SCANNING

EXERCISE ONE: As a whole group:

SCANNING is the art of looking through a text ONLY to find answers to specific questions. Let's try an example of this. Read the following text quickly by SCANNING and fill in the table. What do the numbers given in the table refer to?

1%	
2%	
6%	
13%	
16%	
30%	
3/4	
86%	

Spoon-fed feel lost at the cutting edge

Before arriving at university students will have been powerfully influenced by their school's approach to learning particular subjects. Yet this is only rarely taken into account by teachers in higher education, according to new research carried out at Nottingham University, which could explain why so many students experience problems making the transition.

Historian Alan Booth says there is a growing feeling on both sides of the Atlantic that the shift from school to university-style learning could be vastly improved. But little consensus exists about who or what is at fault when the students cannot cope. "School teachers commonly blame the poor quality of university teaching, citing factors such as large first-year lectures, the widespread use of inexperienced postgraduate tutors and the general lack of concern for students in an environment where research is dominant in career progression," Dr Booth said.

Many university tutors on the other hand claim that the school system is failing to prepare students for what will be expected of them at university. A-level history in particular is seen to be teacher-dominated, creating a passive dependency culture.

But while both sides are bent on attacking each other, little is heard during such exchanges from the students themselves, according to Dr Booth, who has devised a questionnaire to test the views of more than 200 first-year history students at Nottingham over a three-year period. The students were asked about their experience of how history is taught at the outset of their degree program. It quickly became clear that teaching methods in school were pretty staid.

About 30 per cent of respondents claimed to have made significant use of primary sources (few felt very confident in handling them) and this had mostly been in connection with project work. Only 16 per cent had used video/audio; 2 percent had experienced field trips and less than 1 percent had engaged in role-play.

Dr Booth found students and teachers were frequently restricted by the assessment style which remains dominated by exams. These put obstacles in the way of more adventurous teaching and active learning, he said. Of the students in the survey just 13 per cent felt their A-level course had prepared them very well for work at university. Three-quarters felt it had prepared them fairly well.

One typical comment sums up the contrasting approach: "At A-level we tended to be spoon-fed with dictated notes and if we were told to do any background reading (which was rare) we were told exactly which pages to read out of the book".

To test this further the students were asked how well they were prepared in specific skills central to degree level history study. The answers reveal that the students felt most confident at taking

notes from lectures and organizing their notes. They were least able to give an oral presentation and there was no great confidence in contributing to seminars, knowing how much to read, using primary sources and searching for texts. Even reading and taking notes from a book were often problematic. Just 6 per cent of the sample said they felt competent at writing essays, the staple A level assessment activity.

The personal influence of the teacher was paramount. In fact individual teachers were the centre of students' learning at A level with some 86 per cent of respondents reporting that their teachers had been more influential in their development as historians than the students' own reading and thinking.

The ideal teacher turned out to be someone who was enthusiastic about the subject; a good clear communicator who encouraged discussion. The ideal teacher was able to develop students' involvement and independence. He or she was approachable and willing to help. The bad teacher, according to the survey, dictates notes and allows no room for discussion. He or she makes students learn strings of facts; appears uninterested in the subject and fails to listen to other points of view.

No matter how poor the students judged their preparedness for degree-level study, however, there was a fairly widespread optimism that the experience would change them significantly, particularly in terms of their open mindedness and ability to cope with people.

But it was clear, Dr Booth said, that the importance attached by many departments to third-year teaching could be misplaced. "Very often tutors regard the third year as the crucial time, allowing postgraduates to do a lot of the earlier teaching. But I am coming to the conclusion that the first year at university is the critical point of intervention".

Alison Utley, *Times Higher Education Supplement.* February 6th, 1998.

EXERCISE TWO: Try this one on your own.

Read the following text quickly and answer the questions.

1. When were X-rays discovered?
2. Who discovered them?
3. What are the four characteristics of X-rays?

The Discovery of X-rays

Except for a brief description of the Compton effect, and a few other remarks, we have postponed the discussion of X-rays until the present chapter because it is particularly convenient to treat X-ray spectra after treating optical spectra. Although this ordering may have given the reader a distorted impression of the historical importance of X-rays, this impression will be corrected shortly as we describe the crucial role played by X-rays in the development of modern physics.

X-rays were discovered in 1895 by Roentgen while studying the phenomena of gaseous discharge. Using a cathode ray tube with a high voltage of several tens of kilovolts, he noticed that salts of barium would fluoresce when brought near the tube, although nothing visible was emitted by the tube. This effect persisted when the tube was wrapped with a layer of black cardboard. Roentgen soon established that the agency responsible for the fluorescence originated at the point at which the stream of energetic electrons struck the glass wall of the tube. Because of its unknown nature, he gave this agency the name *X-rays.* He found that X-rays could manifest themselves by darkening wrapped photographic plates, discharging charged electroscopes, as well as by causing fluorescence in a number of different substances. He also found that X-rays can penetrate considerable thicknesses of materials of low atomic number, whereas substances of high atomic number are relatively opaque. Roentgen took the first steps in identifying the nature of X-rays by using a system of slits to show that (1) *they travel in straight lines,* and that (2) *they are uncharged,* because they are not deflected by electric or magnetic fields.

The discovery of X-rays aroused the interest of all physicists, and many joined in the investigation of their properties. In 1899 Haga and Wind performed a single slit diffraction experiment with X-rays which showed that (3) *X-rays are a wave motion phenomenon,* and, from the size of the diffraction pattern, their wavelength could be estimated to be 10-8 cm. In 1906 Barkla proved that (4) *the waves are transverse* by showing that they can be polarized by scattering from many materials.

There is, of course, no longer anything unknown about the nature of X-rays. They are electromagnetic radiation of exactly the same nature as visible light, except that their wavelength is several orders of magnitude shorter. This conclusion follows from comparing properties 1 through 4 with the similar properties of visible light, but it was actually postulated by Thomson several years before all these properties were known. Thomson argued that X-rays are electromagnetic radiation because such radiation would be expected to be emitted from the point at which the electrons strike the wall of a cathode ray tube. At this point, the electrons suffer very violent accelerations in coming to a stop and, according to classical electromagnetic theory, all accelerated charged particles emit electromagnetic radiations. We shall see later that this explanation of the production of X-rays is at least partially correct.

In common with other electromagnetic radiations, X-rays exhibit particle-like aspects as well as wave-like aspects. The reader will recall that the Compton effect, which is one of the most convincing demonstrations of the existence of quanta, was originally observed with electromagnetic radiation in the X-ray region of wavelengths.

SCANNING

EXERCISE THREE: Try this one in your cooperative learning groups.

Split up the text evenly amongst all the members of your group, read your assigned section of the following text about the Loch Ness monster and fill in the table AS A GROUP.

Does the Loch Ness monster exist?

Type of evidence	Date	Source	Details/features of monster	Reliablity / reasons for doubt

'A modern look at Monsters' by Daniel Cohen

Each nation had its own conception of evil spirits or monsters that lived in deep lakes. In the Highlands of Scotland, the monstrous inhabitants of lakes (or lochs) were called 'water horses" or "water bulls." There was hardly a loch or bay which, according to local folklore, did not have some sort of monster in it.

But the Loch Ness monster has a better pedigree than most of the other Scottish lake monsters. While most were only known in oral tradition, the Loch Ness monster was mentioned in writing in AD. 565. The monster, it seems, ran afoul of the great Scottish holy man, Saint Columba. Adamnan, Saint Columba's biographer, tells of an incident where the saint saved a swimmer from the rampaging monster by saying, "Think not to go further, touch not thou that man. Quick! Go back! Then the beast, upon hearing the voice of the saint, was terrified and fled backwards more rapidly than he came."

It was traditional in pagan societies for heroes to slay dragons and other monsters. When the pagans became Christians these monster-fighting activities were often taken over by the saints. The story of Saint Columba and the Loch Ness monster would have remained nothing more than an obscure bit of folklore, to be treated no more seriously than the story of Saint George and the dragon, had it not been for the events of 1933-1934.

During those years a road was built around the once-isolated loch in the Highlands. The construction brought a large number of outsiders to Loch Ness, and clearing the shore of the loch

for the road gave observers a better view of the water. In those years the Loch Ness monster appeared, or reappeared, if we are to accept the story of Saint Columba.

The Loch Ness monster captured the public fancy as no creature real or imaginary has in a very long time. It knocked the Great Sea Serpent right out of contention as the number one unknown animal in the world. To this day, despite years of disappointment, the Loch Ness monster remains the world's most popular monster, and the only one for which there is a regular and well-organized search.

So much has already been written on the Loch Ness monster that it seems unnecessary to give another detailed account of its history. A brief rundown of background information will be supplied but we will concentrate on developments in the story of the monster during the last few years.

Of the thousands who have reported seeing the monster since 1933 the vast majority have seen only its back or "humps". Most commonly what they have seen is a shape in the water that looks something like an upturned boat, or a string of them. This shape may be anywhere from a few inches to many feet above the water.

Only a small number have reported actually seeing the creature's head and neck. One of the first people to sight the creature's head, and indeed the man who claims to have coined the term Loch Ness monster, is Alex Campbell, a retired fisheries official at the loch. He saw the monster for the first time in 1934. 'It had a long tapering neck, about six feet long, and a smallish head, with a serpentine look about it, and a huge hump behind which I reckon was about thirty feet long. It was turning its head constantly.

In addition to his duty at the loch, Campbell was also a correspondent for the Inverness Courier, the local newspaper for the region. It was Campbell's reports that helped catapult the Loch Ness monster to world-wide fame. Why did he call it monster? "Not because there was anything horrible about it at all, but because of the great size of the creature."

The serpentine appearance of the monster's head and neck was firmly fixed in the public's consciousness by "the famous London surgeon's photograph." It was taken in 1934 by Kenneth Wilson, a surgeon on holiday in Scotland. The photo apparently shows the snakelike neck and tiny head of the monster sticking out of the waters of the loch.

In the 1930s most people agreed that the monster looked very much like an ancient marine reptile plesiosaur. At the time the plesiosaur was also a popular candidate for the Great Sea Serpent, and so was very much on every-one's mind.

After the first sensational sightings there were no further important revelations about the monster. The skeptics and the jokers began to move in. By the beginning of World War II (during which time it dropped out of the news entirely) the Loch Ness monster came to be regarded as either a hoax concocted by canny Scots hotel owners or a hallucination seen only by those who imbibed too freely in Scotland's most famous product.

But a hardy few kept the faith. After the war they came back to Loch Ness and in the face of scorn and ridicule managed to collect what has to be considered the best evidence for the existence of any monster anywhere in the world.

Exhibit A in the new case for the Loch Ness monster is the Dinsdale film. In 1960 monster watcher and amateur photographer Tim Dinsdale filmed what he thought to be the monster swimming in the far side of the loch.

To the untrained observer the short film shows little - just a spot moving through the water. It could be anything - a motorboat, for example. That is what many viewers claimed, and still claim the film shows. In 1965 David James, a former Member of Parliament who had become

interested in the Loch Ness “problem”, persuaded photographic interpretation experts at the Royal Air Force to examine the Dinsdale film. On the basis of an exhaustive frame-by-frame analysis the RAF reported that the shape in the film is “probably an animate object.” Furthermore, they speculated that the object might be as much as ninety-two feet in length although it was probably more like thirty or forty feet long and “not less than six feet wide and five feet high.” It was also moving through the water at a considerable speed.

Since Dinsdale took his film other films have been taken, all at long range. One apparently shows the humps of two monsters moving side by side through the water. Another supposedly shows the monster on a small pebbly beach at the loch. The problem with these films, as with the Dinsdale film, is that they are unspectacular. The object that is supposed to be the monster appears as nothing more than a little blob. Despite the RAF report many refuse to consider the case for the Loch Ness monster proven. They contend, quite correctly, that photographic interpretation, even when done by experts, is far from an exact science. The quality of the monster films is so poor that even the experts might easily be wrong.

Public interest in the monster was beginning to wane again until 1968, when it received a new lease of life. Scientists from the University of Birmingham (England) using a new type of sonar equipment picked up stirrings in Loch Ness that seemed highly suggestive. (The tests were made in 1967 but the results were not published until the following year). The conclusions drawn from the tests were highly tentative. Wrote Hugh Braithwaite who headed the expedition: “Since the objects … are clearly comprised of animals, is it possible they could be fish? The high rate of ascent and descent makes it seem very unlikely, and fishery biologists we have consulted cannot suggest what fish they might be. It is a temptation to suppose they must be the fabulous Loch Ness monsters, now observed for the first time in their underwater activities! The present data, while leaving this a possibility, are quite inadequate to decide the matter. A great deal of further investigation with more refined equipment - which is not at present available - is needed before definite conclusions can be drawn.”

But even this cautious approach was quickly challenged by other scientists who said what the sonar had picked up was a “ghost” not a monster. The University of Birmingham equipment, they said, was registering a false image, a not uncommon occurrence with sonar.

Naturally, during this period the Loch Ness monster, or Nessie, as she, he, it, or they is affectionately called by the watchers, has not gone unnoticed. Aside from the tourists who flock by the hundreds each summer to the shores of Loch Ness to see if they can catch a glimpse of the elusive creature, there has been, since 1963, a regular yearly expedition organized to watch for the monster. The expedition is run by the Loch Ness Phenomena Investigation Bureau, Ltd. founded by David James. During the warmer months a full crew of watchers, armed with binoculars and cameras, drive specially equipped vans to various locations around the loch. On a good day they have virtually the entire surface of Loch Ness under visual observation. Most of the watchers are student volunteers from various countries. (America is most heavily represented.) Two weeks of monster watching makes a cheap and often exciting holiday. But it would be a mistake to underestimate either the seriousness or competence of these amateurs. The bureau is a non-profit organization.

Field Director of the Loch Ness Investigation is Clem Skelton, a photographer with a severe case of monster fever. During the long Highland winter, when the weather becomes frigid and the daylight almost negligible, and the tourists and college students abandon the shores of Loch Ness, Skelton and his wife remain in their trailer on the shores of the loch. Their closest neighbor may be the monster itself. Since he spends more time looking for the monster than anyone else, Skelton has quite naturally seen the monster or what he thinks is the monster more times than anyone else.

Once, he says, he was practically on top of it. In June 1964 Skelton saw the creature’s hump from a distance of only fifteen yards. “I was rowing a boat across the loch at 12.30 a.m. It never really

gets dark at Loch Ness in the middle of June, there is always a glow in the sky. I looked over my right shoulder and there it was. It was the classic upturned boat sighting, but it was bigger than my boat and if anyone wanted to win the diamond skulls at Henley he should have rowed nearly as fast as I did to get out of its way.

Skelton is absolutely convinced that there is a monster in Loch Ness. Many others who have seen what they take to be the monster are equally convinced, as are a lot of people who have never seen the monster at all. Each year the Loch Ness Investigation carefully records all the sightings. From their lists they try to eliminate all hoaxes and mistakes. Skelton figures that eighty to ninety percent of the people who think they have seen the monster have really seen something else. The remaining probable sightings are then carefully tallied and published by the Bureau at the end of the year. They make an impressive record. But the monster watchers know that they need more than an endless accumulation of sighting reports to convince the scientific world and the public at large that Nessie exists.

Numerous suggestions have been made for catching the monster, from poisoning the loch to stretching a net across it. Less drastic but more practical suggestions have been offered for getting a piece of the monster's hide (or whatever) by the use of a harpoon or crossbow. In 1962 a small ship sailed around Loch Ness with a crew member on deck, ready with a long pole tipped with a piece of sticky stuff. The hope was that with the pole and sticky material they could detach a scale or piece of skin from the monster. The problem was that in order to stick, or shoot, or prod the monster you have to get close to it. In this the monster has proved thoroughly uncooperative.

Most hopes are pinned on getting what members of the Bureau call "The Picture" - a good close up shot, or preferably film of the monster with its head above the water. This, they feel, unlike the vague spots and shapes which have appeared in the other pictures, would clinch the case for the monster. For this reason they have spent the bulk of their funds, which come from private donations and grants, on buying good camera equipment. The largest single grant, twenty thousand dollars, came from Field Educational Enterprises, the same organization that helped to bankroll an expedition to find the Abominable Snowman in the Himalayas.

The Loch Ness monster is a near-perfect subject for scientific investigation. Unlike the Great Sea Serpent, which could be anywhere in the vast expanse or abyssal depths of the oceans, the Loch Ness monster is strictly confined. No large creature could get in or out of Loch Ness without being observed. So whatever it is lives in the loch and has for a long time. Naturally the monster buffs do not say what they are seeing is the same ageless specimen confronted by Saint Columba a millennium ago. They speak of the loch as home for a small but viable breeding herd of monsters.

Many people wonder why, if the monster's range is so confined, a specimen has not yet been captured or at least photographed at closer range. The question is a good one. But just because the monster has not yet been captured or well photographed, we should not simply jump to the conclusion that it does not exist. Loch Ness is a lot bigger than it looks on the map. It is the largest body of fresh water in the British Isles, cutting twenty-four miles through Scotland's Great Glen. At one end it is connected to the sea by the little river Ness. It also serves as a link in the Caledonian Canal which bisects the Highlands and is the country's principal waterway.

The waters of Loch Ness are deep, dark, cold, and often dangerous. Average width of the loch is only a mile, but the sides plunge precipitously to depths of over seven hundred feet. A suspension of peat makes the water brown and murky and the few divers who have ventured into it found themselves in a world where even a strong light would penetrate no more than twelve feet. The loch never freezes, but it never really warms up either. Throughout the year the temperature hovers in the chilly mid-forties. Currents of surprising strength can catch the unwary boater, and more than one has rowed or sailed onto the loch and never been seen again.

Because of the dangers of the loch, the history of the monster has been kept remarkably free from a particular sort of hoax - the kind in which a group of jokers float a model monster in the

water. The model would have to be propelled in some way, presumably by a swimmer or a group of swimmers underwater. It would then have to be pulled under or gotten out of sight in some other way, before the startled observers had a chance to discover what it really was. But nobody wants to go swimming in Loch Ness, particularly underwater. A group of college students who built a rubber monster were forced to float it in a smaller, friendlier loch nearby.

Divers don't like to go into the loch at all. When they do they can't see much anyway. So there is little point in searching for the monster underwater except by sonar. You might think that with all the publicity the monster has received in the last decade the shores of Loch Ness would be packed solidly with tourists bristling with binoculars and cameras and that the boats would be as thick as rowboats in the Central Park lagoon. Actually, even at the peak of the tourist season Loch Ness seems pleasantly uncrowded to an American. There are relatively few good places to sit and watch for the monster, and the weather is so rotten so often that only the most dedicated will brave it regularly. Boats are surprisingly infrequent on the loch, and if you wished to rent one you would find them scarce.

Despite all the publicity, the search for the Loch Ness monster remains remarkably under financed. Visitors to the loch often ask expedition members why they don't just send down a miniature submarine to find the monster - as if miniature submarines were the cheapest and most easily obtainable things in the world. The Loch Ness investigators have never had anywhere near the amount of funds they need to conduct a thorough investigation.

In 1969 a miniature submarine actually was brought to the loch to aid in the investigation. But the submarine was a homemade contraption, and it never worked properly. Despite high hopes it added nothing to our knowledge of the Loch Ness monster.

Therefore, it is possible - barely perhaps - but possible, that a large unknown creature or rather a group of them really do live in the depths of Loch Ness and have escaped conclusive detection.