In pairs, discuss the following questions.

- When you have a problem at work, who do you usually ask for help?
- Have you ever asked a question on a science internet forum? If so, was your question answered?

2. Read three recent posts from an online forum (A-C) below. Imagine you belong to the forum where these questions are asked. Which questions could you answer? Which answers could you guess?

3. Read the posts again. For each post, say which sentence or sentences (1-3) in each one the writer uses to:

1. a ask the question
2. b say what the problem is
3. c thank the reader

4. How are the questions in the Subject field of each post different from normal questions?

5. Think of a question related to your own research. Then write a three-sentence post for an online forum in an appropriate style using the phrases in the box to help you.

1. Does anybody know what... is ... ?
2. I know that... , but I can't find / don't know...
3. I was wondering how / what / why ...
4. I don't mean ... , but...
5. In other words, ...
6. Any help here would be appreciated.
7. Thanks in advance.

6. In pairs, discuss the following questions.

- a. What kinds of text do you need to write in English for your work or studies?
- b. Why is it important to write your texts in an appropriate style?
- c. What can you do to take note of the different styles of language used in English texts?

A Subject: Filovirus Host Range?

(1) Does anybody know what the host range is for filoviruses (i.e. Ebola and Marburg)? (2) I know that they can infect most (all?) types of mammals and several species of birds, but I can't find the actual host range anywhere. (3) Any help here would be appreciated.

B Subject: materials which x-rays can't pass through?

(1) I've been looking for a while now, but I can't find anything telling me what the radiopaque materials are. (2) In other words, which materials can't x-rays pass through? (3) Thanks in advance.

C Subject: Quality of scientific writing considered in peer review?

1. I was wondering how important the quality of the writing of a submitted paper is in the peer review process.
2. I don't mean the quality of the data, but the actual writing. (3) In other words, will a nicely written paper with the same data be more likely to be accepted?

READING

1. Read the headlines and beginnings of two news articles reporting a recent scientific development. Then answer the questions below.

The 'Chocolate Cure' For Emotional Stress There may well be another important reason for giving your sweetheart sweets for Valentine's Day ...

New Evidence That Dark Chocolate Helps Ease Emotional Stress
The 'chocolate cure' for emotional stress is getting new support from clinical trial published...

Do you think the claims made in the headlines seem likely or unlikely? Why?

1. In general, how can the science reported in the media differ from the actual science? Why do you think there is a difference?

2. If you wanted to learn more about the research you see reported in the newspaper, where could you look for more information?

2. Martina, a junior researcher, is supervising Ryuchi, an MSc Physiology student. Martina has asked Ryuchi to investigate the claims in the headlines and then to write a critical review of the research. Complete the sentences below in your own words. Then in pairs, discuss your answers.

- If you read research *critically*, it means that you ...
- You should always read research critically because ...

LISTENING

1. ► 2.1 Ryuchi has some questions about writing a critical review. In pairs, discuss questions 1-5. Then listen and make notes on how Martina answers the questions.

- How long should my review be?
- Can I write a critical review if I've only read the abstract?
- How should I approach the reading? What should I read first?
- Is it a good idea to think of questions I want answered?
- Do I need to take notes or can I just highlight the relevant bits of the text?

2. Before reading, Ryuchi writes seven questions to help him. Match the questions (1-7) to the section of the research paper below where you would expect to find the answer.

<ul style="list-style-type: none"> • What variables were investigated? • How did the authors interpret the results? • What were the main findings? • Why is this research relevant? • Who/What was studied? • What procedure was used? • What was the hypothesis? 	1) Introduction: _____ 2) Method: _____ 3) Results: _____ 4) Discussion: _____
--	---

3. Ryuchi has taken notes on the research paper that was reported in the news headlines in Exercise 1.

anxiety ☐ assessment ☐ classify consumption ☐ hormone ☐
metabolic ☐ microbiota ☐ participant ☐ trial period ☐ urine

LANGUAGE IN USE

4. Read the Summary column. Which questions from Exercise 2 can you answer?

(Reference: Martin, F-?X, Rezzi, S., Pere-Trepat, et al. (2009). 'Metabolic, effects of dark chocolate consumption on energy, gut microbiota, and stress-related metabolism in free-living subjects' J. Proteome Res, 8 (12), pp 5568- 5579.

Section of paper	Summary	Opinion
Method:	<ul style="list-style-type: none"> • 30 young healthy adults • 40 g of dark chocolate/day * 14 days (20 g am, 20 g pm) • pre-trial assessment of anxiety levels using questionnaires • participants classified as high or low anxiety • days 1, 8, 15 blood and urine samples taken • analysed changes in Cortisol and catecholamines in urine & energy metabolism and gut microbial activities 	<ul style="list-style-type: none"> • small sample • (1) _____ trial period • using _____ groups further (2) _____ sample size didn't look at changes in (3) _____ levels or reported (4) _____ • No (5) _____ group only young healthy participants

Results:	1. reduction in stress hormones in the urine for all the participants 2. less difference between groups in energy metabolism and gut microbial activity	
Discussion:	3. 40 g of dark chocolate a day for two weeks can change metabolism 4. could have long-term effects on health	5. can't prove that (6) _____ caused the changes 6. need more people with the (7) _____ levels 7. give either chocolate or a (8) _____ 8. look at long-term stress, anxiety, health and (9) _____ <i>changes</i> 9. should use <i>a</i> (10) _____ trial

LISTENING

1. ► 2.2 Before writing his critical review, Ryuchi discusses his notes with Martina. Listen and complete the notes in the Opinion column, using one word from the recording for each answer.

2. From the information in Ryuchi's notes, discuss in pairs whether you think the research is:

- credible? • significant?
- original? • valid? reliable?

READING

1. Read two extracts from Ryuchi's completed critical review and answer the questions.

- 1) Do the extracts include all the main points from Ryuchi's notes in Exercise 4?
- 2) Which extract (A or B) ...

1. summarises part of the research?
2. gives an evaluation?

A 30 young healthy adults completed a pre-trial questionnaire to assess their anxiety levels and based on this, they were classified as either high or low anxiety. All participants ate 40 g of dark chocolate a day for 14 days. On days 1, 8 and 15 urine and blood samples were taken and changes in Cortisol and catecholamines in the urine were analysed, as well as energy metabolism and gut microbial activity. The research found that after 14 days, the level of stress hormones in the urine was reduced in all participants. In addition, there was less difference between the two groups in energy metabolism and gut microbial activity.

B One problem with the research is the small sample size (only 30 people) which was further divided into smaller groups. There was also no control group in the study, making it impossible to conclude that chocolate was the cause of the changes seen rather than some other factor such as other food or drink, lifestyle change or activity level. Furthermore, only young healthy adults were investigated and so the results cannot be applied to those who are older or have pre-existing health issues.

2. Read the six extracts below from a critical review of another paper. Replace the underlined phrases with an underlined expression from Exercise 1.

- A bad thing about this research is there were only 20 participants. Another problem is all the subjects were hospital employees.
- Also, the blood flow in the brachial artery was measured before they drank the coffee, and 30 and 60 minutes after.
- The researchers looked at how the blood flow changed.
- The result of the research was that the people who drank caffeinated coffee had decreased blood flow to their upper arm.
- The results might not be the same for the general population. There was also no measurement of the changes in blood pressure and blood flow after one hour, so we can't know when blood flow returns to normal. 20 subjects, between the ages of 25 and 50, who usually drank little coffee, were given either a caffeinated or decaffeinated Italian espresso coffee. They gave blood before the coffee was drunk, and an hour later.

3. Put extracts a-f in the correct order to make two paragraphs. One paragraph should summarise part of the research, the other should give an evaluation.

4. Find a piece of published research you are interested in and then make a table like the one in Exercise 4 and take notes. Use your notes to write two paragraphs of a critical review in an appropriate style.

Completing a Material Transfer Agreement

LANGUAGE IN USE

1. Read the beginning of the email sent to members of a laboratory. Then in pairs, answer the questions below.

To Nguyen Thanh Binh, Marc Fiedler, Tasha Doran, Pardip Johal...

From...Liam Sands

Send

Subject Re: Technology Transfer - a reminder

Dear all,

Sooner or later, issues of Technology Transfer (sharing and using discoveries, inventions, materials, data etc.) will become important in your research career. Protecting your work from competitors and, where appropriate, making it attractive to the commercial sector will be important during your career as a professional scientist. What are the key issues that you must think about?

1. What is the purpose of the email?

2. What kind of discoveries, inventions, materials and data might you share with other scientists in your field?
3. What do you think are the key issues of technology transfer?

2. **The next part of the email identifies some key issues and offers advice on them. Match the headings (A-E) to the extracts (1 -5).**

1. Huh??? What do I do now??
2. Your research is valuable - to others!
3. Always read the small print!
4. Who, me?
5. Look out! There may be a thief about!

1

Sooner or later someone in your field is going to ask you for some materials. Never send out any material without first checking if a Material Transfer Agreement (MTA) is needed. 2

Don't leave sensitive information, notebooks, etc. open on your desk or in unlocked rooms at the end of the day. You never know who might be in the building ...

3

If you request materials from another lab, you will probably be asked for an MTA to sign. Not all MTAs are the same (some say 'we claim ownership of everything developed in your lab') so read carefully before signing and always ask if you're not sure.

4

Yes, you! Your research may have a commercial application. Always talk possible applications over with your supervisor or division head/director before you publish.

5

If you are still none the wiser, or unsure about any of the issues in this email, please talk to your group leader or contact me (Liam Sands) at the Technology Transfer Office.

SPEAKING

a. In pairs, discuss the following questions.

- Does your place of work or study have similar rules to those in the email?
- What kind of materials require an MTA?
- What kind of information would you expect to be asked for in an MTA?

b. Binh, a biochemist, is completing an MTA to receive some samples from a tissue bank in the UK. Read the MTA form on the right. Does this MTA ask for the kind of information you discussed in your answer to question 3 in Exercise 1?

c. Binh has to write a brief lay summary of what the material will be used for in Section B of the MTA. In pairs, discuss the following questions.

SPEAKING

- What do you think a *lay summary* is?
- What kind of language should Binh use or avoid when writing it?
- Who will probably read the summary?
- Why do you think the MTA asks for the summary to be written in this way?

LISTENING

1. ► 2.3 Binh's supervisor Alina is helping him to complete the MTA. Listen and complete Section A by circling the correct option 1-8).

2. Complete Binh's lay summary using the phrases in the box.

different types of | material
is samples of | The aim of the
research is to investigate |
will be stained to show

MATERIAL TRANSFER FORM

SECTION A

(to be completed when **sending** or **receiving** material):

Recipient Researcher: **Dr Alina Piotrowska**

Recipient Institution & Address: **School of Biological Sciences, University of the South, GPO Box 2010**

Provider Researcher: **Liverpool Tissue Bank**

Material Name: ***Breast tissue microarrays – paraffin wax embedded tissue***

Is this work involved with existing

(1)
Yes/No

commercial arrangements?

Does the work involving the material

(2) Yes /
No

have commercial potential?

Is this material hazardous?

(3) Yes /
No

Is BioSafety Committee Approval required?

(4) Yes /
No

Is Ethics Committee Approval required?

(5) Yes /
No

If required, has Ethics and/or BioSafety

(6) Yes /
No

Approval been received?

Who will own the IP in any modifications to, or data collected on the material?

(7)
University
/Other /
Joint

Will any University of the South

(8) Yes /
No

students be involved in using the material?

SECTION B

(to be completed when **receiving material**):

Brief lay summary of what the material is and what it will be used for:

The (1) _____
human breast
tissue, both normal and from (2)

tumor. The tissue (3) _____
expression of the Nk-2 protein, A
protein which has been shown to
be overexpressed in one CLASS
of tumours. (4) _____ Nk-
2 expression in various tumour
types And grades.

WRITING

1. Think of some material you often use in your lab.
2. Write a brief lay summary of what the material is and what it will be used for, similar to the one Binh wrote in Exercise 3.

Part VII WRITING UP A RESUME OR CV

SPEAKING

1) In pairs, discuss the following questions.

1. Have you ever applied for a job in science? If not, what kind of job would you like to apply for in the future?
2. Which of the following documents are job applicants usually asked for in your country?
 - application form
 - biodata
 - cover letter (covering letter)
 - resume or CV (curriculum vitae)
3. Have you ever written one of these documents in English?
4. Do you think that the information you include and the way you organise a resume or CV in English will be the same as a resume or CV in your own language?

2) Section 1 of the SARF application form asks applicants to include a copy of their CV. In pairs, look at the list of possible headings for a CV (a-l) and then answer the following questions.

- i. Would you use all the headings (a-l) on your CV? Why / why not?
- ii. How would you organise the information in your CV? Put the list of headings (a-l) in the best order.
- iii. What kind of information would you include under each heading? Make suggestions for each heading.

<ul style="list-style-type: none">• <input type="checkbox"/> computer skills• <input type="checkbox"/> dissertations• <input type="checkbox"/> education• <input type="checkbox"/> grants and awards• <input type="checkbox"/> personal information• <input type="checkbox"/> presentations	<ul style="list-style-type: none">• <input type="checkbox"/> publications• <input type="checkbox"/> research experience• <input type="checkbox"/> study abroad• <input type="checkbox"/> teaching experience• <input type="checkbox"/> technical skills• <input type="checkbox"/> travel
--	---

LISTENING

3) ► 1.3 Eriko is getting advice from Susana about writing her CV. Use the list in Exercise 2 to complete the headings Eriko will use.

- (1) Personal Information
- (2)----- (1) _____

- (3) Research Experience
- (4) Technical Skills
- (5) (2) _____
- (6) Publications
- (7) _____ (3) _____ and (4)
- (8) Presentations

4) Look at Eriko's list in Exercise 8a and compare it with your ideas from Exercise 2. Did you choose the same headings and put them in the same order as Eriko? If not, what is different?

5) ► 1.3 Listen to the conversation again. What TWO things does Susana say about how a CV should be organised?

~~One of my research focuses was to examine the relationship between vegetation and the hydroperiod by producing detailed graphical profiles~~
 *produced detailed graphical profiles to examine the relationship between vegetation and the hydroperiod

~~The research for my PhD focused on the analysis of the intra and inter-annual variability of perilagoonal vegetation~~
 *analysed the intra- and inter-annual variability of perilagoonal vegetation

6) In pairs, look at an extract from the CV of a student, Carlos. According to Susana's advice in Exercise 5, does Carlos need to make any changes to what he has written?

7) When adding details to your CV, it is a good idea to use bullet points rather than full sentences. Look at the following revisions to another part of Carlos's CV and then answer the questions below.

- 1) What kind of word comes first in each bullet point? How is this word formed?
- 2) Why does he move to examine the relationship between vegetation and the hydroperiod to the end of the first sentence?

WRITING

1. Rewrite the following sentences as bullet points.

- My main research focus was to generate specific carbohydrate oligomers by using pure cloned enzymes.
- During my project, I focused on the creation of a new CD4 positive HeLa cell clone.
- As part of the Cell Wall Genomics team, I have developed sensitive methods to determine the fine structure of pectins in maize.
- I have been involved in investigating the way the myocardium adapts following exercise, particularly the adaptation that takes place at the subcellular level.

2. Your CV should always include any publications you have worked on in their correct citation form. In pairs, answer the following questions.

a. What is the correct order of information in a citation? Number the items in the box below in order from 1 to 6.

- ☐ page numbers ☐ journal volume and/or issue number
☐ title of article ☐ year ☐ journal name ☐ author's name

b. If the paper has not yet been published, what do you write instead of the *volume* and *page*?

c. If the paper has been submitted (given) to a journal but not yet accepted, what do you write instead of the *journal name*, *volume* and *page*?

3. Write out the information for three different publications Carlos has worked on (1-3) in the correct citation form.

- 1 *Submitted manuscript.* / (2011) / Hernandez Sanchez, R. and Alvarez, C.M. / 'Salinity and intra-annual variability of perilagoonal vegetation'
- 2 Environmental Management Review / (2011) / 'Declining peri-dunal variability in Donana' / *In press.* / Hernandez Sanchez, R., Gomez Herrera, S.A. / and Alvarez, C.M.
- 3 pp 167-184 / 'Hydroperiod effects on peri-dunal vegetation' / Vol 2. / Spanish Hydrology Journal / (2010) / Hernandez Sanchez, R. and Alvarez, C.M.

4. Think about a job or a scholarship you would like to apply for and then write a first draft of your CV.

Part VIII PRESENTING RESEARCH AT A CONFERENCE

Giving a paper at a conference

SPEAKING

1. In pairs, answer the following questions.

- a. Have you ever presented your research to your team or study group? How did you prepare?
- b. Have you ever given a paper to a large audience at a conference?
- c. Why might presenting your research at an international conference be more difficult than presenting to your team or study group?

2. Look at the online poster advertising a conference and answer the following questions.

Who might be interested in attending this conference?

If a researcher applies on 7 May, could he/she give a paper at this conference?

If you were interested in this conference, how could you find out more?

LANGUAGE IN USE

1. Complete the following words and phrases from the poster using the words in the box.

basis course deadline
keynote preliminary
presentation
registration (x2)
strictly submit
updates



7th annual European Malaria Conference
July 31 – August 5
Trinity College Cambridge
United Kingdom
www.eimr.org/con7

Keynote speakers
• Zoltán Szabó
European Institute of Malaria Research (EIMR)
• Miremba Kabasomi
Makarere University, Kampala, Uganda

Preliminary Programme
A list of other invited speakers and preliminary session topics is currently being developed by the Conference Chair and will be announced in due course. Please check back for updates.
For further information about us see www.eimr.org

ONLINE REGISTRATION ONLY
www.eimr.org/con7/registration
Registration is on a strictly first-come, first-served basis.

Application deadlines
4 April for abstract or poster presentation submissions
7 May for attendees

Registration fees
Academia – €450
Students – €350
Commercial/Industry – €650

- a. Application _____
b. on a ____ first-come, first-served _____
c. _____ speakers
d. online only
e. poster _____

- f. programme
g. fees
h. to _____ an abstract
i. in due _____
j. check back for

2. Match the words and phrases (1-10) in Exercise 1c to the definitions (a-j).

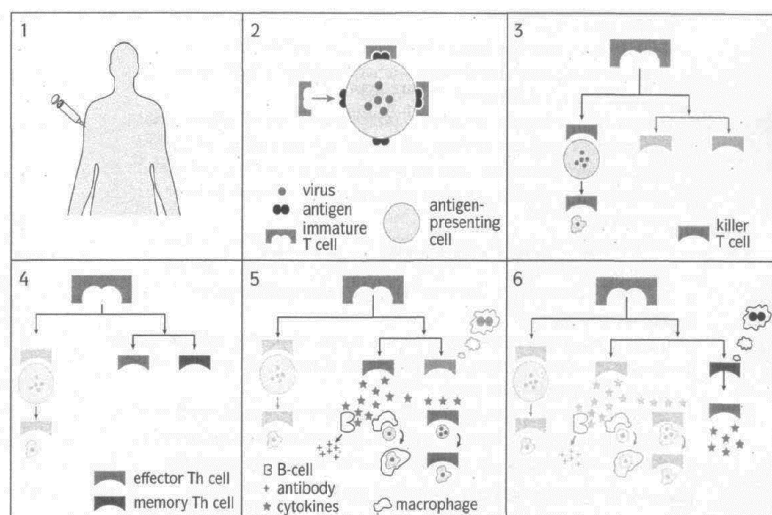
3.

1. research summarised in a visual display;
2. an early plan for the conference (some details may change later);
3. look for further information;
4. money you must pay to attend the conference;
5. soon;
6. the Internet must be used to send personal information for the conference;
7. the last date that personal information can be sent to the conference organisers;
8. the most important presenters at the conference;
9. the organisers will only accept applications in the order they receive them;
10. _____ to send a written summary of your research because you want to present a paper.

4. The diagram below shows how the adaptive immune system responds after vaccination with an attenuated (weakened) virus. In pairs, discuss what you think the diagram shows.

5. Match the descriptions (a-f) to the correct parts of the diagram (1-6) in Exercise 2.

1. When foreign material like bacteria or viruses is introduced into the body, the immune system acts to protect the body against the material. Vaccination makes this process happen, so the body is more ready to act if the same material is met again.



2. Th cells cannot kill infected cells themselves. Instead, they activate and direct other immune cells. There are two groups of Th cells: effector Th cells and memory Th cells.

3. Effector Th cells secrete cytokines. These are signalling molecules which stimulate other cells such as B cells, which produce antibodies; macrophages, which 'eat' infected cells; and Killer T cells,

which attack infected cells.

4. The memory Th cells on the other hand remember the original antigen which showed that foreign material had entered the body. If they meet this antigen again, they can immediately act like effector Th cells. In this way, vaccination can prepare the body to respond more quickly if there is reinfection with the same virus.

5. The immature T cells then develop into either Helper T (Th) cells or Killer T cells. Killer T cells can directly attack cells which have been infected by foreign material.

6. After vaccination, antigen-presenting cells (APC) take in the virus and then start the immune response by presenting antigens on their surface. Immature T cells bind to the antigen and recognise that it is foreign material.

6. Measuring T-cell responses may be used to show researchers how successful a vaccine will be. In pairs, can you think of (or do you know) a method for measuring T-cell responses?

Milan is an immunology PhD student researching T-cell responses to viral-based malaria vaccines. He is presenting his research at the 7th European Malaria Conference at Trinity College Cambridge.

7. All the phrases in *italics* below are appropriate when giving a formal talk on your research. Read extracts 1-8. Then listen and underline the phrase Milan uses in each one.

- a. *Good afternoon, everybody. / Welcome, ladies and gentlemen.*
- b. *To start, thank you / I'd like to start by thanking you all for coming to my talk today.*
- c. *I'm Milan Poborski and at present / My name is Milan Poborski and I'm a PhD candidate at Northumbria University.*
- d. *I'm going to talk today / My talk today is about my recent research investigating ...*
- e. *I'll begin by explaining / To start with, I'll explain briefly how T-cell responses*
- f. *After that, I'll / I'll go on to describe the alternative method I have been investigating...*
- g. *Finally, I will discuss / I'll conclude by discussing why this method could be useful as a way ...*
- h. *I plan to talk for about 40 minutes, leaving plenty of time for I will talk for about 40 minutes and then I'll answer any questions at the end of my talk.*

8. Match each pair of phrases (1-8) to their correct function (a-f) below. Note that one of the functions may be expressed with three different pairs of phrases.

- 1. Give instructions for asking questions ____
- 2. Greet the audience ____
- 3. Introduce the topic of the presentation ____
- 4. Introduce yourself ____
- 5. Outline the structure of the presentation ____
- 6. Thank the audience for coming ____

9. Think of a piece of research you have done recently. Use the words and phrases in Exercise 6 to help you plan the introduction to a presentation about your research.

LISTENING

1. ► 10.2 Below are five extracts from the main part of Milan's presentation. Match the beginnings (1-5) to the endings (a-e). Then listen and check your answers.

1. A number of potential vaccine types have been developed and	1. counting IFN- γ secreting cells has been the preferred method to date._
2. <u>As I have already said,</u>	2. using flow cytometry to detect MIG secretion gives us a more accurate way of measuring immune response.
3. <u>As you can see from this image.</u>	3. <u>I will be returning to those shortly.</u> Malaria kills over one million people every year in 109 countries.
4. <u>Let's begin by looking at</u> the size of the malaria problem.	4. <u>so now I'd like to move on to</u> looking at judging the response of the immune system to the vaccine.
5. <u>That's all I have to say about</u> the vaccine itself.	

2. The underlined phrases in Exercise 1 help speakers to organise their presentation clearly and guide listeners through the information. Write the correct underlined phrase to complete the advice below.

Use:

1. _____ : to introduce a new part of the talk;
2. _____ : to conclude one part of the talk and then begin another;
3. _____ : to refer back to an earlier part of the talk;
4. _____ : to refer forward to a later part of the talk;
5. _____ : to refer to a visual aid.

6. ► 10.3 Listen to five more extracts from Milan's presentation. For each extract (1 -5), you will hear a new way of expressing the functions in Exercise 2. Listen and decide which function (a-e) best describes each extract.

7. Continue the presentation plan you began in Exercise 3. Plan how you will organise the body of your presentation. Make sentences for your presentation using the phrases in Exercises 4a-4c. Plan the visual aids you will need.

8. ► 10.4 Milan has come to the end of his presentation. In pairs, look at the list (a-e) and decide on the best order for him to do these things. Then listen and check your answers.

- a ☐ let the audience know his presentation has finished
- b ☐ offer the audience the chance to ask questions about his presentation
- c ☐ reach a conclusion based on his research
- d ☐ summarise the main points of his talk
- e ☐ thank the audience for listening to him

9. ► 10.4 Listen to the end of the presentation again and complete the following phrases using between one and three words in each space.

- a. _____ recap what I've said.
- b. I therefore _____ that...
- c. That _____ to the end of my talk today.
- d. I would like to thank you for _____ attentive audience.
- e. I would be happy to _____ you may have.

SPEAKING

1. In pairs, take turns to practise giving the presentation you have been preparing in this section. Give your partner feedback on their delivery and their use of the functional phrases for organising a presentation from exercises of this unit.

Socialising at a conference

SPEAKING

1. In pairs, discuss the following questions.

1. Have you ever been to a conference? Tell your partner about your experience.
2. Do you plan to attend any conferences in the near future?
3. What might be difficult (apart from giving a presentation) about attending a conference where the main (or only) language is English?

2. In pairs, look at the list of typical conference activities (a-h) below and then discuss the following questions.

1. Which of these activities have you done (or might you expect to do) at conferences?

2. Which activities are easier / more difficult for you? Why?

3. Do you know any words or phrases which are appropriate for these activities?

- making arrangements for coffee, lunch or an evening out
- asking someone which talks they have been to
- asking someone for their opinion on a talk and finding out about where someone works and what
- research they are doing
- asking someone if they are giving a talk
- asking someone how successful their presentation was
- introducing yourself or someone else for the first time
- networking (making useful contacts)

LISTENING

1. ► **10.5 Milan is socialising at the 7th European Malaria Conference in Cambridge. Listen to extracts from eight different conversations Milan has. For each conversation, say which activity in Exercise 2 (a—h) you hear. Sometimes, more than one correct answer is possible.**

Conversation 1: _____	Conversation 5: _____
Conversation 2: _____	Conversation 6: _____
Conversation 3: _____	Conversation 7: _____
Conversation 4: _____	Conversation 8: _____

2. ► **10.5 Look at the sentences from the conversations in Exercise 8c. Complete the spaces with the words in the box. Then listen and check your answers.**

about ☐ based ☐ face ☐ forward ☐ giving ☐ go ☐ honest ☐ how ☐ looking
☐ sessions ☐ this ☐ turnout

Conversation 1

(1) _____ was it?

Well, to be (2) _____ it was a bit too clinical for me.

Conversation 2

And (3) _____ is Freja Pedersen.

Conversation 3

So where are you (4) _____, Freja?

What are you (5) _____ at?

Conversation 4

So are you (6) _____ a paper here, Makareta?

Conversation 5

Well, how (7) _____ you come out with us tonight?

Conversation 6

So, how did the talk (8) _____?

Did you get a good (9) _____?

Conversation 7

So which other (10) _____ have you been to today, Milan?

Conversation 8

It's good to finally meet you, Jacob, and put a (11) _____ to the name.

This might seem a little (12) _____, but I wondered what opportunities there were in your lab for post-doctoral positions.

3. In pairs, role play some of the conference activities (a-h) in Exercise 2.

4. ► 10.6 Listen to eight more extracts (1-8) from conversations at the conference and answer the following questions.

- In which extract(s) is someone joining a conversation? _
- In which extract(s) is someone leaving a conversation? _

5. ► 10.6 Listen again. Which of the extracts do you think might be impolite or inappropriate? Why?

6. In pairs or groups of three, practise socialising at a conference.

Presenting a poster

1. In pairs, answer the following questions.

1) Have you ever attended a conference poster presentation session? If so, did you speak with any presenters?

2) Have you ever prepared and presented a poster at a conference? If so, did anyone ask you questions about your research?

3) What do you think the key features of a good poster are? Make a list.

LANGUAGE IN USE

1. Complete the advice below about preparing a poster using the words in the box.

abstract ☐ colours ☐ columns ☐ contact ☐ font ☐ heading ☐ number ☐ sentences ☐
simple ☐ text ☐ title ☐ white ☐ space

General points

- Give your poster a (1) _____ which summarises the main idea.
- Keep your poster focused and (2) _____ so someone can understand the key points without any extra explanation.
- Remember that a poster is a summary of your work - so it's not usually necessary to include an (3) _____.

The look of your poster

- Don't forget to include your name and (4) _____ information.
- Arrange information in (5): _
- Use charts and diagrams as much as possible, only using (6) _____ to support your visuals.
- Give each section of your poster a clear (7) _____ in large type.
- (8) _____ each section to guide readers through your poster.
- Leave plenty of (9) _____ around each section to make them stand out more easily.

The text in your poster

- Use phrases rather than full (10) _____
- Try to keep phrases short.
- Choose a (11) _____ size which makes the text easy to read from a distance of 1-2 metres.
- Use different (12) _____ for different kinds of information in the poster - but remember to use them consistently.

1. **You are going to see two examples of conference posters and decide how well they have been designed. Do not try to read the text on the posters, but look at each one for just five seconds and think about how it looks. Then in pairs, answer questions 1 -3 on your first impressions.**

- 1) Were the posters well organised?
- 2) Was there space around the sections?
- 3) Could you see the title and section headings easily?

2. **Which poster do you think was more successful? Why?**

3. **Plan the design of a poster to present a piece of your recent work.**

LISTENING

1. ► 10.7 Poster presenters should be prepared to give a short spoken summary of the main points of their research. Listen to Milan's colleague, Mosi, summarising his research and decide whether the following statements are true (T) or false (F).

- Few researchers have studied the response of T cells to malaria vaccines.
- Mosi has been investigating the response of a different kind of cell.
- Mosi has used both mouse and rat models in his research.
- Vaccination changed the numbers of one type of cell.
- Mosi concludes that T cells are a good marker of immune system response to vaccines _____

2. ► 10.8 Poster presenters should be prepared to answer questions from conference participants about their research. Listen to the answers (A-C) that Mosi gives to three questions from a conference participant. Write A, B or C next to the correct question.

1. Could you just clarify how the NK cells could be affecting T-cell responses?
2. Can you tell me what method you used to measure the T-cell and the NK-cell responses?
3. I can't remember what the difference is between CD56^{bright} and CD56^{dim} NK cells. Can you remind me? _____

3. At the end of each answer, Mosi asks a question or makes an offer to the participant. Put the words in brackets into the correct order.

- (about/what/that/you/to/know/is/wanted) them? _____
- (more/want/about/to/know/you/if) the specifics of the protocol or the reagents I used, (an/email/me/just/send). The address is here, on this handout and on my card. _____
- (your/answer/does/that) question? _____

SPEAKING

- 1. Using the poster plan you created in Exercise 13, plan a two-minute explanation of your research.**
- 2. Present your explanation to a partner along with your poster plan. When you are listening, try to ask one or two questions at the end. When you are presenting, answer your partner's questions. Be sure to check that you have really answered their question at the end.**

Part IX OPENING THE SCIENTIFIC CONFERENCE. FORMULATING A PROBLEM

USEFUL LANGUAGE

Opening the scientific conference

On the threshold of smth.	На пороге (открытия)
Be on one's mind	Занимать умы...
Be on the lips	Быть у всех на устах
Be up against smth	Стоять перед проблемой (задачей)
Bring smth into the open	Предавать гласности
Burning question	Животрепещущий вопрос
Come down to brass tacks	Докапываться до сути
Come to the point	Дойти до сути дела
First thing first	Сначала о главном
Keep to the point	Говорить по существу
Make a point of	Подчеркнуть важность
Round the corner	Не за горами, скоро
The best is the enemy of the good	Лучшее- враг хорошего
Rest on one's oars	Почивать на лаврах
No pains-no gains	Без труда не вынешь рыбку из пруда
Practice makes perfect	Дело мастера боится
Steady does it	Терпение и труд всё перетрут

Постановка проблемы:

- *The heart (kernel) of the problem*
 - 1) *Problem is a question that has no definite answer*

Criteria of scientific problem

1. objectivity
- 2) importance

Problem differentiation according to its organization process

- 1) clear and conscious statement
- 2) differentiation in degree of specification
- 3) correlation of qualitative and quantitative factors in statement of the problem

Classes of problems:

- well-structured
- semi structured
- non-structured

1. Periods of creation of a problem:

- 1) Exposure
- 2) Description
- 3) Formulation. Definition in terms of discipline

- Criteria of statement of scientific problem:
 1. measurability 2) accuracy 3) social significance 4) positive statement
- Basic groups of actions for statement of the problem:
 - a. definition 2) construction 3) evaluation 4) substantiation 5) notation

VOCABULARY. IDIOMS ABOUT LEARNING

1. Which subjects do you associate with the sentences below?

- I read five novels a week. I'm a complete **bookworm**. Literature
- I **haven't got a clue** about Algebra _____
- I **picked up** a lot of new words when I visited Poland last summer. _____
- The question about bacteria was so difficult. I just **made a wild guess** _____
- I had to learn the dates of Kings and Queens **by heart**. _____
- I know Puccini's operas **inside out**. _____
- I need to **brush up on** the theories of Nietzsche and Sartre. _____
- Simon always gets good grades for his paintings. He's **a teacher's pet**. _____
- My teacher **gave me a hand** with my essay about African deserts. _____

2. Match the words in bold in 1 to the definitions below.

- a. Helped someone
- b. Memorise
- c. Don't know anything about
- d. Study something again to try and remember it
- e. The teacher's favourite student
- f. Know a subject or topic very well
- g. A person who reads a lot of books
- h. Gave an answer without thinking about it (the answer may be completely wrong)
- i. Learned something without trying

3 Which idioms do the pictures illustrate?

3. Choose the best alternative.

1. She didn't study this, so she *hasn't got a clue* / *knows it inside out*.

2. I know how to the Portuguese alphabet because I've *made a wild guess* / *learned it by heart*.
3. He'd never played baseball but he *picked up* / *brushed up* a lot of tips by watching it on TV.
4. She read all the works of Shakespeare in one month. What a *teacher's pet* / *bookworm*!

4. Correct the sentence.

1. This is too difficult for me. Can you give a hand?
2. I have to brush up my German before I go to Austria.
3. We learned all the Maths formulas to heart.
4. She asked him a difficult question so he did a wild guess.
5. I picked up on some Chinese when I was in Beijing last year.
6. She knows inside the poems of Sylvia Plath out.
7. I understand the question but I haven't got the clues how to answer it.
8. He always brings presents for the teacher. He's the pet's teacher.
9. You read all the time! I've never met such a booksworm!

5. Choose five sentences to complete so that they are true for you.

1. I know _____ inside out.
2. I haven't got a clue about _____.
3. I picked up some _____.
4. I sometimes make a wild guess if _____.
5. I've learned _____ by heart.
6. I know a bookworm called _____. She/he reads _____.
7. I need to brush up on _____.
8. The teacher's pet in my _____ class was _____.
9. The last time I gave someone a hand was _____.

6. Compare your sentences with other students. Ask at least one follow-up question for every sentence you hear.

ACADEMIC ENGLISH

1. Work in pairs. Choose the correct word/phrase *in italics*. Then put the words in bold into tables.

1. There have been a number of claims (1) *with regard to/regarding/to be precise* the Internet. It is a great tool for information sharing, and some search engines, (2) *notably/namely/in terms of* Google, are now household names.

regarding, in terms of (+noun), notably, namely, in particular, with regard to, to be precise.

Introducing a topic	Being specific

2. Originally the Internet was used mainly by academics. (3) *Nevertheless,/ However, /Furthermore*, criminals recognized its usefulness immediately. The Internet crosses international boundaries. (4) *What's more, / However, / Furthermore*, it allows anonymity.

furthermore, nevertheless, however, what's more, and yet (no coma), in addition, on the other hand

Contrast	Saying more

3. It is necessary to (5) *hint at/ highlight/ underline* some of the problems: besides massive fraud and other scams, the music industry's sales have suffered because of piracy using Internet technology. We can't be sure but reasonable estimates would (6) *suggest / focus on / hint at* further losses in the near future.

highlight, hint at, imply, point out, emphasise, infer, stress, underline, focus on, suggest

Verbs of direct focus	Verbs that focus indirectly

4. If we try to (7) *evaluate/ appraise/ generate* the Internet's effect on the world, it is possible to (8) *assess/formulate/construct* a thesis that gives a balanced view: the Internet has great benefits because it's free and open, and great drawbacks in that it makes crime simpler.

Generate, assess, construct, evaluate, appraise, formulate

Verbs for judging	Verbs which mean 'create'

5. (9) *To sum up, / In conclusion, / In chronological order*, the Internet has become a tool for good and bad deeds, just like all other technology.

To sum up, for X days/hours running, in order of = (age, importance, etc), in alphabetical/chronological order, in conclusion.

Arranging data	Finishing

--	--

Text I

Read the text. Choose the correct alternative.

There are many differences between academic writing and literary writing. In academic writing every point contributes towards the thesis. (1) *Furthermore*,/ *Regarding* the purpose of academic writing is usually to inform rather than to entertain. (2) *Namely*/ *In terms of* style, academic writing is more complex and longer, more abstract words are used. (3) *Nevertheless* /*On the other hand*, fiction tends (4) *to emphasise*/ *infer* the things that happen. Another difference is that academic writing is explicit about how parts of the text relate; everything is signaled, whereas writers of fiction leave 'gaps' where things are (5) *implied/stressed* but not (6) *inferred/pointed out* overtly. These gaps allow readers to use their imagination. A further difference is that academic writers have responsibility; (7) *with regard to*/ *in particular*, they must provide evidence for their claims. Writers of fiction, (8) *and yet*/ *however*, are free to (9) *construct*/ *appraise* fictitious worlds.

SPEAKING

Ask and answer the questions using the words/ expressions in this lesson:

1. Will you need to read or write academic texts in English now or in the future?
2. Are there any academic texts which you found particularly memorable or useful?
3. Is formal English easier or more difficult for you to understand than spoken English? Why?

SPEAKING. PREPARING FOR A TALK

1. Have you ever given a talk? How did you find the experience? Was it a success? Why/ Why not?
2. You are going to listen to Lisa Martin, an expert on communication, giving a presentation on preparing for a talk. Work with your partner to discuss what you think will be her main points.
3. ► **2.14** Listen to part of the talk. Which points does Lisa make that you find particularly interesting or helpful?
4. ► **2.14** Listen again and complete the statements. Use between two or three words.
 - a) Your talk should match the _____ of your audience.
 - b) A good way to organise a talk is to divide it _____.
 - c) You need to think about the _____ you want to make, and have other points that you may use if you have time.
 - d) Most people use _____ and number them to keep them in order.
 - e) For a formal talk, many people use software _____.

- f) A 'hook' is something you say to _____ of your audience.
- g) An example of a hook is _____.
- h) You should prepare some memorable sentences which will make _____ on the audience.

5. Are Lisa Martin's points the same as you discussed I 2? Do you have any other ideas about preparing for a talk?

6. Look at Lisa's presentation. Underline all the words and phrases that are used to show the order of the different stages of preparing for a talk.

"...So, when you give any talk, you need to plan it carefully. First of all, think about your audience – who they are, what they know about the subject and what they expect from you. You want to match your presentation to the needs and interests of your audience.

The next stage is to think about how you will structure your talk, how you'll organize it. A good way is to divide your talk into sections, and tell your audience what the sections are. For example, you may say 'I've divided my talk into three parts', then introduce each section with words like firstly, secondly, finally – that's a common way of giving the plan, the map of your talk.

Following that, prepare your material by dividing it into essential points you want to make, and extra points that you'll make if you have time. Of course, think carefully about what the overall message will be. Most people use notes when giving a talk. One way is to give each section of your talk a heading, then put the heading on small cards. You may like to add a few words to each heading to remind you of what you want to say. Then, number the cards in the order

you present the points. Cards will give you confidence, and help you structure your talk.

Next, you'll need some kind of visual aid. If you have to give a very formal talk, you'll probably use software such as PowerPoint. But for less formal talks, posters or diagrams may be enough. A word of warning - don't overuse computers. People come to listen to you, not to look at computer screens all the time.

Also, think about the beginning of your talk very carefully. You need to think of a "hook" – that's something to attract the attention of the audience. Some people use a famous quotation or an amazing statistic, or ask the audience a question. A lot of presenters like to start with a joke, or tell a short story, maybe something from their experience.

Finally, you need to end strongly. Prepare some sentences which will really impress the audience and make a strong impact on them. It's good to end the talk with a bang, so say something that will stay in the audience's mind after they've left you".

7. You are going to give a five-minute talk to a group of multilingual students in a language class. First choose one of the topics below.

- a. Applying for a driving licence in your country
- b. Getting a place at the university either in your country or abroad

- c. Getting a visa to visit another country
- d. Opening a bank account
- e. Becoming a top professional player in a sport
- f. Any process you are familiar with, at work or where you are studying

Now prepare some ideas for the talk. Think about:

How to begin the talk

What your main message will be

What your key points will be

What visual aids you will use

How to end the talk to make an impact on your audience

8. In small groups, explain how you would give the talk and comment on each other's ideas

9. Prepare your talk and give it to the rest of the group. Answer the questions.

10. Read the description of how aircraft are made and answer the questions.

1. Why are the following used to produce an aircraft?
 1. Computers
 2. Wind tunnels
 3. Flight tests
2. What document must a construction company get before it can sell its aircraft?

How Aircraft Are Made

Aircraft production is a huge and costly business. Most aircraft are made by companies who can produce them in large quantities and who can invest time in planning as well as production. Planning alone can take up to 12 years for a large aircraft and production can also be a very long process. The production stages are as follows:

First, the construction company makes designs of the aircraft. The designs are produced on computers, which are then used for the initial simulations. Then

small models of some parts of the aircraft are tested in wind tunnels.

Next, a prototype of the aircraft is made and after that a limited number of aircraft are produced to test on the ground. Representatives from a government aviation agency often make the first flight. Flight tests continue until all the requirements are met. Finally, the government agency authorises the construction company to begin production of the aircraft. A certificate is issued and the aircraft is sold all over the world.

11. Choose the correct meaning for each word.

- | | | |
|---|---|--------------|
| • Simulation | • Prototype | • Authorises |
| 1) A test of what something or someone would do in a real situation | 1. The first design of a product before it has been modified by engineers and designers | • Does tests |

- | | | |
|--|--|--------------------|
| 2) Features of a product that engineers have to change | 2. The first example of a new car, aircraft, etc., used to test the design before it is produced | • Gives permission |
|--|--|--------------------|

12. Using the passive in English, we prefer to start a sentence with information that is already known, not new. We sometimes use the passive to put known information at the beginning of a sentence.

For example:

Aircraft production is a huge and costly business - □ *Most aircraft* are made

We are unlikely to write:

Aircraft production is a huge and costly business. OR Companies make most aircraft....

Find two more examples of this in the text in 8.

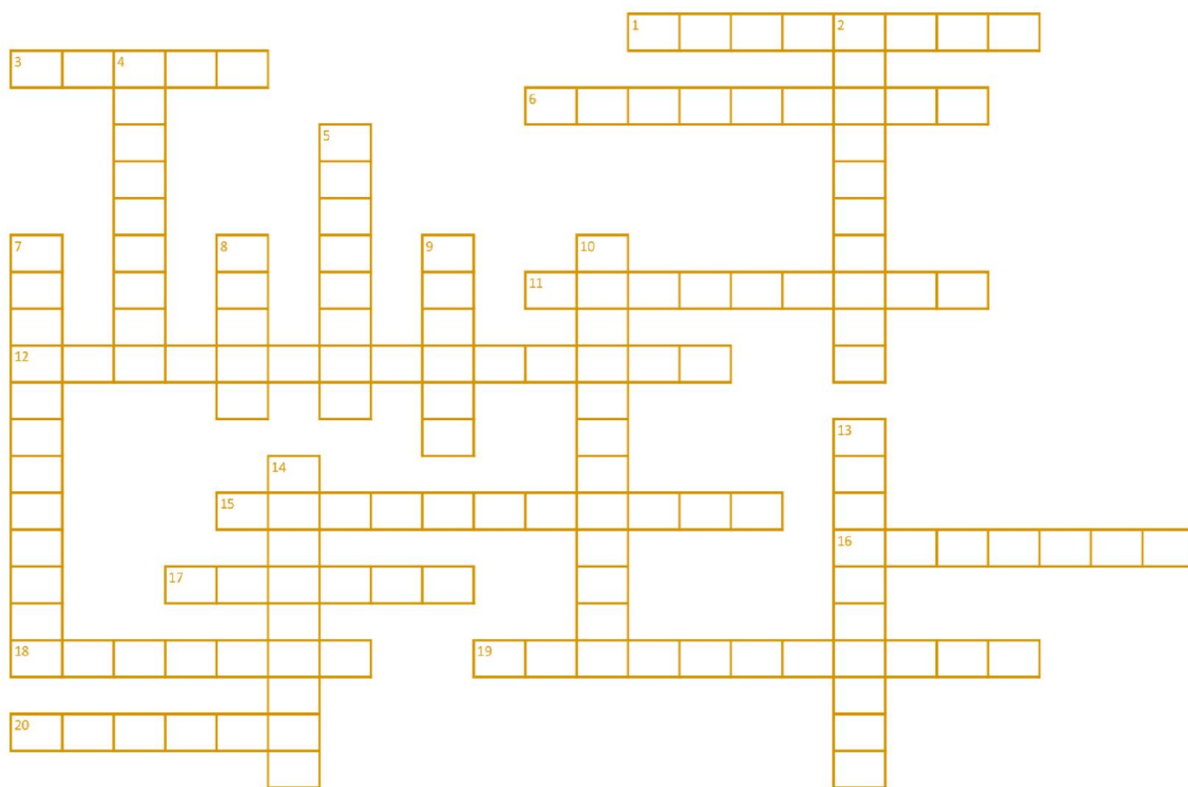
13. Complete the crossword. Information in the brackets after each clue gives word length and word class (either verb or adverbial phrase).

Across

1. Produce or create e.g. ideas, interest (8 verb)
3. Suggest something without saying it directly (5 verb)
6. Emphasise something so people give it more attention (9 verb)
11. Emphasise something and show its importance (9 verb)
12. Present the other side of the argument (2,3,5,4 adv.phrase)
15. To be very exact (2,2,7 adv.phrase)
16. State the main points in short and clear form (2,3,2 adv.phrase/ verb)
17. Introduce exact and detailed information (6 adv.phrase)
18. Introduce a good or important example (7 adv.phrase)
19. Introduce more information about what's been stated (11 adv.phrase)
20. Say something indirectly to subtly show what you're thinking (4,2 verb)

Down

2. Refer to a subject (9 adv.phrase)
4. Mention something in order to give someone more information (5,3 verb)
5. Carefully form an opinion about the amount, value, or quality of something (8 verb)
7. Finally consider all the information (2,10 adv.phrase)
8. Reach an opinion on the basis of information available (5 verb)
9. Judge something's quality or nature, can be similar to test (6 verb)
10. Emphasise a specific point (2,10 adv.phrase)
13. Emphasise another related point (4,2,4 adv.phrase)
14. Create or prepare something carefully e.g. an idea (9 verb)



LANGUAGE IN USE

Future probability

Sure to happen	1. It almost definitely will... 2. Smth (<i>be</i>) bound to..... 3. It will presumably....
Likely to happen	4. The chances are that... 5. There is a strong possibility that... 6. It may/might well..... 7. There is every chance that.... 8. There is a distinct possibility.... 9. There is every likelihood...
Unlikely to happen	10. There is a slight/remote possibility that... 11. There is a little/ slim chance.... 12. I doubt whether... 13. It is doubtful that... 14. It probably won't... 15. The odds are against 16. It is unlikely that...
Impossible	<ul style="list-style-type: none"> • You haven't a hope of... • You don't stand a chance of.... • It's inconceivable that...

- | | |
|--|---|
| | <ul style="list-style-type: none"> • Smth stand(s) no chance of..... |
|--|---|

1. Circle the option that is NOT possible:

1. They haven't a *hope/doubt* of finding life on Mars.
2. There is every *doubt/likelihood* that the experts agree with what you have said.
3. There is a distinct *possibility/doubt* that the antibiotics will work.
4. Is there any *hope/doubt* of getting the results back earlier?

2. Rewrite the sentences using the prompts in bold so that the meaning is the same, as in the example below:

There is no chance that I'm lending her my laptop. **stand**

*She doesn't **stand** a chance of me lending her my laptop.*

1. It's highly unlikely that they will make a breakthrough in the near future. **doubtful**
2. It's vaguely possible that we'll be able to travel to Mars by 2050. **inconceivable**
3. I'm sure they'll notice it's missing. **bound**
4. We can't be entirely confident that the family haven't already been informed. **chance**
5. We're being met at the airport so we don't need train tickets. **presumably**
6. Unfortunately, he doesn't stand a chance of getting the job. **hope**
7. China has a good chance of winning the space race. **distinct**
8. There doesn't seem to be much hope that the relationship will improve. **doubt**

3. Discuss. What are the chances of the following happening in the next twenty years?

1. We will be able to have holidays in space.
2. There will be a cure for cancer/AIDS.
3. Nuclear energy will have been abolished.
4. Parents will be able to choose the sex, hair, eye and skin colour of their babies.
5. All foods will be genetically modified.

4. Complete the sentences using words from the box:

doubt	against	slim	no	likelihood
doubtful	well	chances	possibility	bound

- a. I think there's a _____ chance that Martha will enroll for this course in time.
- b. The odds are _____ us meeting targets for this term, but there's a strong _____ that things will improve over the coming months.

- c. Clark stands _____ chance of being chosen for this project.
- d. I _____ whether they'll finish the work by the end of the week.
- e. We may _____ have the chance to explore the area in more detail later.
- f. Why did you do that? It's _____ to upset her!
- g. It's _____ that they could have solved all their problems in such a short period of time.
- h. There's every _____ that soon he will make a discovery in this scientific field.
- i. The _____ are that we'll be able to go to Mars in this century.

5. Put the words in the correct order to make sentences:

- A. to win the are the match against odds them
- B. tomorrow we're meeting at to her the bound see.
- C. the later it are will chances that rain.
- D. it we everything time doubtful will that is finish today have to.
- E. it idea to well excellent prove may be an.
- F. there can catch a chance is train that we slim the earlier.

Part X COMMUNICATIVE STRATEGIES. TALKING WITH FOREIGN COLLEAGUES

COMMUNICATIVE STRATEGIES

- Using *would*, *could* or *might* to make you say more tentative.
- Presenting your view as a question not a statement.
Using a grammatical negative (adding *n't*) to make a suggestion more open and therefore more negotiable.
- Using an introductory phrase to prepare the listener for your message.
- Adding *I'm afraid* to make clear that you recognize the unhelpfulness of your response.
- Using words which qualify or restrict what you say to make your position more flexible (*a bit difficult*, *a slight problem*).
- Using not with a positive word instead of the obvious negative word (*not very convenient*, *I don't agree*)
- Using a comparative (*better*, *more convenient*) to soften your message.
- Using a continuous form (*I was wondering*) instead of a simple form (*I wondered*) to make a suggestion more flexible.

- Using stress as an important way of making the message more effective (It is important...)

SKILLS PRACTICE

Practice the techniques.

USING WOULD

Would is often added to make any statement more tentative. It takes away dogmatic one of many statements.

- *That is unacceptable – That would be unacceptable.*

That doesn't meet our requirements – That would not meet our requirements.

We need further reassurance – We would need further reassurance.

1. That is too late.
2. I prefer to meet before that.
3. We expect them to accept our proposals
4. We hope to be able to complete before the end of the year.
5. Flying has definite advantages.
6. I'm not able to give a guarantee at this stage.
7. Finance is no problem.
8. I don't agree.
9. I'm afraid I don't accept that.

QUESTIONS

- *That is too late* □ *Is that too late?*

That would be too late □ *Would that be too late?*

1. Flying would have advantages.
2. Friday would be convenient.
3. We would need another meeting fairly soon.
4. We could ask the Un to finance the project.
5. It would be a good idea to involve the French.
6. We could cancel.
7. We've got to increase our offer.
8. They can raise some of the finance themselves.

ADDING N'T TO SUGGESTIONS

- *Isn't that too late?*

Wouldn't that be too late?

Change the other examples in the same way.

INTRODUCTORY PHRASES

Often we introduce our reaction with a word or phrase which tells the listener what kind of comment we are going to make. In particular some phrases warn the listener that disagreement follows. Here are the most common introductory phrases. Which ones are warnings?

*Actually,
Well,
Frankly,
With respect,
To be honest,*

*As a matter of fact,
In those circumstances,
In fact,
To put it bluntly,*

I'M AFRAID

The most common phrase in spoken English to show that the speaker recognizes that his/her reaction is in some way unhelpful or unwelcome is *I'm afraid*. It may warn of disagreement but its general meaning is wider and indicates the speaker sees his/her reaction as *unavoidably unhelpful*:

Could I speak to Jack please?

I'm afraid he's out of the country at the moment.

Would next Tuesday be convenient?

I'm afraid I'm tied up all day.

- 1) Can we meet again later this week?
- 2) Couldn't we ask the IMF to fund us?
- 3) Wouldn't it be a good idea to involve the Americans?
- 4) Could you guarantee delivery by late September?
- 5) Do you know the Chairman personally?
- 6) Have you got last year's figures yet?
- 7) Where's the report?
- 8) I thought you were going to bring the details today?

QUALIFIERS

Successful meetings depend on avoiding direct disagreement. The more general the statement, the more likely it is to produce disagreement. Not surprisingly, therefore, good negotiators often restrict general statements by using qualifiers. Here are some of the most common qualifiers in English.

- Add qualifiers as in the example:

A slight misunderstanding

A little bit too early

A little more time

Some reservations

A short delay

A bit of a problem

A little more time

- That would leave me with a problem.
- I have doubts about that.
- We need more time.
- We have production difficulties.
- We have had a disagreement with our German colleagues.
- We need changes before I can give the proposal my qualified support.

Now say these things in an acceptable way using similar language:

1. I don't want to meet as early as that.
2. If you do that you'll leave me in a mess with my Personnel Manager.
3. I can't accept such a tight schedule.
4. How could you possibly think that's what I meant!

NOT+VERY+POSITIVE ADJECTIVE

Often English avoids negative adjectives, preferring *not+positive equivalent*

- *The hotel was dirty – The hotel wasn't very clean.*
The food was cold – The food was not very hot.

1. That's inconvenient.
2. That's unsuitable.
3. That's a stupid suggestion.
4. This year's figures are bad.
5. That's a negative way of looking at the problem.
6. That proposal is insensitive to local conditions.
7. That suggestion is impractical.
8. That was an unhelpful remark.
9. That's a destructive approach.
10. That's useless line of argument.
11. I'm happy with that idea.

This feature is not only true with an adjective construction. Notice these examples.

I disagree completely.

I dislike that idea.

I reject what you say.

I don't agree at all.

I don't like that idea at all.

I don't accept what you say.

COMPARATIVES

In offering the alternative suggestion, the comparative is often used:

Wouldn't the 31st be more convenient? It might be cheaper to go by air.

The implication is that the other person's suggestion is acceptable, but yours is more acceptable. For this reason the use of the comparative is more tactful. Other these proposals, using a comparative and an appropriate verb form including, for example *would, might*, etc.

- *Wouldn't the 31st be more convenient? It might be cheaper to go by air.*
 - It's appropriate to wait a few weeks.
 - An earlier delivery date is helpful.
 - It's a good idea to take a long term view.
 - It's dangerous to delay a decision.
 - Mr Carlos is a good person to approach.
 - The World Bank is anxious to support this kind of project.

CONTINUOUS FORMS

In English the simple past is used if the speaker sees the event as a single whole, while the past continuous is used if the speaker sees the event “stretched out” in time. For this reason the continuous form of the verb is more flexible, because the event can be interrupted”, while the simple past is more often used to express facts or events seen as finished and complete.

Look at these pairs. Can you see any differences between them? Discuss them in small groups and then compare your ideas with the whole group and with your teacher.

- I tried to ring you yesterday.
I *was trying* to ring you yesterday.
 1. We intended to make new arrangements for next year.
 2. I wondered if you’d come to a decision yet.
 3. We hoped you’d accept 8%.
 4. We discussed the problem yesterday.

Notice in every case the simple past gives the impression that the speaker means ‘this is what I/we did before we started our present discussion’: it gives the impression that the person s/he is speaking to is **excluded**.

In contrast, the continuous form used with verbs like hope, discuss etc gives the impression of **including the other partner** in the discussion. For this reason continuous forms seem more friendly and open, and are often appropriate if you are trying to engage the other person in an open negotiation.

- Stress the words as in the examples
*It’s rather a **large** house.*
*It’s **rather** a large house.*
- We’re quite interested in your suggestion.
- We were quite pleased with their proposal.
- We will be quite disappointed if we can’t reach agreement today.

Diplomatic and tentative language

WARM-UP

1. How would explain the phrases ‘*diplomatic language*’ and ‘*tentative language*’?
2. Study the example and decide if it is diplomatic/tentative:
That will be very expensive.
3. What words/techniques do you know to make the language more tentative or diplomatic?

PRONUNCIATION

1. Practise each pair of sentences. Say the sentences on the left in a strong, clear, direct way. Say the sentences on the right in a diplomatic /tentative, careful, thoughtful way: speak more slowly and use pauses.

- | | |
|--|---|
| 1. <u>Can</u> I go back to the point about <u>Could</u> I <u>just</u> go back to the point about timing? | |
| 2. It's <u>very hot</u> in here. | It's <u>a bit hot</u> in here, <u>isn't it</u> ? |
| 3. We have a problem. | It seems we have a slight problem, |
| 4. There'll be a delay. | There might be a small delay. |
| 5. Can I interrupt for a moment? | Could I just interrupt for a moment? |
| 6. That'll be very expensive | That might be quite expensive. |
| 7. That'll be very expensive. | Won't that be a bit expensive? |
| 8. Can we meet again next week? | Perhaps we could meet again next week? |
| 9. Our competitors are expensive. | I'm afraid our competitors aren't very cheap. |
| 10. There's a problem with that. | I think there's a bit of a problem with that. |
| 11. It'll be better use Air Express. | Wouldn't it be better to use Air Express? |
| 12. We can't do that. | To be honest, I'm not sure we could do that. |
| 13. There's a misunderstanding. | There seems to be a slight misunderstanding. |
| 14. That's going to be difficult. | I guess that could be a little difficult. |
| 15. That gives us very little time. | Actually, that doesn't give us very much time. |
| 16. The transport costs are expensive. | The transport costs are a bit expensive, aren't they? |

2. Underline all the words in the second column that make the language diplomatic/tentative. The first two have been done for you.

3. What are the advantages and disadvantages of using direct language?

4. In which business situations would you expect to hear diplomatic language?

GRAMMAR

1. Complete the table below with the sentence numbers from the previous task. The first two sentence numbers have been done for you.

1. can > could	1
2. will > might	
3. perhaps/maybe	
4. just	
5. seems/appears	
6. negative question	
7. a small/a slight (+ noun)	
8. a bit/quite (+ adjective)	
9. could/would	
10. is → seems to be	

11. I think / I guess f a little / a bit (+ adjective)	
12. phrase to introduce bad news	9
13. a slight / a bit of a (+ noun)	
14. negative question	

What do you think about this example? *I'm afraid there seems to be a slight problem.*

2. Rewrite these phrases so that they are more diplomatic. Use techniques from section 1 and your own ideas.

Part 1

- I want to make a change to the agenda. _____
- It'll be better to ship the goods via Singapore. _____
- We have a problem with our assembly line. _____
- That will be difficult. _____
- Can I finish what I was saying? _____
- Your estimate for the total cost is too low. _____
- That's very strange. _____
- The project is running late. _____

FUNCTIONAL LANGUAGE

1. Match the following intentions with their functions.

Intentions	Function
1. Could you stick to the subject?	1) advice/suggestion/opinion
2. I was wondering where you stood on this question?	2) offer
3. I wish you wouldn't talk in terms of money.	3) request
4. I wondered if there was a telephone I could use?	4) asking for reaction/request
5. Let's get down to business, shall we?	5) directing
6. Suppose we might have an evening out?	6) opening/suggestion

2. Look at the phrases and decide how strongly the speaker is asserting his/her view. Put them in the appropriate box.

Strong	Neutral	Tentative
--------	---------	-----------

What's your position on...?
Could I ask for a reaction...?
It's quite clear that...
As far as I'm concerned...
I think it would be fair to say that...
Perhaps Mr X would care to answer that.
Would you care to comment?
Well, if I could just sum up the discussion...
Would it be OK if we still finished at 11.00?
I'm afraid we can't pay any more.
Unfortunately, our warehouse isn't big enough.

SKILLS PRACTICE

7. Practice the techniques by the following scheme. Choose the topic from the list below. Remember you are practicing the important language of meetings and the subject is less important.

Ask for an opinion→Give a tentative opinion→Bring in to present→Give a neutral opinion→Ask for a reaction→Bring in to answer→Give a strong opinion→Summarize.

Topics for discussion, e.g. Increase in oil prices, Stock market crash, Unsatisfactory students' results, Methods in science, Problems of education and science etc.

Part XI PROJECTS AND CASE STUDIES

PROJECTS

Project 1. What Effect Does a Glucose Solution Have on the Longevity of Cut Flowers?

Category: Biology—Botany—Anatomy Project

Plants produce their own food, mainly in their leaves, by a process called photosynthesis. This food-making process uses light, a form of radiant energy, to change carbon dioxide gas and water into oxygen and glucose (a type of sugar needed by plants and animals). Plants can change the sugar into energy, which can be used for all plant processes necessary for life and growth.

Plants have tube-shaped structures called xylem that carry sap from the roots

to other parts of the plant. Sap is a liquid solution (a mixture of a liquid with substances dissolved in it) containing nutrients including glucose. When the stem connected to a flower is cut, sap can continue to move through the xylem if the cut end is placed in a liquid. The longevity (the length of life) of a cut flower depends on several things, one being the continued movement of sap to the flower. Without sap, cut flowers will wilt (become limp or droopy). Since plants need glucose to

make energy, a project question might be, "What effect does a glucose solution have on the longevity of cut flowers?"

Clues for Your Investigation

Often, a cut flower quickly dies because microbes (organisms that are too small to be seen with the unaided eye) multiply and form a plug in the end of the cut stems, blocking sap from moving through the xylem. To increase the longevity of cut flowers, it is important to use clean cutting tools and containers, which helps control the growth of stem-plugging microbes. Cutting the stems while holding them under water prevents air bubbles from plugging the stems. Use the same kind of flowers and the same cutting tools and procedure to collect or to prepare purchased flowers.

A source of glucose is white corn syrup. Decide on the amount of syrup that will be used for each test and mix it with distilled water. Put several flowers in a

vase or jar containing a different amount of glucose and one with no glucose (the control). Design a method of measuring the longevity of a cut flower. For example, the flower will be considered dead when any part of its petals change color.

Independent Variable: Amount of glucose

Dependent Variable: Longevity of cut flowers.

Controlled Variables: Type of flower, how the flower is cut, cutting tools, containers, distilled water, environmental conditions

Control: Distilled water—no glucose.

Other Questions to Explore

How would these variables affect the longevity of cut flowers: (1) Water temperature, (2) tap water instead of distilled water, and (3) table sugar instead of corn syrup?

Project 2. What Effect Does the Color of Light Have on Phototropism?

Category: Biology—Botany—Behaviorism

Tropism is the movement of organisms in response to a stimulus such as food, light, or water. Stimuli are things that temporarily excite or quicken a response in an organism. Positive tropism is movement toward the stimulus, and negative tropism is movement away from the stimulus. Plant motion is due to inside pressure and unequal growth.

Phototropism is the movement of organisms in response to light. In plant phototropism, the plant bends toward the light. The bending happens because of unequal growth on the sides of the plant stem. The part of the stem exposed to light grows more slowly than the part not exposed. Because of the difference in the stem length on the two sides, the plant

bends toward the shorter, sun-exposed side. Auxin is a light-sensitive growth chemical. When a plant is exposed to light, auxin concentrates on the dark side. This results in the dark side growing faster.

Visible light is a type of radiant energy (energy in the form of waves that can travel through space) that can be seen by the human eye. White light is a combination of all light colors in the visible spectrum, which in order from least to most energy are red, yellow, orange, green, blue, indigo, and violet. Sunlight and light from lightbulbs are examples of white light. A project question might be, "What effect does the color of light have on phototropism?"

Clues for Your Investigation

When white light passes through a colored, transparent piece of plastic, some of its colors are absorbed and others pass through. The colored plastic is said to filter out colors. For example, a red piece of plastic will filter out all but red light, which passes through.

Design a testing method using filters to test the effect of different-colored lights on phototropism. One way might be to prepare a cardboard box with two 1-inch (2 cm) holes on opposite sides. Leave one hole uncovered so that white light enters. Cover the other hole with colored, transparent plastic such as red, green, yellow, or blue.

Place the box over a testing plant. The box and plant should be in a position so that equal amounts of light enter both openings. This can be done by placing the box in a darkened room with one lamp on either side of the box. Keep the testing plant moist with water. Without disturbing the position of the plant, raise the box each day for seven or more days

and observe any change in the direction of the plant leaves. Repeat the procedure with different-colored plastic covering one of the holes of the testing box. Determine how to measure the amount of phototropism. You may wish to take photographs and compare them to determine any change in position of the leaves.

Independent Variable: Light color
Dependent Variable: Amount of phototropism

Controlled Variables: Type of plants, testing procedure, method of measuring phototropism, time of exposure
Control: White light

Other Questions to Explore

1. What effect does the time of exposure have on phototropism?
2. What effect does the type of plant have on phototropism?
3. Plants placed in a maze will grow toward light. What effect does the distance between the plant and the light opening have on the plant's phototropic response?

Project 3. What Effect Does the Position of Artificial Light Have on Plant Growth?

Category: Biology—Botany—Physiology

Light is necessary for healthy plant growth. The process by which plants use light energy, water, and carbon dioxide to make food is called photosynthesis. Photosynthesis occurs in plants that have chlorophyll, which is a green chemical that can capture light energy.

Plants must have all the light colors in the visible spectrum to grow properly. Some of the light colors promote stem growth, flowering, leaf formation, and

dark green foliage. The blue and red parts of the visible spectrum are most important for photosynthesis.

Artificial light is light from a man-made source. Indoor plants that don't get enough sunlight can survive well with white artificial light. Indoor lighting can be placed in different positions in relation to the plants. For example, for a dramatic display, lighting might be placed above and/or beneath plants. A project question might be, "What effect does the position of artificial light have on plant growth?"

Clues for Your Investigation

Design a method for exposing plants to artificial light from different directions: overhead, beneath, and to the side. For example, plants can be placed in separate boxes so that the only light received is from an opening in the box. The testing should be in an unlit room or one as dark as possible so that most or all of the light comes from the testing lamps. All plants should be exposed to light for the same amount of time. Design a method for measuring plant growth. You may wish to start with seeds. After sprouts appear above the soil, begin measuring plant growth by measuring the length of the stems. Since sunlight basically comes from above plants, the light from above

the plants can arbitrarily be selected as the control.

Independent Variable: Direction of light

Dependent Variable: Plant growth—length of stems

Controlled Variables: Testing method; measuring method; type of plants, potting soil, containers, and environmental conditions; types and wattage of light bulbs; amount of light exposure; distance of light from the plants

Control: Arbitrarily selected light from above

Other Questions to Explore

1. What effect do different types of artificial light have on plant growth?
2. What effect do grow lamps have on plant growth?

Project 4. How Does Exposure Time to Microwaves Affect Seed Germination?

Category: Biology—Botany—Physiology

One way that plants produce other plants is by seeds. The sprouting (to begin to grow) of seeds is called germination. During germination the embryo (an organism's earliest stage of development) develops. The embryo looks like a baby plant, and it breaks out of the seed when it grows. The embryo needs nutrients to grow. The part of the seed where the nutrients are stored is called the cotyledon. As the baby plant (embryo) begins to grow, part of it grows down and part of it grows up. The downward-growing part forms a root system, which anchors the plant in the ground and takes in water and nutrients from the soil. The upward-growing part of the embryo contains the shoot system, which forms all

the parts of the plant that are generally above ground, including the stems and leaves. Microwaves are a high energy type of radiant energy. Microwaves are absorbed by some materials such as water and fat in foods, causing the material to get hot. But microwaves pass through other materials such as paper plates. In a microwave oven, the microwaves cause water and fat molecules in food to flip back and forth. The moving molecules bounce into one another. Much like quickly rubbing your hands together causes them to feel hot, the friction of the molecules bouncing into one another causes food cooked in microwave ovens to get hot. Microwaves have been used to kill the embryos in birdseed so that seeds that scatter or pass through the birds do not germinate and produce weeds

(unwanted plants). Will any amount of microwaves kill seeds? A project question might be "How does exposure time to microwaves affect seed germination?"

Clues for Your Investigation

Some seeds, such as pinto beans and radish seeds, grow quickly. Select one type of seed. Place an equal number of the seeds on paper towels in the microwave for different intervals of time, such as 5, 10, 20, and 30 seconds. **CAUTION:** In some ovens the magnetron tube producing the microwaves can be damaged by unabsorbed energy. Since seeds may not absorb all the microwaves produced, place a cup of water in the oven to absorb the energy so that the oven does not get damaged. After all the seeds have been microwaved, plant them in soil in separate containers. Plant all seeds the same depth. For a control, plant seeds that have not been microwaved. The time it takes from planting a seed to the first signs of growth can be called the germination starting time (GST). The time it takes from planting a

seed to the end of germination can be called the germination time (GT). Determine the GT for your project experiment. For example, the GT could be the time it takes for the shoot to break through the soil. Compare the germination times of the different batches of seeds.

Independent Variable: Exposure time to microwaves

Dependent Variable: Germination time

Controlled Variables: Type of seed, type of soil, containers, watering procedure for each plant, environmental conditions such as temperature, humidity, and light

Control: Seeds that have not been placed in the microwave oven.

Other Questions to Explore

1. What effect do microwaves have on different types of seeds?
2. What effect does microwaved soil have on seed germination?

Project 5. What Effect Does the Size of a Plant's Leaves Have on the Plant's Transpiration Rate?

Category: Biology—Botany—Physiology

The process by which plants lose water by vaporization (the change from a liquid to a gas) is called transpiration. The water escapes in gas form from the plant through stomata, which are special openings in the outer layer of plants, generally in the leaves. (The singular form of stomata is stoma.) The stomata can be opened or closed by guard cells.

As particles of water that move out of the plant through the stomata are lost by vaporization at the surface of leaves, more water enters the plants through the roots and fills the space left by the lost

water particles. If the water lost by transpiration is not replaced by water from the soil, there is a loss of turgor (the pressure within plant cells) and the stomata close. With enough loss of turgor, the plant wilts (becomes limp and droopy).

Transpiration rate is the amount of water lost by a plant in a specific period of time. A project question might be, "What effect does the size of a plant's leaves have on its transpiration rate?"

Clues for Your Investigation

Capture the water lost by transpiration from the leaves of plants with different-sized leaves. One way is to

cover the leaves with a plastic bag and measure the water collected in the bag after a specific amount of time. To make sure the environmental conditions are the same for each testing, select plants near one another and do the testing at the same time.

Independent Variable: Leaf size

Dependent Variable: Transpiration rate

Controlled Variables: Number of leaves in each collection bag, type of bag,

how the bag is secured to the plant, time of testing, environmental conditions

Control: Arbitrarily selected plant with medium-sized leaves

Other Questions to Explore

1. How does temperature affect transpiration?

2. What effect does humidity have on transpiration?

3. How does the amount of light received by a plant affect transpiration?

Project 6. How Do Seasonal Color Changes in the Environment Affect Camouflage in Animals?

Category: Biology—Ecology

Camouflage is a disguise caused by similarities between the colors and patterns of an animal's body and those found in its environment. Animals with colors that blend in with their background are said to be camouflaged. Camouflage protects animals from predators (animals that kill and eat other animals). For example, a bird that feeds on grasshoppers will have trouble spotting a green grasshopper on green grass. Coloring that helps to camouflage an animal from a predator is called protective coloration.

Earth's temperate zones include most of North America, Europe, Asia, and the southern parts of South America, Africa, and Australia. In the temperate zones, there are four divisions of the year called climatic seasons (divisions of the year based on average temperature and the amount of time that the Sun is in the sky each day): winter, spring, summer, and autumn. Winter has the shortest days, meaning that the Sun is in the sky for the least amount of time each day. Winter also has the coldest days. Generally, there are few green plants in the winter. Most leaves are dead and more brown in color.

Spring follows winter with medium-length cool days. This is the most colorful season. Following spring the days get longer and warmer, leading into summer, with the longest and hottest days. Summer begins with very colorful plants. As summer progresses, the colors remain if the rainfall is good. Without rain many green grasses die and turn yellow or brown. Autumn follows summer. Like spring, autumn has medium-length cool days. Each day of this season gets shorter and colder, leading to winter, when the cycle begins again. During autumn, leaves no longer produce pigment (some substances that provide color to a material). Without chlorophyll, the green pigment that disappears first, the yellow and orange pigments in the leaves can be seen for a time. Low temperatures and bright sunshine encourage the production of a red pigment for a time. A project question might be "How do seasonal color changes in the environment affect camouflage in animals?"

Clues for Your Investigation

Determine how seasonal changes in the color of ground cover affect which

insect color is most camouflaged. Use colored bread pieces to represent insects. Ask an adult to prepare the bread pieces by trimming off the crust, then cutting each piece of bread into pieces of equal size. Soak the bread in different-colored water solutions made by mixing V4 cup (63 mL) water with 10 drops of food coloring. Use different colors such as red, yellow, and green. White can be the control. Soak the white bread pieces in water with no coloring so that they have the same texture as the colored pieces when dry. Since it can take 3 or more weeks for birds to find a new feeding area, you may wish to offer birdseed for a period of time until the birds start to regularly visit your testing area.

Independent Variable: Seasonal ground color changes

Dependent Variable: Number of each color of bread pieces eaten by birds

Controlled Variables: Same type, size, and number of bread pieces of each color for each testing, equal testing times, same time of day, same testing location

Control: Uncolored bread pieces

Other Questions to Explore

1. What effect does surface type have on camouflage?
2. What effect do patterns have on camouflage?
3. What effect does light have on camouflage?

Project 7. How Does the Amount of Water in a Gel Affect Its Flexibility?

Category: Biology—Food Science

Gelatin is a substance made of animal protein. Proteins are nutrients made of one or more chains of chemicals. The protein chains forming gelatin are like long, tangled strands of sticky spaghetti. Gelatin is flavored and colored to make jiggly desserts and is also used in marshmallows and other foods.

When gelatin is mixed with hot water, the protein chains separate from one another and can freely move about. As the mixture cools, the proteins begin to recombine by forming bonds (the forces that hold chemicals together) between the chains. The chains connect in a haphazard way, forming a tangled web in which water in the mixture is trapped. This process is called gelling, and the semisolid that is formed is called a gel. The protein web of the gel gives it shape,

and the trapped water causes it to be flexible (able to change its shape in response to a force, then recover its original shape when the force is removed); that is, the gel can jiggle. A project problem might be, "How does the amount of water in a gel affect its flexibility?"

Clues for Your Investigation

With adult help, follow the basic directions on a package of dessert gelatin. Make changes only in the amount of water mixed into the dry gelatin for each testing. Keep the amount of gelatin the same and vary only the amount of water for several different gels. Create a scale for testing the flexibility of the gels. For example, shake the gels after they have cooled, and determine on a scale of 1 to 10, with 1 being the least flexible, how easily they return to their original shape.

Independent Variable: Amount of water

Dependent Variable: Flexibility of gel

Controlled Variables: Type of dessert gelatin, amount of dry gelatin used, temperature of water, cooling time, testing procedure for flexibility

Control: Gel made with the median amount of water

Other questions to explore

1. What effect do additives such as flavorings or sugar have on the flexibility of gel?
2. What effect does the addition of fresh fruit have on the ability of a gelatin to gel? Canned fruit? Types of fruit—citrus or noncitrus?

Project 8. What Effect Does the Type of Flour Have on the Ability of Calcium Propionate to Inhibit Bread Mold?

Category: Biology—Food Science

Fungi are single-celled or multicellular organisms that obtain food by the direct absorption of nutrients. Fungi include such things as mushrooms, athlete's foot, and mold. Mold is a fungus that produces a fuzzy, cobweblike growth on moist materials, including food. Black bread mold, *Aspergillus niger*, is one of the most familiar molds. This mold begins as a microscopic, airborne spore (a reproductive cell) that germinates (begins to grow) on contact with the moist surface of a food source, such as bread. It spreads rapidly, forming a netlike mass called mycelia (fungal bodies). Mycelia are tangled masses of threadlike structures called hyphae. (The singular form of Mycelia is mycelium.) Spores are produced at the top of hyphae. The spores are stored in cases. When the cases break, hundreds of spores that are small and easily carried by any air movement are released. If the spores land in a suitable place, they grow and the cycle begins again.

Molds must have a warm, moist environment, oxygen, some light, and food to produce their spores. Most molds grow well on starchy foods (bread), the

rind of some fruit (lemons and oranges), and materials high in cellulose, such as wood, hay, and paper products such as cardboard.

Food preservatives, such as calcium propionate in breads, inhibit the growth of mold. Breads are made from different kinds of flour, including rye, wheat, and corn. A project question might be, "What effect does the type of flour have on the ability of calcium propionate to inhibit bread mold?"

Clues for Your Investigation

Design a method of testing different kinds of bread made with different kinds of flour. All the breads should have the mold-inhibiting additive calcium propionate. The most common bread is made with white flour, so you could use this as a control. One way of testing the bread is to place a moistened paper towel inside a 1-gallon plastic reseal-able bag. Cut equal-sized pieces of each of the types of bread and place them side by side on top of the moistened paper inside the plastic bag. Close the bag and seal it with tape to prevent the bag from being accidentally opened. Use a marking pen to write the bread type above each bread piece on the outside of the plastic bag. Repeat this procedure, preparing four or

more additional bags. Keep the bags at room temperature for two weeks or until each bread piece has mold. Using a magnifying lens, observe the surface of each bread piece daily by looking through the plastic. Determine when the bread will be considered to have mold such as the first sign of black hyphae. CAUTION: Do not do this project if you are allergic to mold. Even if you are not allergic, leave containers with mold closed so that you do not breathe in an excessive number of spores. Discard the closed containers when the project is finished.

Independent Variable: Types of bread flour

Dependent Variable: Growth of bread mold

Controlled Variables: Type of preservative, testing procedure, containers, temperature, size of bread pieces, environmental conditions

Control: White bread

Other Questions to Explore

1. What effect does temperature have on mold growth?
2. What effect does water have on mold growth?
3. What effect does the type of food have on mold growth?
4. What is pH and how does it affect mold growth?
5. Are there natural ingredients that inhibit mold growth? If so, how effective are they?

Project 9. How Does the Texture of Paper Affect Its Printing Quality?

Category: Engineering—Chemistry—Technology

Absorbency is the ability of a material to soak up a fluid such as water or ink. The absorption of liquid by paper is the result of the attraction between the liquid particles and the paper. The attraction between like particles is called cohesion, and the attraction between unlike particles is called adhesion. When the adhesion between the liquid particles and the paper is greater than the cohesion, the liquid is absorbed by the paper.

The degree of absorbency of paper affects the brightness and sharpness of any lines of the ink printed on it. Poor-quality ink prints are made on paper with low absorbency, partly because the ink that is not absorbed by the paper tends to smear and/or rub off the paper. Poor-quality ink prints are also made on paper with a very high degree of absorbency.

This is because the paper absorbs so much ink that the ink shapes have blurred boundaries. The paper with just the right amount of absorbency produces ink prints with sharp, clear lines. Texture is how a surface feels, such as smooth or rough. A project question might be, "How does the texture of paper affect its printing quality?"

Clues for Your Investigation

Determine a way of measuring printing quality. One way is to stamp an ink print on papers with different textures. Using a magnifying lens, compare the sharpness of the borders of the print on each type of paper.

Dependent Variable: Texture of paper
Independent Variable: Quality of ink print

Controlled Variables: Shape of ink print, ink stamping procedure, measuring procedure, color of paper, weight of paper

Control: Medium-textured paper

Other Questions to Explore

1. Does the color of testing papers affect printing quality?

2. Does the weight of testing papers affect printing quality?

3. Copy paper has a suggested side for printing. Is the absorbency different for each side of the paper?

4. Does the print on newspaper and magazine pages affect absorbency rate?

Project 10. What Effect Does Salt Concentration Have on the Specific Heat of an Aqueous Salt Solution?

Category: Physics—Energy—Heat

Heat is the energy that is transferred between objects because of differences in their temperature. It moves from an object with a higher temperature to one with a lower temperature. Specific heat is a measure of how well a material resists changing its temperature. A material with a low specific heat changes temperature easily; it has to gain or lose only a small amount of heat to increase or decrease its temperature. The opposite is true for a material with a high specific heat.

Pots and pans should be made with materials having low specific heats. That way, it doesn't take much heat to get the pot or pan hot, and most of the heat goes into cooking the food. Wood has a higher specific heat than metal. When the same amount of heat is added, a wooden handle on a pot does not get as hot as a metal handle.

Water has a very high specific heat: 1 cal/g °C. One calorie of heat is needed to raise the temperature of 1 gram of water 1°C.

This specific heat is for pure water. A project question might be, "What effect

does salt concentration have on the specific heat of an aqueous salt solution?"

Clues for Your Investigation

Design a safe method of measuring temperature changes. One way is to cool the water and water-and-salt solutions instead of heating. Start with a measured amount of distilled water at room temperature. The water can be cooled by placing the container in the refrigerator or surrounding it with ice. Measure the temperature every 5 minutes for 30 or more minutes. Repeat the experiment using the same amount of water but with different amounts of salt mixed in.

Independent Variable: Amount of salt
Dependent Variable: Temperature change.

Controlled Variables: Amount of water, type of containers, method of cooling, time intervals for measuring

Control: Distilled water.

Other Questions to Explore

1. Do other kinds of solutes such as sugar or baking soda affect the specific heat of an aqueous solution?

2. How can the specific heat of different solids be compared?

Project 11. How Does the Size of a Vibrating Surface Affect the Pitch of Its Sound?

Category: Physics—Energy—Sound

Sound is energy produced by a vibrating material that can be heard and is also called sound waves, which are waves produced as a result of the vibration of a material. Vibration is a back and forth or up and down motion. Sound originates from a vibrating object that forces the particles of a medium (the material sound passes through) to vibrate. For example, if one end of a ruler is held securely to a table and the end extending past the table is pushed down, the free end of the ruler can be observed to vibrate (move back and forth) at a particular frequency (the number of vibrations per second). The vibrations of the ruler cause the air particles around the ruler to move back and forth at the same frequency, creating areas of compression (where the particles are pushed together) and rarefaction (where the particles are spread apart). Waves such as sound waves that have areas of compression and rarefaction are called longitudinal waves.

The movement of the air around the vibrating ruler transfers the sound energy through the air. The vibrating air enters your ears and hits against your eardrums causing them to vibrate. The frequency of the vibration of the eardrums is perceived by your brain as a specific sound called pitch. The greater the frequency, the higher the pitch. As the length of the ruler

decreases, its frequency increases, producing increasingly higher-pitched sounds.

Percussion instruments are musical instruments that make sound when you strike or shake them. Percussion instruments include drums, xylophones, gongs, and cymbals. Drums come in different sizes and shapes. A project question might be,

"How does the size of a vibrating surface affect the pitch of its sound?"

Clues for Your Investigation

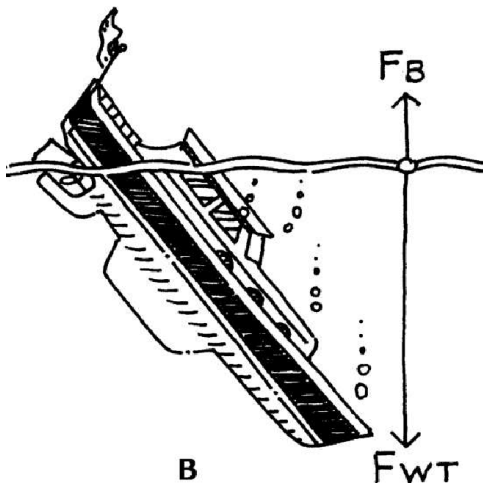
Make one type of percussion instrument such as a drum in different sizes. Drums have plastic or other materials stretched tightly across a hollow plastic, wooden, or metal cylinder. Decide on the material to be used and make drums that have the same shape but vary in surface size. Decide on how the drums will be struck, and use the same procedure when testing each drum. Compare the pitch produced by each drum.

Independent Variable: Surface size of drum **Dependent Variable:** Pitch **Controlled Variables:** Material the drums are made of, shape of the drums, how the drums will be tested **Control:** Medium-sized drum surface

Other Questions to Explore

1. What effect does the density of a vibrating material have on pitch?
2. What effect does the shape of a vibrating material have on pitch?

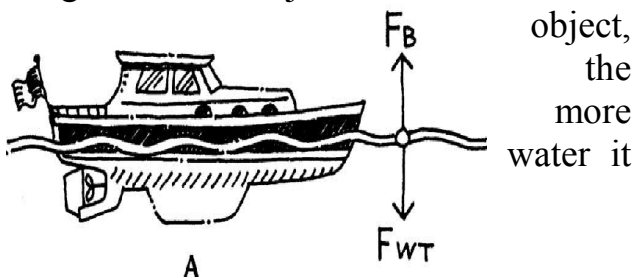
Project 12. How Does Density Affect the Buoyancy of Objects?



Category: Physics—**Mechanics—Buoyancy**

Buoyancy is the upward force of a fluid on an object placed in it. Archimedes (287-212 B.C.), a Greek mathematician, is given credit for explaining buoyancy. Floating is usually associated with water or air, but floating can describe any object that is suspended in any fluid, whether it is a liquid or a gas. The term buoyant is a measure of how well an object floats.

When an object such as a boat is placed in water, the submerged part of the object displaces (pushes aside) an amount of water whose weight is equal to the weight of the object. The heavier the



object, the more water it displaces, and thus the lower it sits in the water.

An object floats or sinks in water because of the difference between the total downward force and the total upward force acting on the object. If no other forces are acting on the object, the downward force is equal to the weight (F_{wt}) of the object, and the upward force is equal to buoyancy (F_B). Weight is the

measure of the force of gravity acting on the object. If the weight of the object is less than the buoyancy on the object, then the object floats. If the weight of the object is greater than the buoyancy on the object, then the object sinks. In diagram A, the weight of the boat is equal to the buoyancy on it, which is indicated by equal-length arrows; thus, $F_{wt} = F_B$, and the boat floats. In diagram B, the

Clues for Your Investigation

weight of the boat is greater than the buoyancy on it, which is indicated by unequal-length arrows; thus, $F_w > F_B$, and the boat sinks.

Since an object continues to sink into the water until it displaces an amount of water whose weight equals the weight of the object, would spreading out the weight make a difference in buoyancy? Volume is how much space an object takes up. For example, a piece of aluminum foil that is wadded into a tight ball has a small size and thus a small volume. If the same-size piece of aluminum foil has a boat shape, it has the same weight, but it now has a bigger size (a bigger volume).

Boats are made of different materials such as wood and steel. But boats are not solid pieces of material. Instead, boats have hollow spaces filled with air. Air is lighter than wood or metal. The more hollow spaces a boat has, the greater its volume. Since density is a measure of the mass of a given volume, a project question might be, "How does density affect the buoyancy of objects?"

Build boats with the same mass but different volumes. Use the same kind and amount of material. Determine a way to measure the volume of each boat such as submerging the boats in water and measuring the amount of water displaced.

With the mass and volume measurement, determine the density of each boat using this formula: density = mass / volume.

Determine a way to compare buoyancy such as by measuring the height of the boat above the waterline.

Independent Variable: Boats with different volumes

Dependent Variable: Buoyancy measured by the height of the boat above the waterline
Controlled Variables:

Project 13. How Does Mass Affect the Period of a Pendulum?

Category: Physics—**Mechanics—Pendulum**

A pendulum is a device with a bob (a weight) hung from a fixed pivot (the point on which something turns) so that it swings back and forth. When a pendulum hangs so that its bob is directly below the pivot, it experiences zero net force (the sum of all forces simultaneously acting on an object) and is said to be at its resting point. When the bob is pulled to one side and released, it repeatedly swings back and forth. One back-and-forth motion is called a vibration. The pendulum's period (T) is the time required to complete one vibration. The equation for period is: period (T) = time/vibrations.

Displacement is the distance a pendulum moves to one side from its vertical position. Since the pendulum moves in an arc (a part of a circle), its displacement is an angular distance measured in degrees. The displacement angle is measured from the pendulum's vertical position. At a displacement angle of 15° or less, the periodic motion of the pendulum is the same; that is, regardless of the displacement of the pendulum, as long as it is 15° or less, the period of the pendulum will be the same.

Mass of the boats, material used, testing container for holding water, method of measuring buoyancy
Control: Median density

Other Questions to Explore

1. How does the placement of cargo in a boat affect its buoyancy?
2. What effect do building materials have on buoyancy?
3. What effect does salinity of ocean water have on buoyancy?

Since weight is a measure of the gravitational pull on an object, would pendulums of different weights have different periods? As the mass of an object increases, its weight increases. A project problem might be, "How does mass affect the period of a pendulum?"

Clues for Your Investigation

Design pendulums that are the same except for the weight of the bob. They might be washers tied to a string. You can vary the weight of the bob by using a different number of washers for each pendulum. Pull the pendulums to one side so that they all start with the same displacement. Count the oscillations in a given time period.

Independent Variable: Weight of bobs
Dependent Variable: Period
Constant Variables: Length of pendulum, timing of period, displacement angle
Control: Median-weight pendulum

Other Questions to Explore

1. What effect does a displacement greater than 15° have on the period of a pendulum?
2. What effect does the stiffness of the bob support have on the period of a pendulum?
3. What effect does the size of the bob have on the period of a pendulum?

4. What effect does the length of a pendulum have on its period?

CASE STUDIES

Case 1. Lady Tasting Coffee



Part I: Coffee Shop Wager

Characters

Model: An attractive young woman with impeccable taste, working as a successful model for an advertising firm.

Escort: A tall, dark, and handsome young man, working as a marketing and survey researcher for the same advertising firm.

Older Gentleman: An adjunct professor of biostatistics at a local college and a coffeehouse regular; dressed in a slightly aged tweed jacket.

Setting

The red sports car makes a quick stop in front of the Philadelphia coffeehouse after its occupants have spent a night on the town. A sleek model and her tall, dark, handsome escort gracefully exit the car and approach the counter, where the escort purchases two cups of house coffee. At the condiments table, the escort proceeds to pour milk into the two coffees, and the following dialogue results.

Dialogue

Model: Oh, no. I'll need a fresh cup.

Escort: You like milk in your coffee, right?

Model: Yes, I like milk in my coffee, but only, and I say only, if it is added to the cup first.

Escort (laughing): Oh, come on, that's ridiculous; you can't possibly tell the difference. Coffee is coffee whether you add the milk first or second.

Chapter 21

Model: Of course I can tell the difference; you've no right to laugh at me.

Older Gentleman: Pardon me for overhearing your conversation. Actually, the lady may be able to tell the difference.

Escort: You're kidding me, right?

Older Gentleman: Such claims have been made before. A woman made that claim at an afternoon tea party in Cambridge in the 1920s. She stated that she could always tell whether milk was added before or after the tea was poured in the cup. The famous statistician Sir Ronald Fisher was at high tea that afternoon and immediately designed an experiment to test the woman's palate. Rumor has it that she shocked the guests because she correctly told Sir Fisher whether milk had been added first or second after tasting multiple cups of tea. The event became famous because Sir Fisher used it to explain the basics of experimental design in one of the first textbooks ever published on the topic of experimental design.

Escort: Well that's a good story, but it also sounds suspiciously like a story with no basis in reality, invented by an

imaginative professor writing a textbook. You certainly haven't convinced me to buy the lady another cup of coffee.

Older Gentleman: From what I've read, it was a real event, and furthermore, humans have very sensitive taste buds. I think she deserves a new cup.

Model: Now that the coffee is cold, I certainly deserve a fresh cup.

Older Gentleman: Ma'am, I fully agree. In fact, I think you deserve several cups of fresh coffee! Let's set up our own experiment to determine whether this lady can or cannot discern whether milk was added to the cup before or after the coffee.

Model: How fun! Yes, let's see who is right with our own tea test, I mean coffee test.

Older Gentleman: Clever pun, ma'am. You know the real student's t-test was developed in the early 1900s by a

taste tester of sorts at the Guinness Brewery in Dublin, Ireland. Only he wasn't tasting tea either. Sir, are you a gambling man? How about a wager? If our experiment shows that she can tell the difference, you will pay for the coffee. If the experiment does not demonstrate her discerning palate, I will pay for the fresh cups.

Escort: You're on! But I want the rules hashed out before she starts sipping. I mean, how many cups are we talking about? And what if she's wrong for just a few cups? I don't want to pay for the coffee just because she is a good guesser.

Older Gentleman: Fisher would agree completely. Even the smallest experiment requires forethought and planning. You must tell me, sir, just how sure do you want to be that she isn't guessing?

QUESTIONS

Imagine that you are going to design and perform the experiment described in the dialogue.

1. What is the hypothesis that will be tested in this experiment?
2. Why is it important to offer the model more than just two cups (one with the milk added first and one with the milk added second)? Explain your answer.
3. How many cups of coffee should the model taste? Explain your answer.
4. Describe exactly how the cups should be prepared. Does every cup need to be exactly the same in every way except the order in which the milk and coffee are added? Can you actually make every cup identical? Explain your answer fully.
5. In what order should the cups be presented? What method or decision rules might you use to decide which cup will be offered first, second, and so on?
6. How do you recommend that the characters decide if the model is able to tell whether the milk was added to the cup before or after the coffee? (In other words, how many cups does she have to correctly evaluate for you to conclude that she really can tell the difference?) Explain your choice.
7. Without looking it up in a textbook or online, provide your own definition of "experimental design."

Part II: Tasting Tea

Read Fisher's essay "Mathematics of a Lady Tasting Tea," available online at <http://legacy.library.ucsf.edu/tid/fqi22eoo/pdf>. Then answer the questions below.

QUESTIONS

The questions below ask you to compare your answers to the questions in Part I to the explanations found in Fisher's essay.

1. Referring to your answers to the questions in Part I, was the hypothesis you chose different than the null hypothesis given by Fisher in his essay? Explain your answer.
2. What reason did you give for why it is important to offer the model more than just two cups (one with the milk added first and one with the milk added second)? Was your answer the same as Fisher's answer? Based on the essay, please describe Fisher's answer to this question.
3. How many cups did you say the model should taste? How many cups did Fisher say that the "tea lady" in the story should taste? Please describe fully Fisher's answer to this question, including any mathematical considerations. Was your answer the same as Fisher's answer? If not, how was it different?
4. Before reading Fisher's essay, did you think that every cup needed to be exactly the same in every way except the order of the addition of milk and coffee? Does Fisher believe that every cup should be prepared identically? Describe Fisher's explanation for how to deal with uncontrollable variations among cups.
5. Before reading Fisher's essay, what method did you recommend for choosing the order in which the cups should be presented? Was your answer different from what Fisher recommends in his essay? Describe Fisher's explanation for how to choose the cup order.
6. In Part I, you answered the question of how one should decide if the model is able to tell whether the milk was added to the cup before or after the coffee. (In other words, how many cups does she have to correctly evaluate for you to conclude that she really can tell the difference?) Compare your answer to Fisher's answer and then describe Fisher's answer fully.
7. Your instructor will provide you with a textbook definition of experimental design. Was your definition complete? Your answers to all of the questions in Part I probably differed in small or large ways from Fisher's proposed design of a tea-tasting experiment. Are there any differences that changed your perception of statistics and experimental design? If yes, describe how Fisher's essay enlightened you. Even if you did not find that Fisher's essay changed your views, make a short summary list of the important design concepts that you think are emphasized in Fisher's essay.
8. Following the guidance of your instructor, use Part III of the story or, alternatively, if your instructor has provided materials, set up a mock event similar to the tea-tasting experiment. Instead of tea, you might consider seeing if your classmates can tell the difference between 1% and 2% milk, between two brands of bottled water, between two brands of flavored diet or regular soda, or some other simple taste comparison. Adhere to the principles of Fisher's paper,

and draw conclusions based on your results, using Fisher's rules.

9. Rumor has it that the real lady who had tea with Fisher on an afternoon in the 1920s was able to accurately tell whether the milk was added first or second every single time she was offered a new cup.

Part III: Tasting Coffee

The escort and the older gentleman prepared four cups of coffee to which they added the milk first and four cups of coffee to which they added the milk second. The two men attempted to make sure that the cups were identically prepared as much as possible in terms of the amount of coffee, milk, and other factors. By writing the numbers 1-8 on slips of paper and pulling the numbers out of the hat, the escort and the older gentleman randomly decided that cups #2, 3, 6, and 7 would be prepared with the milk added first and cups #1, 4, 5, and 8 would be prepared with the coffee added first. The model has just finished sipping all cups (presented in order 1-8), and she has written down her decision.

Older Gentleman: Are we all in agreement that we will use Fisher's rules for deciding the conclusion for the experiment?

Escort: Yes, we are. Please tell us which cups you think had the milk added first.

Model (smiling broadly): It is so obvious that cups #2, 3, 4, and 7 had the milk first.

Older Gentleman: Are you sure? Is this your final answer?

Model: Yes, those are the cups that had the milk added first.

Escort: Ha! Based on Fisher's rules, you can't really tell the difference! The

Can you conclude from her success that most people can tell the difference between milk-first and tea-first cups? Briefly describe the design of an experiment that would test this broader question.

milk was added first to cups #2, 3, 6, and 7. Hot dog, mister! You will have to pay for the cups!

Model: But I got 6 of the 8 correct! That's pretty good! Who is this Fisher guy to say I can't do it?

Older Gentleman: I have to agree, ma'am, that you may be able to tell the difference, but we did decide beforehand that we would use Fisher's rules, and his rules are quite strict. We can only conclude that you can tell the difference if there were less than a 5% chance that your success could be explained by good guessing.

Model: But I didn't guess! I really can tell; it seems unfair that you accuse me of guessing just because I made one mistake!

Escort: We aren't really accusing you of guessing; the 5% rule is the common cutoff that is used in many statistical analyses.

Model: Fisher's rules are too strict. Give me another two cups and, if I get it right this time, my success rate will be better than the 5% guess rate. I'll show you that I really am able to tell the difference!

Escort: Hold on! It would be cheating to change the plan now. No more cups. Please, let's quit while I'm ahead!

QUESTIONS

1. Did the characters correctly follow Fisher's rules when they concluded that the results do not allow us to conclude that the woman can tell the difference between the two types of cups?
2. Do you think the lady really can tell the difference between the milk-first versus the milk-second cups?
3. Which of the following sentences do you think most accurately and clearly states the conclusion of the experiment? Propose your own statement if you find flaws in all of the statements below.
 - a) The model cannot tell the difference between the milk-first and the milk- second cups.
 - b) There is a 5% or greater chance that the woman guessed her answers.
 - c) At the 5% level, the model cannot significantly tell the difference between the milk-first and the milk-second cups.
4. Would it be acceptable to add two more cups now? Why or why not? What is the value of deciding the experimental design before you begin an experiment and not changing it in the middle of the experiment?
5. Do you think Fisher's rules are too strict? Why or why not?
6. Would you feel the same way about his rules if we were testing whether a monitor at a nuclear power plant can really recognize elevated levels of radiation?
7. Would you feel the same way if we were testing whether a new children's vitamin caused increased risk of kidney dysfunction?
8. To answer questions (a) and (b) better, read the more detailed descriptions of the two hypothetical experiments given below. For each design, state the null hypothesis. There are two types of mistakes that statisticians can make at the conclusion of a significance test: They can incorrectly reject a true null hypothesis (Type I error), or they can incorrectly fail to reject a false null hypothesis (Type II error). The 5% rule ensures that a Type I error is never made at a greater rate than 5%, and the likelihood of making a Type I error is often inversely related to the likelihood of making a Type II error. Type II error rates are usually not controlled in scientific experiments and can be considerably higher than 5%. For the following two experiments, what would be the human ethical consequence of making Type I and Type II mistakes in your conclusion at the end of the experiment? Would you recommend the 5% rule for these experiments? Why or why not?
9. Nuclear Monitor Experimental Design: The monitor is exposed to eight environments (four high and four low radiation levels), and the experimenter records whether the monitor warning light comes on or not.
10. Vitamin Experimental Design: Eight children are given a placebo and eight children are given the new vitamin. Urine from the children is collected and the pH in

the urine is monitored and compared between the two groups. Both high and low pH are indications of kidney dysfunction.

11. Return again to the coffee-tasting experiment. Does the outcome described in the dialogue prove that the model cannot tell the difference between the two types of cups of coffee?

Case 2. PCBs in the Last Frontier

The Case Part I: PCBs

Polychlorinated biphenyls (PCBs) are compounds that were once used as insulators in electrical transmission lines and in the production of polymers. Each PCB differs by the quantity and location of the chlorine atoms. An example of one of the many different PCBs is shown in Figure 12.1. PCB production was halted in 1977 due to the

potential toxicity, but the chemicals are still found in the environment due to their stability. Studies in remote areas of Alaska have shown that PCBs can even be found in lakes untouched by humans. There is no known natural process that produces PCBs, so all of the PCBs in existence are presumed to have been produced by humans.

Questions

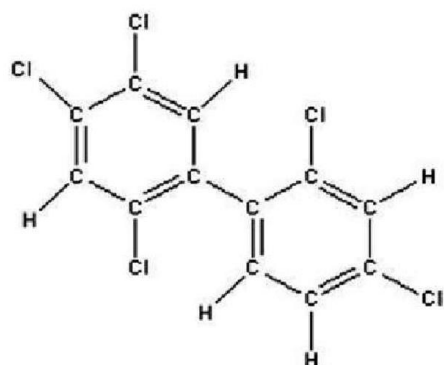
1. What scientific observation about PCB distribution is described above?



Mount McKinley and Wonder Lake: Denali National Park, Alaska

2. Propose a hypothesis or "explanatory story" to explain the global movement of pollutants such as PCBs. Specifically, how could they end up in the most remote Alaskan lakes?
3. Propose a method, either through observations or direct experimentation that would test your hypothesis from question 2. (Note: Your approach may be on a local scale despite examining a global phenomenon.)

Figure 12.1. 2,2',4,4',5-Pentachlorobiphenyl



Part II: Global Transport

Later studies showed that the global circulation of PCBs was due at least in part to atmospheric transport. PCBs enter the atmosphere by several mechanisms, including the burning of organic material and evaporation in warmer climates, followed by condensation at higher latitudes. This explained how chemicals made by humans could be found in areas untouched by humans.

Questions

1. Come up with a hypothesis or "explanatory story" to answer the following question: Should PCB levels differ significantly in Alaskan lakes that are near each other and at the same altitude? (Keep in mind that a hypothesis is an educated guess, so it requires a reason why you think your answer is correct.)
2. Propose a method, either through observations or direct experimentation, that would test your hypothesis from question 1.

Part III: Significant Difference?

Recent observations of PCB levels in arctic lakes have shown that the levels of PCBs are not the same in all lakes that are near each other and at the same altitude. In fact, lakes at the terminus (i.e., the start) of river systems had higher PCB levels than completely isolated lakes that were close by.

Questions

1. What possible "explanatory story" might explain the observation described above? (Hint: Think of species that leave a lake but return later in life.)
2. How would you test your hypothesis?


Recent scientific studies have shown that sockeye salmon returning from the ocean to spawn in Alaskan lakes contain elevated levels of PCBs. After spawning, the salmon die and their contents become part of the lake sediment and/or enter the food chain. The salmon are responsible for adding approximately six times as many PCBs to remote lakes as atmospheric circulation. The types of PCBs in the salmon also match those found in the ocean.

Question

Imagine yourself as a scientist working on this issue. What would you want to look at next?

Case 3. The Great Parking Debate

Part I: The Question

 At the end of a long day of shopping, Katelyn and Lisa were walking out to Lisa's car, ready to go home. Putting their shopping bags in the trunk, Lisa slipped into the driver's seat while Katelyn took her position as passenger.

Lisa put the key in the ignition and absently said to Katelyn, "Looks like someone's waiting for our spot." Lisa started the car. The vehicle waiting for their spot honked.

"That drives me nuts," Lisa said in response to the horn. "I'm going, I'm going. Be patient," she muttered under her breath to the driver of the other car. Although she had been about to put the car in reverse and pull out of the spot, she dug into her purse for her lipstick.

"Lisa, that other car is waiting. Why aren't you leaving?" Katelyn inquired.

"I will," said Lisa. "I can't put lipstick on while I'm driving. Besides, it's

my spot and I can stay in it as long as I want."

"Now you're being rude," Katelyn scolded her friend. "I always try to leave as quickly as I can when another car is waiting."

"You do not," Lisa responded. "I've ridden with you, and you make the other person wait."

Lisa pulled out of the parking spot as Katelyn shot back, "Do not."

"Do too," Lisa continued the argument. "Everyone takes longer to leave a parking spot when someone's waiting. It's an instinctual thing—we're defending our territory."

Katelyn responded with a snort. "Instinct. I don't think so. People are nicer than that. Except for a few rude people like you," she said teasingly, "most of us leave faster when someone's waiting."

"As a psych major, you could study something like that," Lisa responded. "Maybe I'll make that my next project for my research methods class," Katelyn replied. "I'll let you know what I find out."

QUESTIONS

Help Katelyn find out whether she is right or Lisa is right. In groups of two or three students, address the following:

1. Identify the specific research question(s) implied by their discussion.
2. What hypothesis would your group suggest?
3. What predictions can you make if your hypothesis is correct?
4. How could you test the predictions? In other words, if you were to investigate this issue, how might you do it?

Part II: Finding a Method

A few weeks later, Katelyn met Lisa for lunch. She brought up their parking debate and told Lisa about a study she had found that addressed the question.

In this study, the researchers stood in front of the main entrance to a shopping mall and watched shoppers as they left the mall and walked to their vehicles. They timed the shoppers from the time they opened the vehicle's door to when they

had completely left the parking space. The researchers noted how many people were traveling in the vehicle as well as whether or not another vehicle was waiting for the parking space.

QUESTIONS

1. What method are the researchers using to investigate the research question (case study, survey, naturalistic observation, or experiment)?
2. How does this method test the hypothesis?
3. Based on the hypothesis, what would you expect they would find?

Part III: And Now, Some Results

The researchers (Ruback and Juieng 1997) designated those drivers who had a vehicle waiting for them to pull out of their parking spot as intruded upon.

Those who did not have a vehicle waiting for them to leave were not intruded upon.

For the 200 drivers observed, these were the average amounts of time to leave the parking space:

Intruded upon 39-03 seconds

Not intruded upon 32.15 seconds

The researchers also looked at whether it took those traveling with others longer to leave than those who were alone:

Traveling alone 30.64 seconds

Traveling with others 37.45 seconds

QUESTIONS

1. What do these findings tell us? Do the data support your hypothesis?
2. What might be a weakness (or some weaknesses) of this method?
3. How might the researchers use another method to explore this research question?
4. Are there additional effects that the researchers should investigate?

Part IV: That's Not All

The researchers were concerned that the type of car waiting or some behavior of the driver of that car might make a difference in the actions of the people in their first study. To deal with this, they designed an experiment. They used a low-status car (1985 Nissan Maxima) and a high-status car (1994 Infinity Q45 or 1993 Lexus SC400). They had three levels of intrusion: (1) no intrusion (no car was waiting for the spot), (2) low intrusion (the other car waited four

spaces from and faced the direction of the departing car), and (3) high intrusion (the car waited four spaces from the departing car, turned on its turn signal, and honked the horn once after the driver sat behind the wheel). The high-status cars were involved in half of each of the intrusion conditions and the low-status cars in the other half of the intrusion conditions. An observer recorded the number of seconds it took the driver to leave the space after he or she opened the door.

QUESTIONS

1. What do you think were the hypotheses of the researchers?

2. What would you predict they would find?
3. What made this study an experiment and not a naturalistic observation?

Part V: More Results

Below are data from the study.

Average number of seconds that vehicles took to leave a parking space in three conditions:

High intrusion	Low intrusion	No intrusion
42.75 seconds	30.80 seconds	26.45 seconds

The researchers did not find any significant effect for whether the intruding car was high or low status.

QUESTION

What did the researchers find about the effect of intrusion on length of time to leave a space?

Part VI: The Final Word

"I was right!" Lisa crowed when Katelyn told her about the results. "I knew people took longer to leave when someone else was waiting. Everyone knows that."

"Maybe not everyone, Lisa," Katelyn countered. "These researchers did one more study to see if people knew the effect that intruding cars have on people."

Katelyn explained: "The researchers asked participants whether other drivers would vacate their spaces in different amounts of time than they had. Participants made judgments on a scale from 1, 'make the time shorter,' to 7, 'make the time longer,' with 4 in the middle as 'no effect.'"

QUESTIONS

1. What does Table 13.1 tell us about what people think they do and what they think others do in response to intrusion?
2. Do these results and the results of the other studies tell us about anything else besides parking? Do people behave in similar ways in other places besides parking

"The researchers asked people to make the judgment for their own behavior and for others' behavior and whether the other car honked or not." "What did they find?" Lisa asked.

"Here's the table of their findings," Katelyn replied, pulling a sheet of paper from her bag.

Table 13.1. Mean Ratings of Own and Others' Behavior Following Low Intrusion (No Honking) or High Intrusion (Honking) When Leaving a Parking Space

	Low Intrusion	High Intrusion
Own behavior	1.87	4.88
Others' behavior	2.83	4.40

Lisa studied the table for a few seconds. "What does this tell us?" she asked.

lots? In what other kinds of situations might these results help us understand human behavior?

Case 4. Childbed Fever: A 19th- century Mystery

Part I

Ignaz Semmelweis, a young Hungarian doctor working in the obstetrical ward of Vienna General Hospital in the late 1840s, was dismayed at the high death rate among his patients. He had noticed that nearly 20% of the women



under his and his colleagues' care in Division I of the ward (the division attended to by physicians and male medical students) died shortly after childbirth. This phenomenon had come to be known as "childbed fever." Alarming, Semmelweis noted that this death rate was four to five times greater than that in Division II of the ward (the division attended by female midwifery students).

QUESTIONS

1. What were Semmelweis's initial observations?
2. What was the problem at hand?
3. What possible explanatory story might Semmelweis come up with?
4. How might Semmelweis test his suspicions?

Part II

One day, Semmelweis and some of his colleagues were in the autopsy room performing autopsies, as they often did between deliveries. They were discussing their concerns about death rates from childbed fever. One of Semmelweis's friends was distracted by the conversation

and punctured his finger with the scalpel. Days later, Semmelweis's friend became quite sick, showing symptoms not unlike those of childbed fever. His friend's eventual death from the illness strengthened Semmelweis's resolve to understand and prevent childbed fever.

QUESTIONS

1. What might Semmelweis now propose as an explanatory story?
2. How could Semmelweis test his new hypothesis?

Part III

In an effort to curtail the deaths in his ward due to childbed fever, Semmelweis instituted a strict hand-washing policy among his male medical students and physician colleagues in Division I of the ward. Everyone was required to wash their hands with

chlorinated lime water prior to attending to patients. Mortality rates immediately dropped from 18.3% to 1.3%, and in fact not a single woman died from childbirth between March and August 1848 in Semmelweis's division.

QUESTIONS

1. What conclusions can be drawn from Semmelweis's experiment?

2. How might Semmelweis revise his original hypothesis or experiments to gain additional information?

Part IV

Despite the dramatic reduction in the mortality rate in Semmelweis's ward, his colleagues and the greater medical community greeted his findings with hostility or dismissal. Even after presenting his work on childbed fever (technically named puerperal sepsis) to the Viennese Medical Society, Semmelweis was not able to secure the teaching post he desired, so he returned to Hungary. There, he repeated his successful hand-washing attack on

childbed fever at St. Rochus Hospital in Budapest. In 1860, Semmelweis finally published his principal work on the subject of puerperal sepsis, but this too was dismissed. It is believed that the years of controversy and repeated rejection of his work by the medical community caused him to suffer a mental breakdown. Semmelweis died in 1865 in an Austrian mental institution. Some believe that his death was, ironically, caused by puerperal sepsis.

QUESTIONS

1. When presented with what appears to be unequivocal evidence in support of hand washing, why might Semmelweis's colleagues have dismissed his ideas?
2. How else might Semmelweis have approached the problem of disseminating his research findings to ensure their acceptance?
3. What, if any, role did serendipity play in Semmelweis's story of childbed fever?

Case 5. The "Mozart Effect"

Part I: Enhanced Performance?

"Hey, Bill, what are you listening to?" asked Fred.

"I'm listening to these CDs of classical music that I bought. They're supposed to help me concentrate more and make me become more creative," answered Bill.

Fred frowned. "How can listening to classical music do all of that? Where did you hear about this?"

"Well, I was flipping through this magazine at my girlfriend's house and I saw this ad where you could buy these CDs that are supposed to stimulate the right side of your brain and improve your ability to concentrate and stuff" said Bill.

"And how much did you pay for these CDs?"

"Just \$45, and there's a money-back guarantee if they don't work. In the ad, it said that some researchers found that listening to this music made people do better on different mental tests and that it made your brain release these chemicals that made you feel better," Bill said excitedly.

Fred still felt a little skeptical about the power of Bill's new CDs. "So, what else did the ad say?"

"All kinds of cool things. Like, when they played the music for these cows, they gave more milk, and immigrants who were learning English

learned faster when they listened to the music, and, this one is really cool, when they played the music next to this yeast, it made better sake," said Bill.

Fred laughed. "So, have you been giving more milk or what?"

"Hey, don't make fun of me. I haven't been doing so great in some of my college classes, so I figured I might as well give it a chance " Bill answered. "Here, you can check it out for yourself on the product website."

"You know, this might just be the kind of thing I could do for my project in my research methods class. Our professor is encouraging us to be more skeptical about claims just like this one. We've been talking about something called the principle of falsifiability," Fred said.

"The principle of what-ability?" asked Bill.

"The principle of falsifiability. It's a scientific term that basically says that when we study something, like whether

these CDs improve concentration and creativity, we have to do it in a way that will allow us to confirm whether the prediction is false. So, if people study this effect using the scientific method and they don't find that the CDs improve concentration and creativity, then we have to accept that there's no truth to the claim being made by the person who produced them," replied Fred.

"Well, that makes sense to me. You know, I think I want to help you with this study. I already have the CDs, so maybe it would be kind of cool to be part of a scientific study. What do we do next?" asked Bill.

Fred and Bill need to figure out how they can determine if listening to classical music really will produce the kind of effects that the product's maker claims. Fred and Bill decide to go visit Fred's psychology professor to see what she thinks about their study idea.

QUESTIONS

Answer the following questions based on Bill's description of the advertisement and the information on the website.

1. What claims are made for the product?
2. Is there evidence to support the claims?
3. What suggestions do you have for Fred and Bill?
4. How can Fred and Bill find out if there's any published evidence to substantiate the claims?
5. Evaluate the quality of the information presented on the website. Use Table 18.1, which distinguishes between characteristics of nonscientific and scientific ways of acquiring knowledge, to help you organize your response. For example, decide whether the observations posted on the website for the CDs are based on a handful of anecdotes or rather on systematic, controlled experiments. Next, evaluate whether the reporting of results is biased and subjective, or unbiased and objective. Apply each category in turn and use the dialogue between Bill and Fred to justify your conclusions.

Table 18.1. Characteristics of Nonscientific and Scientific Ways of Acquiring Knowledge

	Characteristics of a Nonscientific, Everyday Approach to Experience	Characteristics of a Scientific Approach to Experience
Observation	Casual, uncontrolled	Systematic, controlled
Reporting	Biased, subjective	Unbiased, objective
Concepts	Ambiguous, with surplus meanings	Clear definitions, operational specificity
Instruments	Inaccurate, imprecise	Accurate, precise
Measurements	Not valid or reliable	Valid, reliable
Hypotheses	Untestable	Testable
Attitude	Uncritical, accepting	Critical, skeptical
General Approach	Intuitive	Empirical

Note: Adapted from Shaughnessy, J. B., E. B. Zechmeister, and J. S. Zechmeister. 2003. Research methods in psychology. 6th ed. New York: McGraw-Hill.

Part II: Outlines of an Experiment

Encouraged by Fred's psychology professor, Fred and Bill decide to conduct an experiment to test the effectiveness of the classical music CDs. Outline an experiment that they could conduct. Be sure to address the following questions:

1. What is the research question that Fred and Bill want answered?
2. What would be the scientific hypothesis?
3. What independent variable(s) could be tested?
4. How could the effect of the independent variable(s) be measured? In other words, what should the dependent variable(s) be?
5. What other variables should be controlled, and how should this be done? Describe control procedures that Fred and Bill may want to use, including (but not limited to) holding some variables constant, eliminating the effect of some variables, choosing a random sample, and randomly assigning participants to groups (levels of the independent variable).

Part III: Research Report Analyses

(A) Rauscher, Shaw, and Ky (1993)

Fred and Bill did a literature review, and one of the research reports they found was from Nature (see Rauscher, Shaw, and Ky 1993). Read this report and respond to the following:

1. Identify the independent variable(s).
2. Identify the dependent variable(s).
3. What aspects of the study did the researchers control? What aspects did they fail to control?
4. What were the results of the study?

5. What conclusions do the researchers reach?
6. Based on the design and results of this study, do you believe that the researchers are justified in reaching these conclusions? Why or why not?
7. Now look at the study that you and your group designed. Did you control for any of the problems present in Rauscher, Shaw, and Ky's study? If so, what were your controls?

(B) Steele, Bass, and Crook (1999)

Let's take a look at another research report that Fred and Bill found in the journal *Psychological Science* (see Steele, Bass, and Crook 1999). Read this report and respond to questions 1-6 above as they pertain to this article. In addition, point out ways in which this study is an improvement on the Rauscher, Shaw, and Ky study.

Part IV: Replication (Optional)

As a class project, we are going to do our own study to see if we can replicate the study done by Rauscher. We will use the 1993 *Nature* article and the Steele article in *Psychological Science*, as well as any additional articles that we come across in a literature review. Your next task is to use the database PsycInfo to conduct a literature review. Spend some time with your group generating some search terms that will be useful for this literature search. Don't forget to include authors' last names as appropriate terms.

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