新托福 TPO（1-24）听力原文文本

TPO1 Conversation 1

Narrator
Listen to part of a conversation between a student and a librarian.

Student
Hi, um…, I really hope you can help me.

Librarian
That's why I'm here. What can I do for you?

Student
I'm supposed to do a literature review for my psychology course, but um… having a hard time finding articles. I don't even know where to start looking.

Librarian
You said this is for your psychology course, right? So your focus is on …

Student
Dream Interpretation.

Librarian
Well, you have a focus, so that's already a good start. Hmmm… well, there're a few things… Oh wait… have you checked to see if your professor put any material for you to look at on reserve?

Student
Aha, that's one thing I did know to do. I just copied an article, but I still need three more on my topic from three different journals.

Librarian
Let's get you going on looking for those then. We have printed versions of twenty psychologyjournals in the Reference Section. These are the ones published within the last year. Then I think about it… there's a journal named Sleep and Dream.

Student
Oh, yeah, the article I just copied is from that journal, so I've got to look at other sources.

Librarian

Ok, actually, most of our materials are available electronically now. You can access psychology databases or electronic journals and articles through the library's computers, and if you want to search by title with the word 'dream' for example, just type it in and all the articles with 'dream' in the title will come up on the screen.

Student

Cool, that's great! Too bad I cannot do this from home.

Librarian

But you can. All of the library's databases and electronic sources can be accessed through any computer connected to the university network.

Student

Really?! I can't believe I didn't know that. It still sounds like it's going to take a while though, you know, going through all of that information, all of those sources.

Librarian

Maybe, but you already narrow your search down to articles on Dream Interpretation, so it shouldn't be too bad. And you probably notice that there's an abstract or summary at the top of the first page of the article you copied. When you go into the databases and electronic sources, you have the option to display the abstracts on the computer screen, skimming those to decide whether or not you want to read the whole article should cut down some time.

Student

Right, abstracts! They'll definitely make the project more durable. I guess I should try out the electronic search while I'm still here then, you know, just in case.

Librarian

Sure, er… that computer's free over there, and I'll be here till five this afternoon.

Student

Thanks, I feel a lot better about this assignment now.

TPO 1 Lecture 1 Contemporary art

Narrator

Listen to part of a lecture in a contemporary art class.

Professor

Ok, I'm going to begin this lecture by giving you your next assignment. Remember I said that at some point during this semester I wanted you to attend an exhibit at the Fairy Street Gallery and then write about it? Well, the exhibit that I want you to attend is coming up. It's already started in fact, but it'll be at the gallery for the next month, which should give you plenty of time to complete this assignment.

The name of the artist exhibiting there isRose Frantzen. Frantzen's work may be unfamiliar to you since she's a relatively young artist. But she's got a very unusual style, compared to some of the artists we've looked at this term. But anyway, Frantzen's style is what she herself calls Realistic Impressionism. So you've probably studied both of these movements separately, separate movementsRealism and Impressionism, in some of your art history courses. So who can just sum these up?

Student

Well, Impressionism started in the late 19th century. Um…the basic impressionist style was very different from earlier styles. It didn't depict scenes or models exactly as they looked. Um… Impressionist painters tended to apply paint really thickly, and in big brushstrokes, so the texture of the canvas was rough.

Professor

Good. What else? What were the subjects?

Student

Well, a lot of impressionist artists painted everyday scenes, like people on the streets and in cafes, lots of nature scenes, especially landscapes.

Professor

Good. So when you go to the exhibit, I really want you to take a close look at a certain painting. It's a farm scene. And you will see it right as you enter the gallery. The reason I think this painting is so important is that it stresses the impressionist aspect of Frantzen's style. It's an outdoor scene, an everyday scene. It's kind of bleak, which you can really see those broad brushstrokes and the blurry lines. The colors aren't quite realistic. The sky is kind of, well, in a natural… pinkish yellow. And the fence in the foreground is blue, but somehow the overall scene gives an impression of a cold, bleak, winter day on a farm. So that's the impressionist side of her work.

Oh, and speaking about farms, that reminds me. One interesting thing I read about Franzten is that when she first moved back to Iowa after living abroad, she often visited this place in her town called the Sales Barn. And the Sales Barn, it was basically this place where the local farmers bought and sold their cattle, their farm animals. And the reason Frantzen went there, and she later on would visit other places like dance halls, was to observe people and the ways that they moved. She really found that this helped her work---that it gave her an understanding of body movements and actions, how humans move, and stand still, what their postures were like, too. So, what about Realism? What are the elements of Realism we should be looking for in Frantzen's work?

Student

Um… real honest depictions of subject matter, pretty unidealized stuff, and pretty everyday subject matter, too.

Professor

Good. One other painting I really want you to look at is of a young woman surrounded by pumpkins. You will notice that the woman's face is so realistic looking that it's almost like a photograph. The woman's nose is a little less than perfect and her hair is kind of messed up. This is realism. But then, the background of the painting, this woman with the pumpkins is wrapped in a blanket of broad thick brushstrokes, and, it's all kinds of zigzagging brushstrokes and lines, kind of chaotic almost when you look at it close. And there are vibrant colors. There's lots of orange, with little hints of an electric blue peeking out. I find Frantzen to be a very accessible artist. I mean, some artists, to appreciate them, you have to know their life story. But here's a little bit about Rose Frantzen's life anyway. She attended art school, but was told by one of her instructors that she was not good at illustration, that she should go into advertising instead. So she took advertising classes and fine arts classes too, until she was convinced by the head of an advertising agency that her work was really good, that she could be an artist. But of course, it's not as easy as that, and so Frantzen had to paint other people's portraits at places like art fairs just to make money to buy paint for her more series of art work. No matter what, she never stopped painting. And now, Frantzen is doing extremely well. And her work is being shown all over the country. So I think most of us would be discouraged if we had to face challenges and difficulties like that. But what's important is that you keep at it that you don't give up. That's what is really important to remember.

TPO 1 Lecture2 Geology

Narrator

Listen to part of a lecture in a geology class.

Professor

Ok, let's get started. Great. Today I want to talk about a way in which we are able to determine how old a piece of land, or some other geologic feature is - dating techniques. I'm going to talk about a particular dating technique. Why? Good dating is a key to good analysis. In other words, if you want to know how a land formation was formed, the first thing you probably want to know is how old it is. It's fundamental.

Um…Take the Grand Canyon for instance. Now, we geologists thought we had a pretty good idea of how the Grand Canyon in the southwestern United States was formed. We knew that it was formed from sandstone that solidified somewhere between 150 and 300 million years ago. Before it solidified, it was just regular sand. Essentially it was part of a vast desert. And until just recently, most of us thought the sand had come from an ancient mountain range fairly close by that flattened out over time. That's been the conventional wisdom among geologists for quite some time. But now we've learned something different, and quite surprising, using a technique called Uranium-Lead Dating.

I should say that Uranium-Lead Dating has been around for quite a while. But there have been some recent refinements. I will get into this in a minute. Anyway, Uranium-Lead Dating has produced some surprises. Two geologists discovered that about half of the sand from the Grand Canyon was actually once part of the Appalachian Mountains. That's really eye-opening news, since the Appalachian Mountain Range is, of course, thousands of kilometers to the east of the Grand Canyon. Sounds pretty unbelievable, right?

Of course, the obvious question is how did that sand end up so far west? The theory is that huge rivers and wind carried the sand west where it mixed in with the sand that was already there. Well, this was a pretty revolutionary finding. Um… and it was basically because of Uranium-Lead Dating. Why? Well, as everyone in this class should know, we usually look at the grain type within sandstone, meaning the actual particles in the sandstone, to determine where it came from. You can do other things too, like look at the wind or water that brought the grains to their location and figure out which way it was flowing. But that's only useful up to a point, and that's not what these two geologists did.

Uranium-Lead Dating allowed them to go about it in an entirely different way. What they did was: they looked at the grains of Zircon in the sandstone. Zircon is a material that contains radioactive Uranium, which makes it very useful for dating purposes. Zircon starts off as molten magma, the hot larva from volcanoes. This magma then crystallizes. And when Zircon crystallizes, the

Uranium inside it begins to change into Lead. So if you measure the amount of Lead in the Zircon grain, you can figure out when the grain was formed. After that, you can determine the age of Zircon from different mountain ranges. Once you do that, you can compare the age of the Zircon in the sandstone in your sample to the age of the Zircon in the mountains. If the age of the Zircon matches the age of one of the mountain ranges, then it means the sandstone actually used to be part of that particular mountain range. Is everybody with me on that? Good.

So, in this case, Uranium-Lead Dating was used to establish that half of the sandstone in the samples was formed at the same time the granite in the Appalachian Mountains was formed. So because of this, this new way of doing Uranium-Lead Dating, we've been able to determine that one of our major assumptions about the Grand Canyon was wrong.

Like I said before, Uranium-Lead Dating has been with us for a while. But, um… until recently, in order to do it, you really had to study many individual grains. And it took a long time before you got results. It just wasn't very efficient. And it wasn't very accurate. But technical advances have cut down on the number of grains you have to study, so you get your results faster. So I'll predict that Uranium-Lead Dating is going to become an increasingly popular dating method. There are a few pretty exciting possibilities for Uranium-Lead Dating. Here is one that comes to mind. You know the theory that earth's continents were once joined together and only split apart relatively recently? Well, with Uranium-Lead Dating, we could prove that more conclusively.

If they show evidence of once having been joined, that could really tell us a lot about the early history of the planet's geology.

TPO 1 Conversation 2

Narrator
Listen to part of a conversation between a student and his professor.

Professor
Hi Mathew, I'm glad you can come in today. You've been observing Mr. Grable's third-grade class for your approaches to education paper, right?

Student
Hmmm, yes. I go over the Johnson Elementary School, you know, to watch Mr. Grable teach the children in class. It's been amazing, I mean, I'm just learning so much from just watching him. I'm so glad the classroom observations are a requirement for the education program. I mean it's like the best thing ever to prepare you to be a good teacher.

Professor
Well, I'm glad to see you feel that way, Mathew. You know, that's the goal. So, I've been reading over your observation notes and I'm quite interested in what's going on, in particular what's the astronomy unit he's been teaching.

Student
The astronomy unit?

Professor
It seems that Mr. Grable has mastered the interdisciplinary approach to teaching — the way we've been talking about in class.

Student
Oh! OK, yeah, so like when he was teaching them astronomy, he didn't just teach them the names of the planets, he used it as a way to teach mythology.

Professor
Really! So, how did he do that?

Student
Well, some of the students could already name the planets, but they didn't know that the names had any meaning — the stories behind them.

Professor
So, he…

Student
He introduced Greek and Roman mythology as a way of explaining. Like, you know, how like Jupiter's the biggest planet, right, and how Jupiter was the name of the king of the gods in Roman mythology, right? So since Jupiter, the planet, is the largest planet in our solar system, it's like the king of the planets, like Jupiter was the king of all the gods.

Professor
Oh, Mathew, that's a great example.

Student

Yeah! And each student chose a planet and then did research on it to write a report and make a presentation. They went to the library to do the research, then they made presentations about the planet they chose.

Professor

So, in one science unit, in which the focus was astronomy, the students also learned about the literature of Greek and Roman mythology, used research skills in the library, wrote a report and practiced their oral presentation skills.

Student

Exactly! He used this one topic to teach third-grades all that stuff — how to use the books in the library, to write reports, and even how to speak in public. Plus they had a great time doing it.

Professor

You know, Mathew, this is just what we've been talking about in our class. I'm sure everyone can learn something from your experience. You know, Mathew, I'd love for you to talk about this astronomy unit in class on Wednesday.

Student

Really?! Hmmm… 'cause I don't really think I'll have any time to write my paper by then.

Professor

Oh, you won't need to write anything new just yet. For Wednesday, use your class observation notes and explain the things we've discussed today.

Student

Ok, that sounds all right.

TPO 1 Lecture 3 Archeology

Narrator

Listen to part of a lecture in an archeology class.

Professor

OK, we've been talking about early agriculture in the near east. So let's concentrate on one site and see what we can learn from it. Let's look at Catalhoyuk. Ah… I'd better write that down. Catalhoyuk, that's about as close as we get in English. It's Turkish, really. The sites in modern day

Turkey, and who knows what the original inhabitants called it. Anyway, uh…Catalhoyuk wasn't the first agricultural settlement in the near east, but it was pretty early, settled about 9000 years ago in the Neolithic period. And ... umm... the settlement...ah...town really, lasted about a thousand years and grew to a size of about eight or ten thousand people. That certainly makes it one of the largest towns in the world at that time.

One of the things that make the settlement of this size impressive is the time period. It's the Neolithic, remember, the late Stone Age. So the people that lived there had only stone tools, no metals. So everything they accomplished, like building this town, they did with just stone, plus wood, bricks, that sort of thing. But you got to remember that it wasn't just any stone they had, they had obsidian. And umm... obsidian is a black, volcanic, well, almost like glass. It flakes very nicely into really sharp points. The sharpest tools of the entire Stone Age were made of obsidian. And urrr... the people of Catalhoyuk got theirs from further inland, from central Turkey, traded for it, probably.

Anyway, what I wanna focus on is the way the town was built. The houses are all rectangular, one storey made of sun dried bricks. But what's really interesting is that there are no spaces between them, no streets in other words, and so generally no doors on the houses either. People walked around on the roofs and entered the house through a hatchway on the roof, down a wooden ladder. You can still see the diagonal marks of the ladders in the plaster on the inside walls. Once you were in the house, there would be one main room and a couple of small rooms for storage. The main room had the hearths, for cooking and for heat. It would've been pretty cold during the winters. And it also looks like they made their tools near the fire. There tends to be a lot of obsidian flakes and chips in the hearth ashes, but no chimney. The smoke just went out the same hatchway that people used for going in and out themselves. So there would have been an open fire inside the house with only one hole in the roof to let the smoke out. You and I would have found it a bit too smoky in there. You can see on the walls, which they plastered and decorated with paintings. They ended up with a layer of black soot on them, and so did people's lungs. The bones found in the graves show a layer of soot on the inside of the ribs.

And that's another unusual feature of Catalhoyuk, the burial sites. The graves have all been found under the houses, right under the floors. And it maybe this burial custom that explains why the houses were packed in so tightly without streets. I mean, you might think it was for protection or something, but there has been no evidence found yet of any violent attack that would indicate that kind of danger. It maybe they wanted to live as near as possible to their ancestors' graves and be buried near them themselves. But it makes a good point.

Based on excavations, we can know the layout of the houses and the location of the graves, but we're only guessing when we tried to say why they did it that way. That's the way it is with archeology. You are dealing with the physical remains that people left behind. We have no sure access to what they thought and how they felt about things. I mean it's interesting to speculate. And the physical artifacts can give us clues, but there is a lot we can't really know. So, for instance, their art. They painted on the plastered walls and usually they painted hunting scenes with wild animals in them. Now they did hunt and they also raised cereal crops and kept sheep, but we don't know why so many of the paintings are of hunting scenes. Was it supposed to have religious or magical significance? That's the kind of thing we can only guess at based on clues. And hopefully, further excavation of Catalhoyuk will yield more clues. But we'll probably never know for sure.

TPO 1 Lecture 4 Biology

Narrator

Listen to part of a lecture in a biology class.

Professor

For today's discussion, we'll review the case study on how some animals have behaviorally adapted to their environments. Now you had to read about two animal species, the Eastern marmot and the Olympic marmot. Marmots are rodents. They are large ground squirrels, about the size of an average house cat. And they live in a variety of habitats. And even though they spend the significant portion of the year hibernating, according to this case study, marmots are still considered excellent subjects for animal behavioral studies. Why is that?

Student

Well, when they are not hibernating, you can find them in open areas. And they are pretty active during the day, which makes them easy to observe, right?

Professor

Uh-ha, so first let's discuss the Eastern marmots. They reside throughout the eastern region of North America where there is a temperate climate, where the growing season lasts for at least five months of the year, which is when they do all their mating, playing and eating.

Student

Oh, I see. At first I wasn't sure what growing season meant, just from the reading. But now I get it. It's the amount of time it takes for them to grow, right? So it would be five months?

Professor

Umm? Oh, uh… I'm sorry but no. It has nothing to do with that. It's not about the time it takes for Eastern marmots to grow. It's when the food is available. That is when it's not covered in snow and there is no frost covering the grass and, umm, vegetative parts of a plant's herbs and the flowers the marmots like to eat. So growing season refers to the availability of the food they eat, OK? So now how would you describe the Eastern marmots' social habits?

Student

Well, they are really territorial, and loners, and just so aggressive even with other Eastern marmots. And their mating ritual is just so impersonal.

Professor

Uh-ha? Now when they emerge in the spring from hibernation, the mating process begins. For them, well, they come together to mate and then they go their separate ways. Then about six to eight weeks after birth, the offspring leave their mothers.

Student

Really? Just six weeks? Is that possible for the offspring to make it on their own so young?

Professor

Well, it's not as if they aren't ready for the real world because they are. Remember, they mature quickly and the weather's nice. Also they live in open fields where there is lots of edible vegetation. So roughly six weeks after birth,

Eastern marmots are just old enough to take their chances of surviving in the temperate environment. So how does this relate to their behavior?

Student

Oh, I get it. Since the climate's not too bad, the Eastern marmots don't have to rely on each other too much and they really don't need to stay together as a family to survive either.

Professor

Uh-ha. Any contrast, the Olympic marmots? What about them?

Student

Well, they live together as a family and take care of their young until they are at least two years old. They're really friendly with each other. And what I really like is that they even have greeting ceremonies. And they are not at all aggressive and territorial like the Eastern marmots. So their social behavior is so different from Eastern marmots because of the climate where they live? That seems so bizarre.

Professor

Well, the Olympic marmots inhabit meadows high in the Olympic Mountains where the weather conditions are much harsher. So there is a lot more wind and snow. The growing season only lasts about two to three months. So in that much shorter period of time, all the Olympic marmots, male and female, eat, play, work and nurture the young together. Because the climate is so harsh, cooperation increases the survival rate of the Olympic marmots. They keep their young at home until they are physically able to survive on their own. This could explain why the social behavior of the Olympic marmots is so unlike that of the Eastern marmots.

TPO2 Conversation 1

Narrator
Listen to a conversation between a student and a professor.

Student
Uh, excuse me, Professor Thompson. I know your office hours are tomorrow, but I was wondering if you had a few minutes free now to discuss something.

Professor
Sure, John. What did you want to talk about?

Student
Well, I have some quick questions about how to write up the research project I did this semester—about climate variations.

Professor
Oh, yes. You were looking at variations in climate in the Grant City area, right? How far along have you gotten?

Student
I've got all my data, so I'm starting to summarize it now, preparing graphs and stuff.
But I'm just. . . I'm looking at it and I'm afraid that it's not enough, but I'm not sure what else to put in the report.

Professor
I hear the same thing from every student. You know, you have to remember now that you're the expert on what you've done. So, think about what you'd need to include if you were going to explain your research project to someone with general or casual knowledge about the subject, like . . . like your parents. That's usually my rule of thumb: would my parents understand this?

Student
OK. I get it.

Professor
I hope you can recognize by my saying that how much you do know about the subject.

Student
Right. I understand. I was wondering if I should also include the notes from the research journal you suggested I keep.

Professor
Yes, definitely. You should use them to indicate what your evolution in thought was through time. So, just set up, you know, what was the purpose of what you were doing—to try to understand the climate variability of this area—and what you did, and what your approach was.

Student
OK. So, for example, I studied meteorological records; I looked at climate charts; I used different methods for analyzing the data, like certain statistical tests; and then
I discuss the results. Is that what you mean?

Professor
Yes, that's right. You should include all of that. The statistical tests are especially important. And also be sure you include a good reference section where all your published and unpublished data came from, 'cause you have a lot of unpublished climate data.

Student
Hmm . . . something just came into my mind and went out the other side.

Professor
That happens to me a lot, so I've come up with a pretty good memory management tool. I carry a little pad with me all the time and jot down questions or ideas that I don't want to forget. For example, I went to the doctor with my daughter and her baby son last week and we knew we wouldn't remember everything we wanted to ask the doctor, so we actually made a list of five things we wanted answers to.

Student
A notepad is a good idea. Since I'm so busy now at the end of the semester, I'm getting pretty forgetful these days. OK. I just remembered what I was trying to say before.

Professor
Good. I was hoping you'd come up with it.

Student
Yes. It ends up that I have data on more than just the immediate Grant City area, so I also included some regional data in the report. With everything else it should be a pretty good indicator of the climate in this part of the state.

Professor
Sounds good. I'd be happy to look over a draft version before you hand in the final copy, if you wish.

Student
Great. I'll plan to get you a draft of the paper by next Friday. Thanks very much. Well, see ya.

Professor
OK.

TPO2 Lecture 1 Philosophy

Narrator
Listen to part of a lecture in a philosophy class.

Professor
OK. Another ancient Greek philosopher we need to discuss is Aristotle—Aristotle's ethical theory. What Aristotle's ethical theory is all about is this: he's trying to show you how to be happy—what true happiness is.
Now, why is he interested in human happiness? It's not just because it's something that all people want to aim for. It's more than that. But to get there we need to first make a very important distinction. Let me introduce a couple of technical terms: extrinsic value and intrinsic value. To understand Aristotle's interest in happiness, you need to understand this distinction. Some things we aim for and value, not for themselves but for what they bring about in addition to themselves. If I value something as a means to something else, then it has what we will call "extrinsic value." Other things we desire and hold to be valuable for themselves alone. If we value something not as a means to something else, but for its own sake, let us say that it has "intrinsic value." Exercise. There may be some people who value exercise for itself, but I don't. I value exercise because if I exercise, I tend to stay healthier than I would if I didn't. So I desire to engage in exercise and I value exercise extrinsically . . . not for its own sake, but as a means to something beyond it. It brings me good health.
Health. Why do I value good health? Well, here it gets a little more complicated for me. Um, health is important for me because I can't . . .do other things I want to do— play music, teach philosophy—if I'm ill. So health is important to me—has value to me—as a means to a productive life. But health is also important to me because I just kind of like to be healthy—it feels good. It's pleasant to be healthy, unpleasant not to be. So to some degree I value health both for itself and as a means to something else: productivity. It's got extrinsic and intrinsic value for me. Then there's some things that are just valued for themselves. I'm a musician, not a professional musician; I just play a musical instrument for fun. Why do I value playing music? Well, like most amateur musicians, I only play because, well, I just enjoy it. It's something that's an end in itself.
Now, something else I value is teaching. Why? Well, it brings in a modest income, but I could make more money doing other things. I'd do it even if they didn't pay me. I just enjoy teaching. In that sense it's an end to itself. But teaching's not something that has intrinsic value for all people—and that's true generally. Most things that are enjoyed in and of themselves vary from person to person.
Some people value teaching intrinsically, but others don't. So how does all this relate to human happiness? Well, Aristotle asks: is there something that all human beings value . . . and value only intrinsically, for its own sake and only for its own sake? If you could find such a thing, that would be the universal final good, or truly the ultimate purpose or goal for all human beings. Aristotle thought the answer was yes. What is it? Happiness. Everyone will agree, he argues, that happiness is the ultimate end to be valued for itself and really only for itself. For what other purpose is there in being happy? What does it yield? The attainment of happiness becomes the ultimate or highest good for Aristotle.
The next question that Aristotle raises is: what is happiness? We all want it; we all desire it; we all seek it. It's the goal we have in life. But what is it? How do we find it? Here he notes, with some frustration, people disagree. But he does give us a couple of criteria, or features, to keep in

mind as we look for what true human happiness is. True human happiness should be, as he puts it, complete. Complete in that it's all we require. Well, true human happiness . . . if you had that, what else do you need? Nothing. And, second, true happiness should be something that I can obtain on my own. I shouldn't have to rely on other people for it. Many people value fame and seek fame. Fame for them becomes the goal. But, according to Aristotle, this won't work either, because fame depends altogether too much on other people. I can't get it on my own, without help from other people. In the end, Aristotle says that true happiness is the exercise of reason—a life of intellectual contemplation . . . of thinking. So let's see how he comes to that.

TPO2 Lecture 2 Psychology

Narrator
Listen to part of a psychology lecture. The professor is discussing behaviorism.

Professor
Now, many people consider John Watson to be the founder of behaviorism. And like other behaviorists, he believed that psychologists should study only the behaviors they can observe and measure. They're not interested in mental processes. While a person could describe his thoughts, no one else can see or hear them to verify the accuracy of his report. But one thing you can observe is muscular habits. What Watson did was to observe muscular habits because he viewed them as a manifestation of thinking. One kind of habit that he studied are laryngeal habits. Watson thought laryngeal habits . . . you know, from larynx, in other words, related to the voice box . . . he thought those habits were an expression of thinking. He argued that for very young children, thinking is really talking out loud to oneself because they talk out loud even if they're not trying to communicate with someone in particular. As the individual matures, that overt talking to oneself becomes covert talking to oneself, but thinking still shows up as a laryngeal habit. One of the bits of evidence that supports this is that when people are trying to solve a problem, they, um, typically have increased muscular activity in the throat region. That is, if you put electrodes on the throat and measure muscle potential—muscle activity—you discover that when people are thinking, like if they're diligently trying to solve a problem, that there is muscular activity in the throat region.
So, Watson made the argument that problem solving, or thinking, can be defined as a set of behaviors—a set of responses—and in this case the response he observed was the throat activity. That's what he means when he calls it a laryngeal habit. Now, as I am thinking about what I am going to be saying, my muscles in my throat are responding. So, thinking can be measured as muscle activity. Now, the motor theory . . . yes?

Student
Professor Blake, um, did he happen to look at people who sign? I mean deaf people?

Professor
Uh, he did indeed, um, and to jump ahead, what one finds in deaf individuals who use sign language when they're given problems of various kinds, they have muscular changes in their hands when they are trying to solve a problem . . . muscle changes in the hand, just like the muscular changes going on in the throat region for speaking individuals. So, for Watson, thinking is identical with the activity of muscles. A related concept of thinking was developed by William James. It's called ideomotor action.
Ideomotor action is an activity that occurs without our noticing it, without our being aware of it. I'll give you one simple example. If you think of locations, there tends to be eye movement that occurs with your thinking about that location. In particular, from where we're sitting, imagine that you're asked to think of our university library. Well, if you close your eyes and think of the library, and if you're sitting directly facing me, then according to this notion, your eyeballs will move slightly to the left, to your left, 'cause the library's in that general direction.
James and others said that this is an idea leading to a motor action, and that's why it's called "ideomotor action"—an idea leads to motor activity. If you wish to impress your friends and relatives, you can change this simple process into a magic trick. Ask people to do something such

as I’ve just described: think of something on their left; think of something on their right. You get them to think about two things on either side with their eyes closed, and you watch their eyes very carefully. And if you do that, you’ll discover that you can see rather clearly the eye movement—that is, you can see the movement of the eyeballs. Now, then you say, think of either one and I’ll tell which you’re thinking of.

OK. Well, Watson makes the assumption that muscular activity is equivalent to thinking. But given everything we’ve been talking about here, one has to ask: are there alternatives to this motor theory—this claim that muscular activities are equivalent to thinking? Is there anything else that might account for this change in muscular activity, other than saying that it is thinking? And the answer is clearly yes. Is there any way to answer the question definitively? I think the answer is no.

TPO 2 Conversation 2

Narrator: Listen to a conversation between two students. They are both studying to be English teachers.

W: Did you register already for your classes next semester?

M: Yes, I did.

W: What are you taking?

M: Contemporary literature, English style, a teaching seminar, and I still have to do my student teaching. I'm gonna help teach a writing class at the junior high.

W: That's a heavy schedule.

M: Yeah, it'll be really busy. And I'm also taking a theory class. I would have to quit my job in a couple of weeks 'cause it'll be just too much.

W: Where do you work at?

M: Buter's Coffee Shop. But just till the end of the month. What are you doing next semester?

W: Actually it's teaching seminar, too. And I'll have to start writing my thesis. You know I'm also going for my master's degree.

M: So you are not writing any poetry I imagine.

W: No, I was actually thinking about revising some of my poems and sending them into places for publication.

M: Cool. You should. Did you hear about that new poetry club, The Poetry Kitchen.

W: Yeah, no time.

M: It's fine. It's Sunday night. You don't do anything Sunday nights.

W: I do homework Sunday nights.

M: Well, it's only from 7 to 9.

W: Is it every Sunday?

M: Last Sunday every month. I don't know about this month 'cause it probably a little too close to Thanksgiving. So they might move it out. I don't know what they're gonna do. But it's a good time. It's fun. Some really impressive readings.

W: Who? From our class?

M: Some people from our class are reading. A lot of them go, sometimes even the professor.

W: Really? I don't know if I wanna read in front of her.

M: You wouldn't have to read. You can just watch. I just watched the first time. But it's a good environment to read in, I think anyway.

W: I probably have to write something new. So maybe during the summer, I just can't now.

M: Yeah, it wouldn't be the same just reading old stuff. But you're gonna do summer score.

W: Definitely. Otherwise I'll be short 6 credits. I have no choice.

M: Yeah, me too. This is the second summer I have to take classes. Got to go now, my Shakespeare class starts in 20 minutes.

TPO2 Lecture 3 Philosophy

Narrator: Listen to part of a lecture in a philosophy class.

Professor: OK. Another ancient Greek philosopher we need to discuss is Aristotle—Aristotle's ethical theory. What Aristotle's ethical theory is all about is this: he's trying to show you how to be happy—what true happiness is.

Now, why is he interested in human happiness? It's not just because it's something that all people want to aim for. It's more than that. But to get there we need to first make a very important distinction. Let me introduce a couple of technical terms: extrinsic value and intrinsic value. To understand Aristotle's interest in happiness, you need to understand this distinction.

Some things we aim for and value, not for themselves but for what they bring about in addition to themselves. If I value something as a means to something else, then it has what we will call ?extrinsic value.? Other things we desire and hold to be valuable for themselves alone. If we value something not as a means to something else, but for its own sake, let us say that it has ?intrinsic value.? Exercise. There may be some people who value exercise for itself, but I don't. I value exercise because if I exercise, I tend to stay healthier than I would if I didn't. So I desire to engage in exercise and I value exercise extrinsically . . . not for its own sake, but as a means to something beyond it. It brings me good health.

Health. Why do I value good health? Well, here it gets a little more complicated for me. Um, health is important for me because I can't . . .do other things I want to do— play music, teach philosophy—if I'm ill. So health is important to me—has value to me—as a means to a productive life. But health is also important to me because I just kind of like to be healthy—it feels good. It's pleasant to be healthy, unpleasant not to be. So to some degree I value health both for itself and as a means to something else: productivity. It's got extrinsic and intrinsic value for me.

Then there's some things that are just valued for themselves. I'm a musician, not a professional musician; I just play a musical instrument for fun. Why do I value playing music? Well, like most amateur musicians, I only play because, well, I just enjoy it. It's something that's an end in itself.

Now, something else I value is teaching. Why? Well, it brings in a modest income, but I could make more money doing other things. I'd do it even if they didn't pay me. I just enjoy teaching. In that sense it's an end to itself. But teaching's not something that has intrinsic value for all people—and that's true generally. Most things that are enjoyed in and of themselves vary from person to person.

Some people value teaching intrinsically, but others don't. So how does all this relate to human happiness? Well, Aristotle asks: is there something that all human beings value . . . and value only intrinsically, for its own sake and only for its own sake? If you could find such a thing, that would be the universal final good, or truly the ultimate purpose or goal for all human beings.

Aristotle thought the answer was yes. What is it? Happiness. Everyone will agree, he argues, that happiness is the ultimate end to be valued for itself and really only for itself. For what other purpose is there in being happy? What does it yield? The attainment of happiness becomes the ultimate or highest good for Aristotle.

The next question that Aristotle raises is: what is happiness? We all want it; we all desire it; we all seek it. It's the goal we have in life. But what is it? How do we find it? Here he notes, with some frustration, people disagree. But he does give us a couple of criteria, or features, to keep in mind as we look for what true human happiness is. True human happiness should be, as he puts it, complete. Complete in that it's all we require.

Well, true human happiness . . . if you had that, what else do you need? Nothing. And, second, true happiness should be something that I can obtain on my own. I shouldn't have to rely on other people for it. Many people value fame and seek fame. Fame for them becomes the goal. But, according to Aristotle, this won't work either, because fame depends altogether too much on other people. I can't get it on my own, without help from other people. In the end, Aristotle says that true happiness is the exercise of reason—a life of intellectual contemplation . . . of thinking. So let's see how he comes to that.

TPO 2 Lecture 4 Astronomy

Narrator

Listen to part of a lecture in an astronomy class. You will not need to remember the numbers the professor mentions.

Professor
OK. Let's get going. Today I'm going to talk about how the asteroid belt was discovered.
And . . . I'm going to start by writing some numbers on the board. Here they are:
We'll start with zero, then 3, . . . 6, . . . 12. Uh, tell me what I'm doing.

Female student
Multiplying by 2?

Professor
Right. I'm doubling the numbers, so 2 times 12 is 24, and the next one I'm going to write after 24 would be . . .

Female student
48.

Professor
48. Then 96. We'll stop there for now. Uh, now I'll write another row of numbers under that. Tell me what I'm doing. 4, 7, 10 . . . How am I getting this second row?

Male Student
Adding 4 to the numbers in the first row.

Professor
I'm adding 4 to each number in the first row to give you a second row. So the last two will be 52, 100, and now tell me what I'm doing.

Female Student
Putting in a decimal?

Professor
Yes, I divided all those numbers by 10 by putting in a decimal point. Now I'm going to write the names of the planets under the numbers. Mercury . . . Venus. . . Earth. . . Mars. So, what do the numbers mean? Do you remember from the reading?

Male Student
Is it the distance of the planets from the Sun?

Professor
Right. In astronomical units—not perfect, but tantalizingly close. The value for Mars is off by . . . 6 or 7 percent or so. It's . . . but it's within 10 percent of the average distance to Mars from the Sun. But I kind of have to skip the one after Mars for now. Then Jupiter's right there at 5-point something, and then Saturn is about 10 astronomical units from the Sun. Um, well, this pattern is known as Bode's Law. Um, it isn't really a scientific law, not in the sense of predicting gravitation mathematically or something, but it's attempting a pattern in the spacing of the planets, and it was noticed by Bode hundreds of years ago. Well, you can imagine that there was some interest

in why the 2.8 spot in the pattern was skipped, and um . . . but there wasn't anything obvious there, in the early telescopes. Then what happened in the late 1700s? The discovery of . . . ?

Female Student
Another planet?

Professor
The next planet out, Uranus—after Saturn. And look, Uranus fits in the next spot in the pattern pretty nicely, um, not perfectly, but close. And so then people got really excited about the validity of this thing and finding the missing object between Mars and Jupiter. And telescopes, remember, were getting better. So people went to work on finding objects that would be at that missing distance from the Sun, and then in 1801, the object Ceres was discovered.
And Ceres was in the right place—the missing spot. Uh, but it was way too faint to be a planet. It looked like a little star. Uh, and because of its starlike appearance, um, it was called an "asteroid." OK? "Aster" is Greek for "star," as in "astronomy." Um, and so, Ceres was the first and is the largest of what became many objects discovered at that same distance. Not just one

thing, but all the objects found at that distance from the asteroid belt. So the asteroid belt is the most famous success of this Bode's Law. That's how the asteroid belt was discovered.

TPO 3 Conversation 1

Narrator
Listen to a conversation between a student and a receptionist at the Registrar's Office on the first day of the semester.

Student
Excuse me, I'm supposed to be having my physics class in the science building, but no one's in the classroom. Could you tell me where the class is? Physics 403 — has it been moved?

Receptionist
Well, there's a room assignment sheet on the bulletin board outside this office.

Student
Yeah, I know, but my class isn't listed there. There must be some kind of mistake or something. Could you look it up, please?

Receptionist
Hmmm... ok, let me check on the computer. It's physics, right? Wait, did you say physics 403?

Student
Yeah.

Receptionist
Er…I'm sorry, but it says here that it was cancelled. You should have got note letter from the registrar's office about this.

Student
What? I've never got it.

Receptionist
Are you sure? 'Cause it says on the computer that the letter was sent out to students a week ago.

Student
Really? I should have got it by now. I wonder if I threw it away with all the junk mail by mistake.

Receptionist
Well, it does happen. Er… let me check something. What's your name?

Student
Woodhouse, Laura Woodhouse.

Receptionist
Ok, hmmm…Woodhouse, let me see… ah, it says here we sent it to your apartment on er… Center Street.

Student
Oh, that’s my old apartment. I moved out of there a little while ago.

Receptionist
Well, and I suppose you haven’t changed your mailing address at the administration office. Well that would explain it.

Student
Yeah, I guess that’s it. But how can they cancel the class after offering it. If I’d known this was going to happen, I would have taken it last semester.

Receptionist
I know, it’s really inconvenient for you, I understand that, but er… if we don’t have enough students sign up for the course, the college can’t offer it. You know, it’s a practical issue, like we can’t have an instructor when there’re only a few students in the class. You see what I mean?

Student
I guess, but now I don’t know what course I should take instead.

Receptionist
Ok, let’s see. Do you have any courses you’re going to take next semester? If you do, you might want to take them now and sign up for physics 403 next semester.

Student
Yeah, I guess I could do that. I just hope it won't be cancelled again. Do you know how many people have to be enrolled in order to keep a class from being cancelled?

Receptionist
Well, it depends on the class, but for that class, you have to have er… let’s see, usually it’d be at least ten people, but since it was cancelled this semester, they might even do it with less. But do you know what you should do? Give the physics department a call a couple of weeks before the semester starts. They’ll be able to tell you if they’re planning to go through with it. It's their decision, actually.

Student
Oh, ok, I will do that. Thanks for the info.

Receptionist
No problem. Sorry about the class. Oh, why aren’t you to go change a mail address now. It lonely takes a minute.

Student
Oh, oh, sure, I will do that right way.

TPO 3 Lecture 1 Environmental science

Narrator
Listen to part of a lecture in an environmental science class.

Professor
Now, we've been talking about the loss of animal habitat from housing developments, uh …, growing cities – small habitat losses. But today I wanna begin talking about what happens when habitat is reduced across a large area. There are, of course, animal species that require large areas of habitat, and some migrate over very long distances. So what's the impact of habitat loss on those animals – animals that need large areas of habitat?
Well, I'll use the humming birds as an example. Now you know a humming bird is amazingly small, but even though it's really tiny, it migrates over very long distances, travels up and down the western hemisphere – the Americas, back and forth between where it breeds in the summer and the warmer climates where it's spent the winter.
So you would say that this whole area over which it migrates is its habitat because on this long-distance journey, it needs to come down to feed and sleep every so often, right? Well, the humming bird beats its wings – get this – about 3 thousand times per minute. So you think, wow, it must need a lot of energy, a lot of food, right?
Well, it does. It drinks a lot of nectar from flowers and feeds on some insects, but it's energy-efficient too. You can't say it isn't. I mean, as it flies all the way across the Mexico Gulf, it uses up none of its body fat. But that doesn't mean it doesn't need to eat. So humming birds have to rely on plants in their natural habitat.
And it goes without saying, but the opposite is true as well, plants depend on humming birds too. There are some flowers that can only be pollinated by the humming birds. Without its stopping to feed and spread pollen from flower to flower, these plants would cease to exist.
But the problem, well, as natural habitat along these migration routes is developed by humans for housing or agriculture or cleared for raising cattle, for instance, there is less food available for migrating humming birds. Their nesting sites are affected too, the same by the same sorts of human activities. And all of these activities pose a real threat to the humming bird population.
So help them survive, we need to preserve their habitats. And one of the concrete ways people have been doing this is by cleaning up polluted habitat areas and then replanting flowers, um, replanting native flowers that humming birds feed on.
Promoting ecological tourism is another way to help save their habitat. As the number of visitors, eco-tourists who come to humming bird habitats to watch the birds, the more the number of visitors grows, the more local businesses' profit, so ecological tourism can bring financial rewards, all the more reason to value these beautiful little creatures in their habitat, right?
But to understand more about how to protect them to support the humming birds the best we can, we've got to learn more about their breeding, nesting sites and migration routes, and also about the natural habitats we find there. That just helps us determine how to prevent further decline in the population.
A good research method, a good way to learn more, is by running a banding study. Banding the birds allows us to track them over their lifetime. It's been a practice that's been used by researchers for years. In fact, most of what we've known about humming birds comes from banding studies, where we capture a humming bird and make sure all the information about it, like its weight and age and length, are all recorded and put into an international information

database.

And then we place an extremely lightweight band on one of its legs, well, what looks like a leg, although technically it's considered part of the bird's foot. Anyway, these bands are perfectly safe, and some humming birds have worn them for years with no evidence of any problems. The band is labeled with tracking number, oh, and there is a phone number on the band for people to call for free, to report a banded bird to be found or recaptured.

So when a banded bird is recaptured and reported, we learn about its migration route, its growth, and how long it has been alive, its lifespan. One recaptured bird was banded almost 12 years earlier – she was one of the oldest humming birds on record. Another interesting thing we learned is that some humming birds no longer use a certain route. They travel by a different route to reach their destination.

And findings like these have been of interest to biologists and environmental scientists in a number of countries who are trying to understand the complexities of how changes in a habitat affect the species in it.

TPO 3 Lecture 2 Film history

Narrator
Listen to part of a lecture in a film history class.

Professor
Okay, we've been discussing films in the 1920s and 30s, and how back then film categories, as we know them today, had not yet been established. We said that by today's standards, many of the films of the 20s and 30s would be considered hybrids, that is, a mixture of styles that wouldn't exactly fit into any of today's categories, and in that context.
Today we are going to talk about a film-maker who began ** very unique films in the late 1920s. He was French, and his name was Jean Painlevé.
Jean Painlevé was born in 1902. He made his first film in 1928. Now in a way, Painlevé's films conform to norms of the 20s and 30s, that is, they don't fit very neatly into the categories we use to classify films today. That said, even by the standards of the 20s and 30s, Painlevé's films were unique, a hybrid of styles. He had a special way of fusing, or some people might say confusing, science and fiction.
His films begin with facts, but then they become more and more fictional. They gradually add more and more fictional elements. In fact, Painlevé was known for saying that science is fiction.
Painlevé was a pioneer in underwater film-**, and a lot of his short films focused on the aquatic animal world. He liked to show small underwater creatures, displaying what seemed like familiar human characteristics – what we think of as unique to humans.
He might take a clip of a mollusk going up and down in the water and set it to music. You know, to make it look like the mollusk were dancing to the music like a human being – that sort of thing. But then he suddenly changed the image or narration to remind us how different the animals are, how unlike humans. He confused his audience in the way he portrayed the animals he filmed, mixing up on notions of the categories of humans and animals.
The films make us a little uncomfortable at times because we are uncertain about what we are seeing. It gives him films an uncanny feature: the familiar made unfamiliar, the normal made suspicious. He liked twists, he liked the unusual. In fact, one of his favorite sea animals was the seahorse because with seahorses, it's the male that carries the eggs, and he thought that was great. His first and most celebrated underwater film is about the seahorse.
Susan, you have a question?

Student 1
But underwater film-** wasn't that unusual, was it? I mean, weren't there other people ** movies underwater?

Professor
Well, actually, it was pretty rare at that time. I mean, we are talking about the early 1920s

Student 1
But what about Jacques Cousteau? Was he like an innovator, you know, with underwater photography too?

Professor

Ah, Jacques Cousteau. Well, Painlevé and Cousteau did both film underwater, and they were both innovators, so you are right in that sense. But that's pretty much where the similarities end. First of all, Painlevé was about 20 years ahead of Cousteau. And Cousteau's adventures were high-tech, with lots of fancy equipment, whereas Painlevé kind of patched the equipment together as he needed it.

Cousteau usually filmed large animals, usually in the open sea, whereas Painlevé generally filmed smaller animals, and he liked to film in shallow water. Uh, what else, oh well, the main difference was that Cousteau simply investigated and presented the facts – he didn't mix in fiction. He was a strict documentarist. He set the standard really for the nature documentary. Painlevé, on the other hand, as we said before, mixed in elements of fiction. And his films are much more artistic, incorporating music as an important element.

John, you have a question?

Student 2

Well, maybe I shouldn't be asking this, but if Painlevé's films are so special, so good, why haven't we ever heard of them? I mean, everyone's heard of Jacques Cousteau.

Professor

Well, that's a fair question. Uh, the short answer is that Painlevé's style just never caught on with the public. I mean, it probably goes back at least in part to where we mentioned earlier, that people didn't know what to make of his films – they were confused by them, whereas Cousteau's documentaries were very straightforward, met people's expectations more than Painlevé's films did. But you are true: film history is about what we know about them. And Painlevé is still highly respected in many circles.

TPO 3 Conversation 2

Narrator
Listen to a conversation between a student and a professor.

Student
Hi, Professor Archure, you know how in class last week you said you were looking for students who are interested in volunteering for your archeology project?

Professor
Of course, are you volunteering?

Student
Yes, I am. It sounds really interesting, but er… do I need to have any experience for these kinds of projects?

Professor
No, not really. I assume that most students taking the introductory level of class would have little or no experience with the archeological research, but that's ok.

Student
Oh, good, that's a relief. Actually, that's why I'm volunteering for the project — to get experience. What kind of work is it?

Professor
Well, as you know, we're studying the history of the campus this semester. This used to be an agricultural area and we already know that where the main lecture hall now stands, there once were farm house and barn that were erected in the late 1700s. We are excavating near the lecture hall to see what types of artifacts we find, you know, things people used in the past that got buried when the campus was constructed. We've already began to find some very interesting items like old bottles, buttons, pieces of clay pottery.

Student
Buttons and clay pottery? Did the old owners leave in such a hurry that they left their clothes and dishes behind?

Professor
Hmmm… that's just one of the questions we hope to answer with this project.

Student
Wow, and it's all right here on campus.

Professor
That's right, no traveling involved. I wouldn't expect volunteers to travel to a site, especially in the middle of the semester. We expect to find many more things, but we do need more people to help.

Student
So… how many student volunteers are you looking for?

Professor

I'm hoping to get five or six. I've asked for volunteers in all of the classes I teach, but no one has responded. You are the first person to express interest.

Student
Sounds like it could be a lot of work. Is there er… is there anyway I can use the experience to get some extra credit in class? I mean, can I write a paper about it?

Professor
I think it'll depend on what type of work you do in the excavation, but I imagine we can arrange something. Actually I've been considering offering extra credit for class because I've been having a tough time getting volunteers. Extra credit is always a good incentive for students.

Student
And how often would you want the volunteers to work?

Professor
We're asking for three or four hours per week, depending on your schedule. A senior researcher, I think you know John Franklin, my assistant, is on site every day.

Student
Sure, I know John. By the way, will there be some sort of training?

Professor
Yes, er… I want to wait still Friday to see how many students volunteer, and then I'll schedule the training class next week at a time that's convenient for everyone.

Student
Ok. I'll wait to hear from you. Thanks a lot for accepting me.

TPO 3 Lecture 3 Art History

Narrator
Listen to part of a lecture in an Art History class. The professor has been discussing the origins of art.

Professor
Some of the world's oldest preserved art is the cave art of Europe, most of it in Spain and France. And the earliest cave paintings found to date are those of the Chauvet Cave in France discovered in 1994.
And you know, I remember when I heard about the results of the dating of the Chauvet paintings, I said to my wife, "Can you believe these paintings are over 30,000 years old?" And my 3-year-old daughter piped up and said, "Is that older than my great-grandmother?" That was the oldest age she knew.
And you know, come to think of it. It's pretty hard for me to really understand how long 30,000 years is too. I mean, we tend to think that people who lived at that time must have been pretty primitive. But I'm gonna show you some slides in a few minutes and I think you will agree with me that this art is anything but primitive. They are masterpieces. And they look so real, so alive that it's very hard to imagine that they are so very old.
Now, not everyone agrees on exactly how old. A number of the Chauvet paintings have been dated by a lab to 30,000 or more years ago. That would make them not just older than any other cave art, but about twice as old as the art in the caves at Altamira or Lascaux, which you may have heard of.
Some people find it hard to believe Chauvet is so much older than Altamira and Lascaux, and they noted that only one lab did the dating for Chauvet, without independent confirmation from any other lab. But be that as it may, whatever the exact date, whether it's 15,000, 20,000 or 30,000 years ago, the Chauvet paintings are from the dawn of art. So they are a good place to start our discussion of cave painting.
Now, one thing you've got to remember is the context of these paintings. Paleolithic humans - that's the period we are talking about here, the Paleolithic, the early stone age, not too long after humans first arrived in Europe - the climate was significantly colder then and so rock shelters, shallow caves were valued as homes protected from the wind and rain. And in some cases at least, artists drew on the walls of their homes. But many of the truly great cave art sites like Chauvet were never inhabited. These paintings were made deep inside a dark cave, where no natural light can penetrate. There's no evidence of people ever living here. Cave bears, yes, but not humans. You would have had to make a special trip into the cave to make the paintings, and a special trip to go see it. And each time you'd have to bring along torches to light your way. And people did go see the art. There are charcoal marks from their torches on the cave walls clearly dating from thousands of years after the paintings were made. So we can tell people went there. They came but they didn't stay. Deep inside a cave like that is not really a place you'd want to stay, so, why? What inspired the Paleolithic artists to make such beautiful art in such inaccessible places? We'll never really know of course, though it's interesting to speculate.
But, um, getting to the paintings themselves, virtually all Paleolithic cave art represents animals, and Chauvet is no exception. The artists were highly skilled at using, or even enhancing, the natural shape of the cave walls to give depth and perspectives to their drawings, the sense of motion and vitality in these animals. Well, wait till I show you the slides. Anyway, most

Paleolithic cave art depicts large herbivores. Horses are most common overall with deer and bison pretty common too, probably animals they hunted. But earlier at Chauvet, there is a significant interest in large dangerous animals, lots of rhinoceros, lions, mammoth, bears. Remember that the ranges of many animal species were different back then so all these animals actually lived in the region at that time. But the Chauvet artists didn't paint people. There is a half-man-half-bison creature and there is outline of human hands but no depiction of a full human.

So, why these precise animals? Why not birds, fish, snakes? Was it for their religion, magic or sheer beauty? We don't know. But whatever it was, it was worth it to them to spend hours deep inside a cave with just a torch between them and utter darkness. So, on that note, let's dim the lights, so we can see these slides and actually look at the techniques they used.

TPO 3 Lecture 4 Astronomy

Narrator
Listen to part of a lecture in an astronomy class.

Professor
Now astronomy didn't really bloom into the science it is today until the development of spectroscopy.
Spectroscopy is basically the study of spectra and spectral lines of light, and specifically for us, the light from stars. It makes it possible to analyze the light emitted from stars. When you analyze this light, you can figure out their distance from the earth, and identify what they are made of, determine their chemical composition.
Before we get into that though, it's probably a good thing to back up a bit. You all know how when you take a crystal prism and pass a beam of sunlight through it, you get a spectrum, which looks like a continuous band of rainbow colors. The light that we see with our human eyes as a band of rainbow color falls in a range of what's called visible light. And visible light spectroscopy is probably the most important kind of spectroscopy. Anyone want to take a stab at the scientific term for visible light? And I'm sure all of you know this because you all did the reading for today.

Student
Optical radiation. But I thought being exposed to radiation is dangerous.

Professor
Yes, and no. If you are talking about radiation, like in the element Uranium, yeah, that's dangerous. But radiation as a general term actually refers to anything that spreads away from its source. So optical radiation is just visible light energy spreading out. OK, so we've got a spectrum of a beam of sunlight and it looks like the colors bleed into each other. There are no interruptions, just a band flowing from violet to green, to yellow, to… you get the idea.
Well, what happens if the sunlight's spectrum is magnified? Maybe you all didn't do the reading. Well, here's what you'd see.
I want you to know this that this spectrum is interrupted by dark lines called spectral lines. If you really magnify the spectrum of the sunlight, you could identify more than 100,000 of them. They may look like kind of randomly placed, but they actually form many distinct patterns. And if you were looking at the spectrum of some other star, the colors would be the same. But the spectral lines would break it up at different places, ** different patterns. Each pattern stands for a distinct chemical element, and so different sets or patterns of spectral lines mean that the star has a different chemical composition.

Student
So how do we know which spectral patterns match up with which elements?

Professor
Well, a kind of spectroscopic library of elements was compiled using flame tests. A known element, say a piece of iron for example, is heated in a pure gas flame. The iron eventually heats to the point that it radiates light. This light is passed through a prism, which breaks it up into a spectrum. And a unique pattern, kind of like a chemical fingerprint of spectral lines for that

element appears. This process was repeated over and over again for many different elements, so we can figure out the chemical makeup of another star by comparing the spectral pattern it has to the pattern of the elements in the library.
Oh, an interesting story about how one of the elements was discovered through spectroscopy. There was a pretty extensive library of spectral line patterns of elements even by the 1860s. A British astronomer was analyzing a spectrograph of sunlight, and he noticed a particular pattern of spectral lines that didn't match anything in the library. So he put two and two together, and decided there was an element in the sun that hadn't been discovered here on the earth yet. Any guesses about what that element is? It actually turned out to be pretty common and I'm sure all of you know it.
OK. Let's try something else. Any of you happened to be familiar with the Greek word for "sun" by chance?

Student
Something like "Helius" or something like that. Oh it must be "Helium". So you are saying that Helium was discovered on the sun first.

Professor
Yes, and this is a good example of how important spectroscopy is in astronomy.

TPO 4 Conversation 1

Narrator
Listen to a conversation between a student and a librarian.

Librarian
Can I help you?

Student
Yeah, I need to find a review. It's for my English class. We have to find reviews of the play we are reading. But they have to be from when the play was first performed, so I need to know when that was and I suppose I should start with newspaper reviews and…

Librarian
Contemporary reviews.

Student
Sorry?

Librarian
You want contemporary reviews. What's the name of the play?

Student
It's Happy Strangers. It was written in 1962 and we are supposed to write about its influence on American theatre and show why it's been so important.

Librarian
Well, that certainly explains why your professor wants you to read some of those old reviews. The critiques really tore the play to pieces when it opened. It's so controversial. Nobody had ever seen anything like it on the stage.

Student
Really? Is that a big deal?

Librarian
Oh, sure. Of course the critiques' reaction made some people kind of curious about it. They wanted to see what's causing all the fuss. In fact, we were on vacation in New York. Oh, I had to be, eh, around 16 or so, and my parents took me to see it. That would've been about 1965.

Student
So that was the year premier, great, but eh, newspaper from back then weren't online, so, how do I…

Librarian

Well, we have copies of all the newspapers in the basement, and all the major papers publish reference guides to their articles reviews, etc. You will find them in the reference stacks in the back. But I start with 1964, so I think the play had been running for a little while when I saw it.

Student
How do you like it? I mean just two characters on the stage hanging around and basically doing nothing.

Librarian
Well, I was impressed. The actors were famous, and besides it was my first time in a real theatre. But you are right. It was definitely different from many plays that we read in high school. Of course, in a small town the assignments are pretty traditional.

Student
Yeah, I've only read it but it doesn't seem like it would be much fun to watch. The story doesn't progress in any sort of logical matter, doesn't have real ending either, just stops. Honestly, you know, I thought it was kind of slow and boring.

Librarian
Oh, well I guess you might think that. But when I saw it back then it was anything but boring. Some parts were really funny, but I remember crying too. But I'm not sure just reading it. You know, they've done this play at least once on campus. I'm sure there is a tape of the play in our video library. You might want to borrow it.

Student
That's a good idea. I'll have a better idea of what I really think of it before I read those reviews.

Librarian
I'm sure you will be surprised that anyone ever found it radical. But you will see why it is still powerful, dramatically speaking.

Student
Yeah, it must be something about it, or the professor wouldn't have assigned it. I'm sure I'll figure it out.

TPO 4 Lecture 1 Biology

Narrator
Listen to part of a lecture in a biology class. The class is discussing animal behavior.

Professor
Ok, the next kind of animal behavior I want to talk about might be familiar to you. You may have seen, for example, a bird that's in the middle of a mating ritual, and suddenly it stops and preens, you know, takes a few moments to straighten its feathers, and then returns to the mating ritual. This kind of behavior, this doing something that seems completely out of place, is what we call a 'Displacement Activity'. Displacement activities are activities that animal's engaging in when they have conflicting drives. If we take our example from a minute ago, if the bird is afraid of its mate, it's conflicted. It wants to mate but it's also afraid and wants to run away. So, instead, it starts grooming itself. So, the displacement activity, the grooming, the straightening of its feathers, seems to be an irrelevant behavior. So, what do you think another example of a displacement activity might be?

Karl
How about an animal that, um, instead of fighting its enemy or running away, it attacks a plant or a bush?

Professor
That's really good suggestion, Karl. But that's called 'redirecting'. The animal is redirecting its behavior to another object, in this case, the plant or the bush. But that's not an irrelevant or inappropriate behavior. The behavior makes sense. It's appropriate under the circumstances. But what doesn't make sense is the object the behavior's directed towards. Ok, who else? Carol?

Carol
I think I read in another class about an experiment where an object that the animal was afraid of was put next to its food – next to the animal's food. And the animal, it was conflicted between confronting the object and eating the food, so instead, it just fell asleep. Like that?

Professor
That's exactly what I mean. Displacement occurs because the animal's got two conflicting drives – two competing urges, in this case, fear and hunger. And what happens is, they inhibit each other, they cancel each other out in a way, and a third seemingly irrelevant behavior surfaces through a process that we call 'Disinhibition'. Now in disinhibition, the basic idea is that two drives that seem to inhibit, to hold back, a third drive. Or, well, they're getting in a way of each in a… in a conflict situation and somehow lose control, lose their inhibiting effect on that third behavior, which means that the third drive

surfaces, it's expressed in the animal's behavior. Now, these displacement activities can include feeding, drinking, grooming, even sleeping. These are what we call 'Comfort Behavior'. So why do you think displacement activities are so often comfort behaviors, such as grooming?

Karl
Maybe because it's easy for them to do? I mean, grooming is like one of the most accessible things an animal can do. It's something they do all the time, and they have the stimulus right there on the outside of their bodies in order to do the grooming, or if food is right in front of them. Basically, they don't have to think very much about those behaviors.

Carol
Professor, isn't it possible that animals groom because they've got messed up a little from fighting or mating? I mean if a bird's feathers get ruffled or an animal's fur, maybe it's not so strange for them to stop and tidy themselves up at that point.

Professor
That's another possible reason although it doesn't necessarily explain other behaviors such as eating, drinking or sleeping. What's interesting is that studies have been done that suggest that the animal's environment may play a part in determining what kind of behavior it displays. For example, there's a bird, the 'wood thrush', anyway, when the 'wood thrush' is in an attack-escape conflict, that is, it's caught between the two urges to escape from or to attack an enemy, if it's sitting on a horizontal branch, it'll wipe its beak on its perch. If it's sitting on a vertical branch, it'll groom its breast feathers. The immediate environment of the bird, its immediate, um, its relationship to its immediate environment seems to play a part in which behavior will display.

TPO 4 Lecture 2 Literature

Narrator
Listen to part of a lecture in a literature class.

Professor
All right, so let me close today's class with some thoughts to keep in mind while you are doing tonight's assignment. You will be reading one of Ralph Waldo Emerson's best-known essays 'Self-Reliance' and comparing it with his poems and other works. I think this essay has the potential to be quite meaningful for all of you as young people who probably wonder about things like truth and where your lives are going - all sorts of profound questions. Knowing something about Emerson's philosophies will help you when you read 'Self-Reliance'. And basically, one of the main beliefs that he had was about truth. Not that it's something that we can be taught, Emerson says it's found within ourselves. So this truth, the idea that it's in each one of us, is one of the first points that you'll see Emerson ** in this essay. It's a bit abstract but he's very into…ah… into each person believing his or her own thought, believing in yourself, the thought or conviction that's true for you. But actually, he ties that in with a sort of 'universal truth' – something that everyone knows but doesn't realize they know. Most of us aren't in touch with ourselves in a way, so we just aren't capable of recognizing profound truth. It takes geniuses, people like, say, Shakespeare, who're unique because when they have a glimpse at this truth, this universal truth, they pay attention to it and express it and don't just dismiss it like most people do.
So Emerson is really into each individual believing in and trusting him or herself. You'll see that he writes about, well, first, conformity. He criticizes that people of his time for abandoning their own minds and their own wills for the sake of conformity and consistency. They try to fit in with the rest of the world even though it's at odds with their beliefs and their identities. Therefore, it's best to be a non-conformist – to do your own thing, not worrying about what other people think. That's an important point. He really drives this argument home throughout the essay.
When you are reading, I want you to think about that and why that kind of thought would be relevant to the readers of his time. Remember this is 1838, 'Self-Reliance' was a novel idea at the time and the United State's citizens were less secure about themselves as individuals and as Americans. The country as a whole was trying to define itself. Emerson wanted to give people something to really think about, help them find their own way and what it meant to be who they were. So that's something that I think is definitely as relevant today as it was then, probably, um, especially among young adults like yourselves, you know, uh, college being a time to sort of really think about who you are and where you're going.
Now we already said that Emerson really emphasizes non-conformity, right, as a way to sort of not lose your own self and identity in the world, to have your own truth and not be afraid to listen to it. Well, he takes this a step further. Not

conforming also means, uh, not conforming with yourself or your past. What does that mean? Well, if you've always been a certain way or done a certain thing, but it's not working for you any more, or you're not content, Emerson says that it'd be foolish to be consistent even with our own past. 'Focus on the future,' he says, "That's what matters more. Inconsistency is good."

He talks about a ship's voyage and this is one of the most famous bits of the essay - how the best voyage is made up of zigzag lines. Up close, it seems a little all over the place, but from farther away, the true path shows and in the end it justifies all the turns along the way. So, don't worry if you are not sure where you're headed or what your long-term goals are. Stay true to yourself and it'll make sense in the end. I mean, I can attest to that. Before I was a literature professor, I was an accountant. Before that, I was a newspaper reporter. My life is taking some pretty interesting turns and here I am, very happy with my experiences and where they've brought me. If you rely on yourself and trust your own talents, your own interest, don't worry, your path will make sense in the end.

TPO 4 Conversation 2

Narrator
Listen to a conversation between a student and a professor.

Professor
Hey, Jane, you look like you are in a hurry.

Student
Yeah, things are a little crazy.

Professor
Oh yeah? What's going on?

Student
Oh, it's nothing. Well, since it's your class, I guess it's OK. It's, it's just I am having trouble with my group project.

Professor
Ah, yes, due next week. What's your group doing again?

Student
It's about United States Supreme Court Decisions. We are looking at the impact of recent cases on property rights, municipal land use cases, owning disputes.

Professor
Right, OK. And it's not going well?

Student
Not really. I'm worried about other two people in my group. They are just sitting back, not really doing their fair share of the work and waiting for an A. It's kind of stressing me out, because we are getting close to the deadline and I feel like I'm doing everything for this project.

Professor
Ah, the good old free writer problem.

Student
Free writer?

Professor
Ah, it's just a term that describes this situation, when people in the group seek to get the benefits of being in a group without contributing to the work. Anyway, what exactly do you mean when you say they just sit back? I mean, they've been following the weekly progress repots with me.

Student
Yes, but I feel like I'm doing 90% of the work. I hate to sound so negative here, but honestly, they are taking credit for things they shouldn't take credit for. Like last week in the library, we decided to split up the research into 3 parts and each of us was supposed to find sources in the library for our parts. I went off to the stack and found some really good material for my part, but when I got back to our table, they were just goofing off and talking. So I went and got materials for their sections as well.

Professor
Um…you know you shouldn't do that.

Student
I know, but I didn't want to risk the project going down the drain.

Professor
I know Teresa and Kevin. I had both of them on other courses. So, I'm familiar with the work and work habits.

Student
I know, me too. That's why this has really surprised me.

Professor
Do you…does your group like your topic?

Student
Well, I think we'd all rather focus on cases that deal with personal liberties, questions about freedom of speech, things like that. But I chose property rights.

Professor
You chose the topic?

Student
Yeah, I thought it would be good for us, all of us to try something new.

Professor
Um…maybe that's part of the problem. Maybe Teresa and Kevin aren't that excited about the topic? And since you picked it, have you thought…talk to them at all about picking a different topic?

Student
But we've got all the sources and it's due next week. We don't have time to start from scratch.

Professor

OK, I will let you go ‘cause I know you are so busy. But you might consider talking to your group about your topic choice.

Student
I will think about it. Got to run, see you in class.

TPO 4 Lecture 3 Geology

Narrator
Listen to part of a lecture in a geology class.

Professor
Now we've got a few minutes before we leave for today. So I'll just touch on an interesting subject that I think makes an important point. We've been covering rocks and different types of rocks for the last several weeks. But next week we are going to do something a bit different. And to get started I thought I'd mention something that shows how uh…as a geologist, you need to know about more than just rocks and the structure of solid matter, moving rocks, you may have heard about them.
It's quite a mystery. Death valley is this desert plane, a dry lake bed in California surrounded by mountains and on the desert floor these huge rocks, some of them hundreds of pounds. And they move. They leave long trails behind them, tracks you might say as they move from one point to another. But nobody has been able to figure out how they are moving because no one has ever seen it happen.
Now there are a lot of theories, but all we know for sure is that people aren't' moving the rocks. There are no footprints, no tyre tracks and no heavy machinery like a bulldozer…uh, nothing was ever brought in to move these heavy rocks.
So what's going on? Theory NO.1 ---Wind? Some researchers think powerful uh…windstorms might move the rocks. Most of the rocks move in the same direction as the dominant wind pattern from southwest to northeast. But some, and this is interesting, move straight west while some zigzag or even move in large circles.
Um…How can that be? How about wind combined with rain? The ground of this desert is made of clay. It's a desert, so it's dry. But when there is the occasional rain, the clay ground becomes extremely slippery. It's hard for anyone to stand on, walk on. Some scientists theorized that perhaps when the ground is slippery the high winds can then move the rocks. There's a problem with this theory. One team of scientists flooded an area of the desert with water, then try to establish how much wind force would be necessary to move the rocks. And guess this, you need winds of at least five hundred miles an hour to move just the smallest rocks. And winds that strong have never been recorded. Ever! Not on this planet.
So I think it's safe to say that that issues has been settled. Here is another possibility – ice. It's possible that rain on the desert floor could turn to thin sheets of ice when temperatures drop at night. So if rocks…uh becoming better than ice, uh … OK, could a piece of ice with rocks in it be pushed around by the wind? But there's a problem with this theory, too. Rocks trapped in ice together would have moved together when the ice moved. But that doesn't always happen. The rocks seem to take separate routes.
There are a few other theories. Maybe the ground vibrates, or maybe the

ground itself is shifting, tilting. Maybe the rocks are moved by a magnetic force. But sadly all these ideas have been eliminated as possibilities. There's just no evidence. I bet you are saying to yourself well, why don't scientists just set up video cameras to record what actually happens? Thing is this is a protective wilderness area. So by law that type of research isn't allowed. Besides, in powerful windstorms, sensitive camera equipment would be destroyed. So why can't researchers just live there for a while until they observe the rocks' moving? Same reason.

So where are we now? Well, right now we still don't have any answers. So all this leads back to my main point – you need to know about more than just rocks as geologists. The researchers studying moving rocks, well, they combine their knowledge of rocks with knowledge of wind, ice and such…um not successfully, not yet. But you know, they would even have been able to get started without uh… earth science understanding – knowledge about wind, storms, you know, meteorology. You need to understand physics. So for several weeks like I said we'll be addressing geology from a wider prospective. I guess that's all for today. See you next time.

TPO 4 **Lecture 4** United States government

Narrator
Listen to part of a lecture in a United States government class.

Professor
OK, last time we were talking about government support for the arts. Who can sum up some of the main points? Frank?

Frank
Well, I guess there wasn't really any, you know, official government support for the arts until the twentieth century. But the first attempt the United States government made to, you know, to support the arts was the Federal Art Project.

Professor
Right, so what can you say about the project?

Frank
Um…it was started during the Depression, um…in the 1930s to employ out-of-work artists.

Professor
So was it successful? Janet? What do you say?

Janet
Yeah, sure, it was successful. I mean, for one thing, the project established a lot of…uh like community art centers and galleries and places like rural areas where people hadn't really had access to the arts.

Professor
Right.

Frank
Yeah. But didn't the government end up wasting a lot of money for art that wasn't even very good?

Professor
Uh…some people might say that. But wasn't the primary objective of the Federal Art Project to provide jobs?

Frank
That's true. I mean…it did provide jobs for thousands of unemployed artists.

Professor
Right. But then when the United States became involved in the Second World

War, unemployment was down and it seems that these programs weren't really necessary any longer.
So, moving on, we don't actually see any govern…well any real government involvement in the arts again until the early 1960s, when President Kennedy and other politicians started to push for major funding to support and promote the arts. It was felt by a number of politicians that …well that the government had a responsibility to support the arts as sort of… oh, what can we say?...the the soul…or spirit of the country. The idea was that there be a federal subsidy…um…uh…financial assistance to artists and artistic or cultural institutions. And for just those reasons, in 1965, the National Endowment for the Arts was created.
So it was through the NEA, the National Endowment for the Arts, um…that the arts would develop, would be promoted throughout the nation. And then individual states throughout the country started to establish their own state arts councils to help support the arts. There was kind of uh…cultural explosion. And by the mid 1970s, by 1974 I think, all fifty states had their own arts agencies, their own state arts councils that work with the federal government with corporations, artists, performers, you name it.

Frank
Did you just say corporations? How are they involved?

Professor
Well, you see, corporations aren't always altruistic. They might not support the arts unless…well, unless the government made it attractive for them to do so, by offering corporations tax incentives to support the arts, that is, by letting corporations pay less in taxes if they were patrons of the arts. Um, the Kennedy Centre in Washington D.C. , you may uh…maybe you've been there, or Lincoln Centre in New York. Both of these were built with substantial financial support from corporations. And the Kennedy and Lincoln centres aren't the only examples. Many of your cultural establishments in the United States will have a plaque somewhere acknowledging the support – the money they received from whatever corporation. Oh, yes, Janet?

Janet
But aren't there a lot of people who don't think it's the government's role to support the arts?

Professor
Well, as a matter of fact, a lot of politicians who did not believe in government support for the arts, they wanted to do away with the agency entirely, for that very reason, to get rid of governmental support. But they only succeeded in taking away about half the annual budget. And as far as the public goes, well…there are about as many individuals who disagree with the government support as there are those who agree. In fact, with artists in particular, you have lots of artists who support and who have benefited from this agency, although it seems that just as many artists suppose a government agency being involved in the arts, for many different reasons, reasons like they don't

want the government to control what they create. In other words, the arguments both for and against government funding of the arts are as many and, and as varied as the individual styles of the artists who hold them.

TPO-5 Conversation 1

Narrator
Listen to a conversation between a student and a counselor at the University Counseling Center.

Student
Hi, thanks for seeing me in such short notice.

Counselor
No problem. How can I help?

Student
Well, I think I might have made a mistake coming to the school.

Counselor
What makes you say that?

Student
I'm a little overwhelmed by the size of this place. I come from a small town. There were only 75 of us in my high school graduating class. Everyone knew everyone. We all grew up together.

Counselor
So it's a bit of a culture shock for you? Being one of 15,000 students on a big campus in an unfamiliar city?

Student
That's an understatement. I just can't get comfortable in class or in the dorms. You know, socially.

Counselor
Um…well, let's start with the academics. Tell me about you classes.

Student
I'm taking mostly introductory courses and some are taught in these huge lecture halls.

Counselor
And you are having trouble in keeping pace with the material?

Student
No, in fact I got an A on my first economics paper.
It's just that, it's so impersonal, I'm not used to it.

Counselor

Are your classes impersonal?

Student
No, it's just that…for example, in sociology yesterday, the professor asked a question, so I raised my hand, several of us raised our hands. And I kept my hand up because I did the reading and knew the answer. But the professor just answered his own question and continued with the lecture.

Counselor
Well, in a big room it's possible he didn't notice you. Maybe he was starting to save time. In either case I wouldn't take it personally.

Student
I suppose. But I just don't know how to, you know, distinguish myself.

Counselor
Why not stop by his office during office hours?

Student
That wouldn't seem right. You know, taking time from other students who need help?

Counselor
Don't say that. That's what office hours are for. There is no reason you couldn't pop in to say hi and to make yourself known. If you are learning a lot in class, let the professor know. Wouldn't you appreciate positive feedback if you were a professor?

Student
You are right. That's a good idea.

Counselor
OK, er…let's turn to your social life. How's it going in the dorms?

Student
I don't have much in common with my roommate or anyone else I've met so far. Everyone's into sports and I'm more artsy, you know, into music. I play the cello.

Counselor
Hah, have you been playing long?

Student
Since age ten. It's a big part of my life. At home I was the youngest member of our community orchestra.

Counselor
You are not going to believe this. There is a string quartet on campus, all

students. And it so happened that the cellist graduated last year. They've been searching high and low for a replacement, someone with experience. Would you be interested in auditioning?

Student
Absolutely. I wanted to get my academic work settled before pursuing my music here. But I think this would be a good thing for me. I guess if I really want to fit in here I should find people who love music as much as I do. Thank you.

Counselor
My pleasure.

TPO 5 Lecture 1 Sociology

Narrator

Listen to part of a lecture in a sociology class.

Professor:
Have you ever heard the one about alligators living in New York sewers? The story goes like this: a family went on vacation in Florida and bought a couple of baby alligators as presents for their children, then returned from vacation to New York, bringing the alligators home with them as pets. But the alligators would escape and find their way into the New York sewer system where they started reproducing, grew to huge sizes and now strike fear into sewer workers. Have you heard this story? Well, it isn't true and it never happened. But despite that, the story has been around since the 1930s. Or how about the song 'twinkle, twinkle little star', you know, 'twinkle, twinkle, little star, how I wonder what you are'. Well we've all heard this song. Where am I going with this? Well, both the song and the story are examples of memes. And that's what we would talk about, the theory of memes.
A meme is defined as a piece of information copied from person to person. By this definition, most of what you know, ideas, skills, stories, songs are memes. All the words you know, all the scientific theories you've learned, the rules your parents taught you to observe, all are memes that have been passed on from person to person.
So what? You may say. Passing on ideas from one person to another is nothing new. Well, the whole point of defining this familiar process as transmission of memes is so that we can explore its analogy with the transmission of genes. As you know, all living organisms pass on biological information through the genes. What's a gene? A gene is a piece of biological information that gets copied or replicated, and the copy or replica is passed on to the new generation. So genes are defined as replicators.
Genes are replicators that pass on information about properties and characteristics of organisms. By analogy, memes also get replicated and in the process pass on culture information from person to person, generation to generation. So memes are also replicators. To be a successful replicator, there are three key characteristics: longevity, fecundity and fidelity. Let's take a closer look.
First, longevity. A replicator must exist long enough to be able to get copied, and transfer its information. Clearly, the longer a replicator survives, the better its chances of getting its message copied and passed on. So longevity is a key characteristic of a replicator. If you take the alligator story, it can exist for a long time in individual memory, let's say, my memory. I can tell you the story now or ten years from now, the same with the twinkle, twinkle song. So these memes have longevity because they are memorable for one reason or another.
Next, fecundity. Fecundity is the ability to reproduce in large numbers. For example, the common housefly reproduces by laying several thousand eggs,

so each fly gene gets copied thousands of times. Memes, well, they can be reproduced in large numbers as well. How many times have you sung the ‘twinkle, twinkle song’ to someone? Each time you replicated that song, and maybe passed it along to someone who did not know it yet, a small child maybe.

And finally, fidelity. Fidelity means accuracy of the copying process. We know fidelity is an essential principle of genetic transmission. If a copy of a gene is a bit different from the original, that’s called a genetic mutation. And mutations are usually bad news. An organism often can not survive with a mutated gene. And so a gene usually can not be passed on, unless it’s an exact copy. For memes however, fidelity is not always so important. For example, if you tell someone the alligator story I told you today, it probably won’t be word for word exactly as I said it. Still, it will be basically the same story, and the person who hears the story will be able to pass it along. Other memes are replicated with higher fidelity though, like the twinkle, twinkle song. It had the exact same words 20 years ago as it does now. Well, that’s because we see songs as something that has to be performed accurately each time. If you change a word, the others will usually bring you in line. They’ll say, ‘that’s not how you sing it’, right?

So, you can see how looking at pieces of cultural information as replicators, as memes, and analyzing them in terms of longevity, fecundity and fidelity, we can gain some inside about how they spread, persist or change

TPO 5 Lecture 2 Astronomy

Narrator
Listen to part of a lecture in an Astronomy Class

Professor:
Last week, we covered some arguments against going back to the Moon. But there are compelling reasons in favor of another Moon landing too, um… not the least of which is trying to pinpoint the moon's age. We could do this in theory by studying an enormous impact crater, known as the South Pole-Aitken Basin. Um…it's located in the moon's South Polar Region. But, since it's on the far side of the moon, it can only be seen from space. Here is an image of…we'll call it the SPA Basin. This color-coated image of the SPA Basin, those aren't its actual colors obviously, this image is from the mid 90s, from the American spacecraft called Clementine. Um… unlike earlier lunar missions, Clementine didn't orbit only around the moon's equator. Its orbits enable it to send back data to create this topographical map of … well, the grey and white area towards the bottom is the South Pole, the purples and blues in the middle correspond to low elevations - the SPA Basin itself, the oranges and reds around it are higher elevations. The basin measures an amazing 2,500 km in diameter, and its average depth is 12 km. That makes it the biggest known crater in our solar system and it may well be the oldest.
You know planetary researchers love studying deep craters until learn about the impacts that created them, how they redistributed pieces of a planet's crust and in this case, we especially want to know if any of the mantle, the layer beneath the crust, was exposed by the impact. Not everyone agrees, but some experts are convinced that whatever created the SPA Basin did penetrate the Moon's mantle. And we need to find out, because much more than the crust, the mantle contains information about a planet's or Moon's total composition. And that's key to understanding planet formation. Um… Dian?
Dian: So, the only way to know the basin's age is to study its rocks directly?
Professor: well, from radio survey data, we know that the basin contains lots of smaller craters. So it must be really old, about 4 billion years, give or take a few hundred million years. But that's not very precise. If we had rock samples to study, we'd know whether the small craters were formed by impacts during the final stages of planetary formation, or if they resulted from later meteor showers.
Dian: But if we know around how old the Basin is, I'm not sure that's reason enough to go to the Moon again.
Professor: No…, but such crude estimates…um…we can do better than that. Besides, there are other things worth investigating, like is there water ice on the moon? Clementine's data indicated that the wall of the south-polar crater was more reflective than expected. So some experts think there's probably ice there. Also, data from a later mission indicates significant concentrations of hydrogen and by inference water less than a meter underground at both poles.
Student: Well if there's water, how did it get there? Underground rivers?

Professor: We think meteors that crashed into the moon or tails of passing comets may have introduced water molecules. Any water molecules that found their way to the floors of craters near the moon's poles, that water would be perpetually frozen, because the floors of those craters are always in shadow. Um…furthermore, if the water ice was mixed in with rock and dust, it would be protected from evaporation.
Dian: So are you saying there might be primitive life on the moon?
Professor: that's not my point at all. Um… o.k., say there is water ice on the moon. That would be a very practical value for a future moon base for astronauts. Water ice could be melted and purified for drinking. It could also be broken down into its component parts - oxygen and hydrogen. Oxygen could be used to breathe, and hydrogen could be turned into fuel, rocket fuel. So water ice could enable the creation of a self-sustaining moon base someday, a mining camp perhaps or a departure point for further space exploration.
Student: But holding tons of equipment to the moon to make fuel and build a life support system for a moon base, wouldn't that be too expensive?
Professor: Permanent base, maybe a way's off, but we shouldn't have to wait for that. The dust at the bottom of the SPA Basin really does have a fascinating story to tell. I wouldn't give for a few samples of it.

TPO 5 Conversation 2

Narrator
Listen to a conversation between a student and a professor.

Student
Hi, I was wondering if I could talk with you about the assignment in the film theory class.

Professor
Of course, Jill.

Student
It seems that pretty much everyone else in the class gets what they are supposed to be doing but I'm not so sure.

Professor
Well, the class is for students who are really serious about film. You must have taken film courses before.

Student
Yeah, in high school, film appreciation.

Professor

Um…I wouldn't think that would be enough. Did you concentrate mainly on form or content?

Student
Oh, definitely content. We'd watch, say Lord of the Flies, and then discuss it.

Professor
Oh, that approach, treating film as literature, ignoring what makes it unique.

Student
I liked it, though.

Professor
Sure, but that kind of class. Well, I'm not surprised that you are feeling a little lost. You know, we have two introductory courses that are supposed to be taken before you get to my course, one in film art, techniques, technical stuff and another in film history. So students in the class you are in should be pretty far along in film studies. In fact, usually the system blocks anyone trying to sign up for the class they shouldn't be taking. And who hasn't taken the courses you are required to do first as prerequisites.

Student
Well, I did have a problem with that but I discussed it with one of your office staff, and she gave me permission.

Professor
Of course. No matter how many times I tell them, they just keep on… Well, for your own good, I really suggest dropping back and starting at the usual place.

Student
Yes. But I've already been in this class for 4 weeks. I'd hate to just drop it now especially since I find it so different, so interesting.

Professor
I guess so. Frankly I can't believe you've lasted this long. These are pretty in-depth theories we've been discussing and you've been doing OK so far, I guess. But still, the program's been designed to progress through certain stages. Like any other professional training we build on pervious knowledge.

Student
Then maybe you could recommend some extra reading I can do to… catch up?

Professor
Well, are you intending to study film as your main concentration?

Student
No, no. I am just interested. I'm actually in marketing, but there seems to be a connection.

Professor
Oh…well, in…in that case, if you're taking the course just out of interest, I mean I still highly recommend signing up for the introductory courses at some point, but in the meantime, there is no harm I guess in trying to keep up with this class. The interest is clearly there. Eh, instead of any extra reading just now though, you could view some of the old introductory lectures. We have them on video. That would give you a better handle on the subject. It's still a pretty tall order, and we will be moving right along, so you will really need to stay on top of it.

Student
OK, I've been warned. Now, could I tell you about the idea for the assignment?

TPO 5 Lecture 3 Chemistry

Narrator
Listen to part of a lecture in a chemistry class.

Professor
Okay. I know you all have a lot of questions about this lab assignment that's coming out so ... I'm gonna take a little time this morning to discuss it.

So, you know the assignment has to do with Spectroscopy, right? And your reading should help you get a good idea of what that's all about. But, let's talk about Spectroscopy a little now just to cover the basics.
What is Spectroscopy? Well, the simplest definition I can give you is that Spectroscopy is the study of the interaction between matter and light. Now, visible light consists of different colors or wavelengths, which together make up what's called spectrum, a band of colors, like you see in a rainbow. And all substances, all forms of matter, can be distinguished according to what wavelength of light they absorb and which ones they reflect. It's like, um, well, every element has, what we call, its own spectral signature. If we can read that signature, we can identify the element. And that's exactly what spectroscopy does.
Now, Laser Spectroscopy, which is the focus of your assignment, works by measuring very precisely what parts of the spectrum are absorbed by different substances. And it has applications in a lot of different disciplines. And your assignment will be to choose a discipline that interests you, and devise an experiment. For example, I'm gonna talk about art. I'm interested in the art and to me it's interesting how spectroscopy is used to analyze art.
Er... let's say a museum curator comes to you with a problem. She's come across this painting that appears to be an original - let's say, a Rembrandt. And she wants to acquire it for her museum. But she's got a problem: she's not absolutely certain it's an original.
So, what do you do? How do you determine whether the painting's authentic? Okay. Think about the scientific process. You've got the question: Is the painting a Rembrandt? So first, you'll need to make a list of characteristics the painting would have to have to be a Rembrandt. Then you have to discover whether the painting in question has those characteristics. So first of all, you'll need to know the techniques Rembrandt used when he applied paint to canvas - his brushstrokes, how thickly he applied his paint. So you'd need to work with an art historian who has expert knowledge of Rembrandt's style. You'd have to know when he created his paintings, um... what pigments he used, in other words, what ingredients he used to make different colors of paint, cos the ingredients used in paints and binding agents plus varnishes, finishes, what have you, have changed over time.
Since you're trying to verify that's a Rembrandt, the ingredients in the pigment would need to have been used during Rembrandt's lifetime - in the 17th century. And that's where chemistry comes in. You've got to find out what's in

those pigments, learn their composition, and that requires lab work - detective work really - in a word, Spectroscopy.

So, how do we use Spectroscopy? Well, we put an infrared microscope - a spectroscope - on tiny tiny bits of paint. And using ultraviolet light we can see the spectral signature of each component part of the pigment. Then we compare these signatures with those of particular elements like zinc or lead, to determine what the pigment was made of. So, you can see why this type of analysis requires a knowledge of the history of pigments, right? How and when they were made? Say we determined a pigment was made with zinc, for example. We know the spectral signature of zinc. And it matches that of the paint sample. We also know that zinc wasn't discovered until the 18th century. And since Rembrandt lived during the 17th century, we know he couldn't have painted it.

Now, Spectroscopy has a very distinct advantage over previous methods of analyzing our works, because it's not invasive. You don't have to remove big chips of paint to do your analysis, which is what other methods require. All you do is train the microscope on tiny flecks of paint and analyze them.

Now a word or two about restoration. Sometimes original art works appear questionable or inauthentic because they’ve had so many restorers add touchup layers to cover up damage, damage from the paint having deteriorated over time. Well, spectroscopy can review the composition of those touchup layers too. So we can find out when they were applied. Then if we want to undo some bad restoration attempts, we can determine what kind of process we can use to remove them to dissolve the paint and uncover the original.

TPO 5 Lecture 4 Literature

Narrator
Listen to part of a lecture in a literature class.

Professor
Now we can't really talk about fairy tales without first talking about folk tales because there's a strong connection between these two genres, these two types of stories. In fact, many fairy tales started out as folk tales.
So, what's a folk tale? How would you characterize them? Jeff?

Jeff:
Well, they are old stories, traditional stories. They were passed down orally within cultures from generation to generation, so they changed a lot over time. I mean, every story teller, or, maybe every town, might have had a slightly different version of the same folk tale.

Professor:
That's right. There's local difference. And that's why we say folk tales are communal. By communal, we mean they reflect the traits and the concerns of a particular community at a particular time. So essentially the same tale could be told in different communities, with certain aspects of the tale adapted to fit the specific community. Um, not the plot, the details of what happens in the story would remain constant. That was the thread that held the tale together. But all the other elements, like the location or characters, might be modified for each audience.
Okay. So what about fairy tales? Th…they also are found in most cultures, but how are they different from folk tales? I guess the first question is: what is a fairy tale?
And don't anyone say "a story with a fairy in it" because we all know that very few fairy tales actually have those tiny magical creatures in them. But, what else can we say about them? Mary.

Mary:
Well, they seem to be less realistic than folk tales…like they have something improbable happening - a frog turning into a prince, say. Oh, that's another common element, royalty - a prince or princess. And fairy tales all seem to take place in a location that's nowhere and everywhere at the same time.

Professor:
What's the line-up? How do all the stories start? Once upon a time, in a far away land... oh, in the case of folk tales, each story teller would specify a particular location and time, though the time and location would differ for different story tellers. With fairy tales, however, the location is generally unspecified, no matter who the story teller is. That land far away... We'll come back to this point in a few minutes.

Student:
Um... I, I thought that a fairy tale was just a written version of an oral folk tale.

Professor:
Well, not exactly, though that is how many fairy tales developed. For example, in the late 18th century, the Grimm Brothers traveled throughout what's now Germany, recording local folk tales. These were eventually published as fairy tales, but not before undergoing a process of evolution.
Now, a number of things happen when an oral tale gets written down. First, the language changes. It becomes more formal, more standard - some might say, "less colorful". It's like the difference in your language depending on whether you are talking to someone, or writing them a letter. Second, when an orally transmitted story is written down, an authoritative version with a recognized author is created. The communal aspect gets lost. The tale no longer belongs to the community. It belongs to the world, so to speak. Because of this, elements like place and time can no longer be tailored to suit a particular audience. So they become less identifiable, more generalizable to any audience.
On the other hand, descriptions of characters and settings can be developed more completely. In folk tales, characters might be identified by a name, but you wouldn't know anything more about them. But in fairy tales, people no longer have to remember plots. They're written down, right? So more energy can be put into other elements of the story like character and setting. So you get more details about the characters, about where the action takes place, what people's houses were like, ur, whether they're small cabins or grand palaces. And it's worth investing that energy because the story, now in book form, isn't in danger of being lost. Those details won't be forgotten. If a folk tale isn't repeated by each generation, it may be lost for all time. But with a fairy tale, it's always there in a book, waiting to be discovered, again and again.
Another interesting difference involves the change in audience. Who the stories are meant for? Contrary to what many people believe today, folk tales were originally intended for adults, not for children. So why is it that fairy tales seem targeted toward children nowadays?

TPO 6 Conversation

Narrator
Listen to a conversation between a student and an employee in the university's career services office.

Student
Hi, do you have a minute?

Employee
Sure, how can I help you?

Student
I have a couple of questions about the career fair next week.

Employee
OK, shoot.

Student
Um ...well, are seniors the only ones who can go? I mean, you know, they are finishing school this year and getting their degrees and everything. And, well, it seems like businesses would wanna talk to them and not first year students like me.

Employee
No, no, the career fair is opened to all our students and we encourage anyone who's interested to go check it out.

Student
Well, that's good to know.

Employee
You've seen the flyers and posters around campus, I assume.

Student
Sure, can't miss them. I mean, they all say where and when the fair is, just not who should attend.

Employee
Actually they do, but it's in the small print. Uh, we should probably make that part easier to reach, shouldn't we? I'll make a note of that right now. So, do you have any other questions?

Student
Yes, actually I do now. Um ...since I'd only be going to familiarize myself with the process, you know, check it out, I was wondering if there is anything you

recommend that I do to prepare.

Employee
That's actually a very good question. Well, as you know, the career fair is generally an opportunity for local businesses to recruit new employees, and for soon-to-be graduates to have interviews with several companies they might be interested in working for. Now, in your case, even though you wouldn't be looking for employment right now, it still wouldn't hurt for you to prepare much like you would if you were looking for a job.

Student
You mean, like get my resume together and wear a suit?

Employee
That's a given. I was thinking more along the lines of doing some research. The flyers and posters list all the businesses that are sending representatives to the career fair. Um ...what's your major urge you to have one yet?

Student
Well, I haven't declared a major yet, but I'm strongly considering accounting. See, that's part of the reason I wanna go to the fair, to help me decide if that's what I really want to study.

Employee
That's very wise. Well, I suggest that you get on the computer and learn more about the accounting companies in particular that would be attending. You can learn a lot about companies from their internet websites. Then prepare a list of questions.

Student
Questions, hmm… so, in a way, I'll be interviewing them?

Employee
That's one way of looking at it. Think about it for a second. What do you want to know about working for an accounting firm?

Student
Well, there is the job itself, and salary of course, and working conditions, I mean, would I have an office, or would I work in a big room with a zillion other employees, and…and maybe about opportunities for advancement.

Employee
See? Those're all important things to know. After you do some research, you'll be able to tailor your questions to the particular company you are talking to.

Student
Wow, I'm glad I came by here. So, it looks like I've got some work to do.

Employee
And if you plan on attending future career fairs, I recommend you sign up for one of our interview workshops.

Student
I'll do that.

TPO 6 Lecture 1 Economics

Narrator
Listen to part of a lecture in an economics class.

Professor
Now when I mention the terms “boom and bust”, what is that going to mind?

Student
The dotcom crash of the ‘90s.

Professor
Ok. The boom in the late 1990s when all those new Internet companies sprung up and then sold for huge amounts of money. Then the bust around 2000…2001 when many of those same Internet companies went out of business.
Of course, booms aren’t always followed by busts. We’ve certainly seen times when local economies expanded rapidly for a while and then went back to a normal pace of growth. But, there’s a type of rapid expansion, what might be called the hysterical or irrational boom that pretty much always leads to a bust. See, people often create and intensify a boom when they get carried away by some new industry that seems like it will make them lots of money fast. You’d think that by the 90s, people would have learned from the past. If they did, well, look at tulips.

Student
Tulips? You mean like the flower?

Professor
Exactly. For instance, do you have any idea where tulips are from? Originally I mean.

Student
Well, the Netherlands, right?

Professor
That’s what most people think, but no. They are not native to the Netherlands, or even Europe. Tulips actually hail from an area that Chinese call the Celestial Mountains in Central Asia. A very remote mountainous region.
It was Turkish nomads who first discovered tulips and spread them slowly westward. Now, around the 16th century, Europeans were traveling to Istanbul and Turkey as merchants and diplomats. And the Turks often gave the Europeans tulip bulbs as gifts which they would carry home with them. For the Europeans, tulips were totally unheard of. Er…a great novelty. The first bulb to show up in the Netherlands, the merchant who received them roasted and ate them. He thought they were kind of onion.

It turns out that the Netherlands was an ideal country for growing tulips. It had the right kind of sandy soil for one thing, but also, it was a wealthy nation with a growing economy, willing to spend lots of money on new exotic things. Plus, the Dutch had a history of gardening. Wealthy people would compete, spending enormous amounts of money to buy the rarest flowers for their gardens.

Soon tulips were beginning to show up in different colors as growers tried to breed them specifically for colors which would make them even more valuable. But they were never completely sure what they would get. Some of the most priced tulips were white with purple stricks, or red with yellow stricks on the paddles, even a dark purple tulip that was very much priced. What happened then was a craze for these specialized tulips. We called that craze “tulip mania”.

So, here we’ve got all the conditions for an irrational boom: a prospering economy, so more people had more disposable income-money to spend on luxuries, but they weren’t experienced at investing their new wealth. Then along comes a thrilling commodity. Sure the first specimens were just played right in tulips, but they could be bred into some extraordinary variations, like that dark purple tulip. And finally, you have an unregulated market place, no government constrains, where price could explode. And explode they did, starting in the 1630s. There was always much more demand for tulips than supply. Tulips didn’t bloom frequently like roses. Tulips bloomed once in the early spring. And that was it for the year. Eventually, specially-bred multi-colored tulips became so valuable, well, according to records, one tulip bulb was worth 24 tons of wheat, or thousand pounds of cheese. One particular tulip bulb was sold and exchanged for a small sheep. In other words, tulips were literally worth their weight in gold.

As demand grew, people began selling promissory notes guaranteeing the future delivery of priced tulip bulbs. The buyers of these pieces of paper would resell the notes and mark up prices. These promissory notes kept changing hands from buyer to buyer until the tulip was ready for delivery. But it was all pure speculation because as I said, there was no way to know if the bulb was really going to produce the variety, the color that was promised. But that didn’t matter to the owner of the note. The owner only cared about having that piece of paper so it could be traded later at a profit. And people were borrowing, mortgaging their homes in many cases to obtain those bits of paper because they were sure they’d find an easy way to make money.

So now, you’ve got all the ingredients for a huge bust. And bust it did, when one cold February morning in 1637, a group of bulb traders got together and discovered that suddenly there were no bidders. Nobody wanted to buy. Panic spread like wild fire and the tulip market collapsed totally.

TPO 6 Lecture 2 Biology

Narrator
Listen to part of a lecture in a biology class.

Professor
Ok, I have an interesting plant species to discuss with you today. Um…it's a species of a very rare tree that grows in Australia, Eidothea hardeniana, but it's better known as the Nightcap Oak.
Now, it was discovered only very recently, just a few years ago. Um… it remained hidden for so long because it's so rare. There are only about 200 of them in existence. They grow in a rain forest, in a mountain rage…range in the north part of New South Wales which is a…er… state in Australia. So just 200 individual trees in all.
Now another interesting thing about the Nightcap Oak is that it is…it represents…er…a very old type…er…kind of tree that grew a hundred million years ago. Um, we found fossils that old that bear remarkable resemblance to the tree. So, it's a primitive tree. A…a living fossil you might say. It's relic from earlier times and it has survived all these years without much change. And it…it's probably a kind of tree from which other trees that grow in Australia today evolved.
Just to give you an idea of what we are talking about. Here's a picture of the leaves of the tree and its flowers. I don't know how well you can see the flowers. They're those little clusters sitting at the base of the leaves.
Okay, what have we tried to find out about the tree since we've discovered it? Hum…or how…why is…is it so rare? That's one of the first questions. Um… how is it…um…how does it reproduce? This's another question. Um, maybe those two questions are actually related. Jim?

Student
Hum …I don't know. But I can imagine that…for instance, seed disposal might be a factor. I mean if the…er…you know, if the seeds cannot really disperse in the wild area, then, you know, the tree may not colonize new areas. It can't spread from the area where it's growing.

Professor
Right. That's…that's actually a very good answer. Um, of course, you might think there might not be any areas where the tree could spread into, er…because…um…well, it's very specialized in terms of the habitat. But, that's not really the case here. Um…the suitable habitat, that is, the actual rainforest is much larger than the few hectares where the Nightcap Oak grows.
Now this tree is a flowering tree as I showed you. Um…um…it produces a fruit, much like a plum. On the inci…inside there's a seed with a hard shell. It…it appears that the shell has to crack open or break down somewhat to allow the seed to soak up water. You know, if the Nightcap Oak remains…if their seeds remain locked inside their shell, they will not germinate. Actually, the

seeds…er…they don't retain the power to germinate for very long, maybe two years. So there's actually quite a short window of opportunity for the seed to germinate. So the shell somehow has to be broken down before this…um…germination ability expires. And…and then there's a kind of rat that likes to feed on the seeds as well. So, given all these limitations, not many seeds that the tree produces will actually germinate. So this is a possible explanation for why the tree does not spread. It doesn't necessarily explain how it became so rare, but it explains why it doesn't increase.

OK, so it seems to be the case that the species, this Nightcap Oak is not very good at spreading. However, it seems, though we can't be sure, that it's very good at persisting as a population. Um…we…there's some indications to suggest that the population of the Nightcap Oak has not declined over the last er…you know, many hundreds of years. So it's stayed quite stable. It's not a remnant of some huge population that is dwindled in last few hundred years for some reason. It's not necessarily a species in retreat.

Ok, so it cannot spread very well, but it's good at maintaining itself. It's rare, but it's not disappearing.

Ok, the next thing we might want to ask about the plant like that is what chances does it have to survive into the future. Let's look at that.

TPO 6 Conversation 2

Narrator
Listen to a conversation between a student and a professor.

Student
Professor Martin?

Professor
Uh, hi, Lisa, what can I do for you?

Student
Well, I've been thinking about, you know, what you were saying in class last week, about how we shouldn't wait until the last minute to find an idea and get started working on our term paper.

Professor
Good, good, and have you come up with anything?

Student
Well, yeah, sort of. See, I've never had a linguistics class before, so I was sort of, I mean, I was looking over the course description and a lot of the stuff you described there, I just don't know what it is talking about, you know, or what it means. But there was one thing that really did jump out at me

Professor
Yes?

Student
The section on dialects, cos…like, that's the kind of thing that's always sort of intrigued me, you know?

Professor
Well, that's certainly an interesting topic. But you may not realize, I mean, the scope...

Student
Well, especially now, cos I've got like one roommate who is from the south and another one from New York. And we all talk like totally different, you know?

Professor
Yes, I understand. But…

Student
But then I was noticing, like, we don't really get into this till the end of the semester, you know. So I…

Professor
So, you want some pointers where to go for information on the subject? Well, you could always start by reading the chapter in the book on social linguistics. That will give you a basic understanding of the key issues involved here.

Student
Yeah, that's what I thought. So I started reading the chapter, you know, about how everyone speaks some dialect of a language. And I'm wondering like, well, how do we even manage to understand each other at all?

Professor
Ah, yes, an interesting question. You see…

Student
So then I read the part about dialect accommodation. You know, the idea that people tend to adapt their speaking to make it closer to the speech of whomever they're talking to, and I'm thinking, yeah, I do that when I talk with my roommates, and without even thinking about it or anything, you know.

Professor
OK, all right. Dialect accommodation is a more manageable sort of topic.

Student
So I was thinking like, I wonder just how much other people do the same thing. I mean, there are students here from all over the place. Does everyone change the way they talk to some degree depending on whom they are talking to?

Professor
You'd be surprised.

Student
So, anyway, my question is, do you think it'd be OK if I did a project like that for my term paper? You know, find students from different parts of the country, record them talking to each other in different combinations, report on how they accommodate their speech or not, that kind of thing?

Professor
Tell you what, Lisa, write me up a short proposal for this project, how you're going to carry out the experiment and everything, a design plan. And I think this'll work out just fine.

TPO 6 Lecture 3 Creative Writing

Narrator
Listen to part of a lecture in a creative writing class.

Professor
Alright everybody, the topic for today is, well, we're gonna take a look at how to start creating the characters for the story you're writing. One way of doing that is to come up with what's called "a character sketch", I don't mean a sketch like a drawing, I guess that's obvious. It's um…it's a…a sketch as a way of getting started on defining your characters' personalities.
To begin, how do we create fictional characters? We don't just pull them from thin air, do we? I mean we don't create them out of nothing. We base them, consciously or unconsciously, we base them on real people, or we blend several people's traits, their attributes into one character. But when people think fiction, they may assume the characters come from the author's imagination. But the writer's imagination is influenced by… by real people, could be anyone, so, pay attention to the people you meet, someone in class, at the gym, that guy who is always sitting in the corner of the coffee house, um… your cousin, who's always getting into dangerous situations. We're pulling from reality, gathering bits and pieces of real people. You use these people, and the bits of behavior or characteristics as a starting point as you begin to sketch out your characters.
Here is what you should think about doing first. When you begin to formulate a story, make a list of interesting people you know or have observed. Consider why they're unique or annoying. Then make notes about their unusual or dominant attributes. As you create fictional characters, you'll almost always combine characteristics from several different people on your list to form the identity and personality of just one character. Keeping this kind of character sketch can help you solidify your character's personality, so that it remains consistent throughout your story.
You need to define your characters, know their personalities so that you can have them acting in ways that are predictable, consistent with their personalities. Get to know them like a friend, you know your friends well enough to know how they'll act in certain situations, right? Say you have three friends, their car runs out of gas on the highway. John gets upset. Mary remains calm. Teresa takes charge of handling the situation. And let's say, both John and Mary defer to her leadership. They call you to explain what happen. And when John tells you he got mad, you're not surprised, because he always gets frustrated when things go wrong. Then he tells you how Teresa took charge, calmed him down, assigned tasks for each person and got them on their way. Again, you're not surprised. It's exactly what you'd expect. Well, you need to know your characters, like you know your friends. If you know a lot about a person's character, it's easy to predict how they'll behave. So if your character's personalities are well defined, it will be easy for you as the writer to portray them realistically…er… believably, in any given situation.

While writing character sketches, do think about details. Ask yourself questions, even if you don't use the details in your story, um…what does each character like to eat, what setting does each prefer, the mountains, the city, what about educational background, their reactions to success or defeat, write it all down.

But, here I need to warn you about a possible pitfall. Don't make you character into a stereotype. Remember the reader needs to know how your character is different from other people who might fall in the same category. Maybe your character loves the mountains and has lived in a remote area for years. To make sure he is not a stereotype, ask yourself how he sees life differently from other people who live in that kind of setting. Be careful not to make him into the cliché of the "ragged mountain dweller".

Okay, now, I'll throw out a little terminology. It's easy stuff. Major characters are sometimes called "round characters". Minor characters are sometimes called, well, just the opposite, "flat". A round character is fully developed; a flat character isn't, character development is fairly limited. The flat character tends to serve mainly as a motivating factor. For instance, you introduce a flat character who has experienced some sort of defeat. And then your round, your main character who loves success and loves to show off, comes and boasts about succeeding and jokes about the flat character's defeat in front of others, humiliates the other guy. The flat character is introduced solely for the purpose of allowing the round character to show off.

TPO 6 Lecture 4 Earth Science

Narrator
Listen to part of a lecture in an earth science class.

Professor
We're really just now beginning to understand how quickly drastic climate change can take place. We can see past occurrences of climate change that took place over just a few hundred years. Take uh… the Sahara Desert in Northern Africa. The Sahara was really different 6,000 years ago. I mean, you wouldn't call it a tropical paradise or anything, uh…or maybe you would if you think about how today in some parts of the Sahara it…it only rains about once a century. Um… but basically, you had granary and you had water. And what I find particularly interesting and amazing really, what really indicates how un desert-like the Sahara was thousands of years ago, was something painted on the rock, pre-historic art, hippopotamuses, 'cos you know hippos need a lot of water and hence? Hence what?

Student
They need to live near a large source of water year round

Professor
That's right.

Student
But how is that proved that the Sahara used to be a lot wetter? I mean the people who painted those hippos, well, couldn't they have seen them on their travels?

Professor
Okay, in principal they could, Karl. But the rock paintings aren't the only evidence. Beneath the Sahara are huge aquifers, basically a sea of fresh water, that's perhaps a million years old filtered through rock layers. And…er…and then there is fossilized pollen, from low shrubs and grasses that once grew in the Sahara. In fact these plants still grow, er…but hundreds of miles away, in more vegetated areas. Anyway, it's this fossilized pollen along with the aquifers and the rock paintings, these three things are all evidence that the Sahara was once much greener than it is today, that there were hippos and probably elephants and giraffes and so on.
So what happened? How did it happen? Now, we're so used to hearing about how human activities are affecting the climate, right? But that takes the focus away from the natural variations in the earth climate, like the Ice Age, right? The planet was practically covered in ice just a few thousand years ago. Now as far as the Sahara goes, there is some recent literature that points to the migration of the monsoon in that area

Students
Huh?????

Professor
What do I mean? Okay, a monsoon is a seasonal wind that can bring in a large amount of rainfall. Now if the monsoon migrates, well, that means that the rains move to another area, right? So what caused the monsoon to migrate? Well, the answer is: the dynamics of earth's motions, the same thing that caused the Ice Age by the way. The earth's not always the same distance from the sun, and it's not always tilting toward the sun at the same angle. There are slight variations in these two perimeters. They're gradual variations but their effects can be pretty abrupt. And can cause the climate to change in just a few hundred years.

Student
That's abrupt?

Professor
Well, yeah, considering that other climate shifts take thousands of years, this one is pretty abrupt. So these changes in the planet's motions, they called it "the climate change", but it was also compounded. What the Sahara experienced was um…a sort of "runaway drying effect". As I said the monsoon migrated itself, so there was less rain in the Sahara. The land started to get drier, which in turn caused huge decrease in the amount of vegetation, because vegetation doesn't grow as well in dry soil, right? And then, less vegetation means the soil can't hold water as well, the soil loses its ability to retain water when it does rain. So then you have less moisture to help clouds form, nothing to evaporate for cloud formation. And then the cycle continues, less rain, drier soil, less vegetation, fewer clouds, less rain etc. etc..

Student
But, what about the people who made the rock paintings?

Professor
Good question. No one really knows. But there might be some connections to ancient Egypt. At about the same time that the Sahara was becoming a desert…

Student
Uh-huh

Professor
5,000 years ago, Egypt really began to flourish out in the Nile River valley. And that's not that far away. So it's only logical to hypothesize that a lot of these people migrated to the Nile valley when they realized that this was more than a temporary drought. And some people take this a step further. And that's okay, that's science and they hypothesize that this migration actually provided an important impetus in the development of ancient Egypt. Well, we'll stay tuned

on that.

TPO 7 Conversation 1

Eric: Hi, Professor Mason, do you have a minute?

Pro: Yeah, of course, Eric. I think there was something I wanted to talk to you about too.
Eric: Probably my late essay.

Pro: Ah, that must be it. I thought maybe I'd lost it.

Eric: No, I'm sorry. Actually it was my computer that lost it, the first draft of it. And, well, anyway, I finally put it in your mail box yesterday.

Pro: Oh, I haven't checked the mail box yet today. Well, I'm glad it's there. I will read it this weekend.

Eric: Well, sorry again. Say, I can send it to you by email too if you like.

Pro: Great. I'll be interested to see how it all comes out.

Eric: Right. Now, ah, I just have overheard some graduates students talking. Something about a party for De Adams?

Pro: Retirement party, yes, all students are invited. Wasn't there notice on the Anthropology Department's bulletin board?

Eric: Ah, I don't know. But I want to offer help with it. You know whatever you need. De Adams, well, I took a few anthropology classes with her and they were great, inspiring. That's why I want to pitch in.

Pro: Oh, that's very thoughtful of you, Eric, but it will be low key, nothing flashy. That's not her style.

Eric: So there's nothing?

Pro: No, we'll have coffee and cookies, maybe a cake. But actually couples of the administrative assistants are working on that. You could ask them but I think they've got covered.

Eric: Ok.

Pro: Actually, oh, no, never mind.

Eric: What's it?

Pro: Well, it's nothing to do with the party and I'm sure there are more exciting ways that you could spend your time. But we do need some help with something. Work pilling a database of articles the anthropology faculty has published. There is not much glory, but we are looking for someone with some knowledge of anthropology who can enter the articles. I hesitate to mention it. But I don't suppose it's something you would

Eric: No, that sounds like cool. I would like to see what they are writing about.

Pro: Wonderful. And there are also some unpublished studies. Do you know De Adams did a lot of field research in Indonesia? Most of them haven't been published yet.

Eric: No, like what?

Pro: Well, she is really versatile. She just spent several months studying social interactions in Indonesia and she's been influential in ecology. Oh, and she's also done work in south of America, this is closer to biology, especially with speciation.

Eric: ah, not to seem uninformed

Pro: Well, how's species form? You know, how two distinct species form from one. Like when population of the same species are isolated from each other and then developed into two different directions and ended up with two distinct species.

Eric: Interesting.

Pro: Yes, while she was there in the south of America, she collected a lot of linguistic information and sounds, really fascinating.

Eric: Well. I hate to see her leave.

Pro: Don't worry. She'll still be around. She's got lots of projects that she's still in the middle of.

TPO 7 Lecture 1 Theater History

Pro: The 19 century was the time that thought what we called: Realism developing in European in theater. Um… to understand this though, we first need to look at the early form of drama known as the well-made play, which basically was a pattern for constructing plays, plays that the beginning with some early 19 century's comedies in France proved very successful commercially. The dramatic devises use here word actually anything new, they have been around for centuries. But the formula for well-made play required certain elements being included, in a particular order, and most importantly, that everything in the plays be logically connected. In fact, some of the player writes would start by writing the end of the play. And the word "backward" toward the beginning, just to make sure each event let logically from what has gone before. Ok, what are the necessary elements of well-made play?

Well, the first is logical exposition. Exposition is whatever background information you have to review to the audience. So, they all understand what is going on. Before this time, exposition might come from the actors simply giving speeches. Someone might watch out the stage and see: "lyric quotation". And until all about the felting family of Romeo and Julie, but for the well-made play, even the exposition had to be logic, believable. So, for example, you might have two servants gossiping as they are cleaning the house. And one says, Oh, what a shame master sound still not married. And the other might mention that a rumor about the mysterious a gentle men who just moved into the town with his beautiful daughter. These comments are parts of the play logical exposition.

The next key elements of the well-made play refer to as the inciting incidents. After we have the background information, we need a king moment to get things moving, they really make the audience interested in what is happened to the characters we just heard about it. So, for example, after the two servants review all this background information, we need the young man. Just is he first lies eyes on the beautiful woman, and he immediately falls in love. This is the inciting incidence. It sets off, the plot of the play.

Now, the plot of well-made plays is usually driven by secrets. Things, the audiences know, but the characters often don't know. So, for example, the audience learned through a letter or through someone else's conversation. Who is the mysterious gentle man is, and why he left the town many years before. But the young man doesn't know about this. And the woman doesn't understand the ancient connection between her family and he is. Before the secret are reviewed to the main character, the plot of the play perceived as the series of the sorts of the up and down moments. For example, the woman first appears not to even notice the young man, and it seems to him like the end of the world. But then, he learns that the she actually wants to meet him too. So, life is wonderful. Then, if he tries to talk with her, maybe her father get furious, for no apparent reason. So, they cannot see each other. But, just the young man has almost loved all hopes, he finds out, well you get the idea, the reversal the fortune continue, increasing the audience's tension and

excitement. They can wonder that everything is going to come out or care it not.

Next come in, elements known as the: An obligatory scene. It’s scene, a moment in which all the secrets are reviewed. In generally, things turn out well for the hero and others we are care about, a happy ending of some sorts. This became so popular that the playwright almost had to include it in every play which is why is called: the obligatory scene. And that’s followed by the final dramatic element---the denouement or the resolution, when all the lucent have to be tight up in the logical way. Remember, the obligatory scene gives the audience emotional pleasure. But the denouement offers the audience a logical conclusion. That’s the subtle distinction we need to try very hard to keep in mind. So, as I said, the well-made play, this form of playwriting, became the base for realism in drama, and for a lot of very popular 19 century plays. And also, a pattern we find in plots of later many play, and even movies that we see it today.

TPO 7 Lecture 2 Biology

Pro: So, that is how elephant uses infrasound. Now, let's talk about the other and the acoustic spectrums, sound that is too high for humans to hear---ultrasounds. Ultrasound is used by many animals that detected and some of them seen out very high frequency sounds. So, what is a good example? Yes, Kayo.

Kayo: Well, bats, since there is all blind, bets have to use sound for, you know, to keep them from flying in the things.

Pro: That is echolocation. Echolocation is pretty self-explanatory; using echoes reflected sound waves to located things. As Kayo said that bat used for navigation and orientation. And what is else. Make.

Make: Well, finding food is always important, and I guess not becoming food for other animals.

Pro: Right, on both accounts. Avoiding other predators, and locating prey, typically insects that fly around it at night. Before I go on, let me just respond something Kayo was saying--- this idea that is bats are blind. Actually, there are some species of bats, the one that don't use echolocation that do rely on their vision for navigation, but its true for many bats, their vision is too weak to count on. Ok, so quick some rays if echolocation works. The bats emit the ultrasonic pulses, very high pitch sound waves that we cannot hear. And then, they analyze the echoes, how the waves bound back. Here, let me finish the style diagram I started it before the class. So the bat sends out the pulses, very focus birds of sound, and echo bounds back. You know, I don't think I need to draw the echoes, your reading assignment for the next class; it has diagram shows this very clearly. So, anyway, as I were saying, by analyzing this echo, the bat can determine, say, if there is wall in a cave that needs to avoid, and how far away it is. Another thing uses the ultrasound to detect is the size and the shape of objects. For example, one echo they quickly identified is one way associated with moff, which is common prey for a bat, particularly a moff meeting its wings. However, moff happened to have major advantage over most other insects. They can detect ultrasound; this means that when the bat approaches, the moff can detect the bat's presence. So, it has time to escape to safety, or else they can just remain motionless. Since, when they stop meeting their wings, they will be much hard for the bat to distinguish from, oh… a leave or some other object. Now, we have tended to underestimate just how sophisticated the ability that animals that use ultrasound are. In fact, we kinds of assume that they were filtering a lot out. The ways are sophisticated radar on our system can ignore the echo from the stationary object on the ground. Radar are does this to remove ground clutter, information about the hills or buildings that they doesn't need. But bats, we thought they were filtering out kinds of information, because they simply couldn't analyze it. But, it looks as

we are wrong. Recent there was the experiment with trees and specific species of bat. A bat called: the laser spear nosed bat. Now, a tree should be huge and acoustic challenge for bat, right? I mean it got all kinds of surfaces with different shapes and angles. So, well, the echoes from trees are going to be massive and chaotic acoustic reflection, right, not like the echo from the moff. So, we thought for a long time that the bat stop their evaluation as simply that is tree. Yet, it turns out that is or at least particular species, cannot only tell that is trees, but can also distinguish between a pine tree, deciduous tree, like a maple or oak tree, just by their leaves. And when I say, leaves, I mean pine needles too. Any idea on how we would know that?

Stu: Well, like with the moff, could be their shape?

Pro: You are on the right track---it actually the echo of all the leaves as whole the matters. Now, think, a pine trees with little densely packed needles. Those produced a large number of fain reflection in which what's we called as: a smooth of echo. The wave forms were very even, but an oak which has fewer but bigger leaves with stronger reflections, produces a gigots wave form, or what we called: a rough echo. And these bats can distinguish between a two, and not just was trees, but with any echo come in smooth and rough shape.

TPO 7 Conversation

Stu: Hi, I am a new here and I couldn't come to our student orientation and I'm wondering if you can give me a few quick points just about library. I'd really appreciate it.

Pro: Sure. I will be glad to. What's your major area of study?

Stu: Latin American Literature.

Pro: OK. Well, over here's the section where we have language, literature and arts. And if you go down stairs you will find history section. Generally, the students who concentrated in Latin American literature find themselves research in history section a lot.

Stu: Hum, you are right. I am a transfer student and I've already done a year in another university so I know how the research can go that spent a lot of time on history section. So how long can I borrow books for?

Pro: Our loan period is a month. Oh I should also mention that we have an inter-library loan service. If you need to get to hold a book that not in our library, there is a truck that runs between our library and a few public and university libraries in this area. It comes around three times a week.

Stu: It's great! At my last school, it takes really a long time to get the materials I needed. So when I had a project, I had to make a plan away in advance. This sounds much faster. Another thing I was wondering is: is there a place where I can bring my computer and hook it up?

Pro: Sure. There is a whole area here on the main floor where you can bring a laptop and plug it in for power but on top of that we also have a connection for the internet that every seat.

Stu: Nice, so I can do the all research I need to do right here in the library. All I have the resources, all the books and the information I need right here in one place.

Pro: Yeah. That's the idea. I am sure you'll need photo copiers too. There is down the hall to the left. We have system where you have to use copy cards so you'll need to buy a card from the front desk. You would insert it into the machine and you read it into the copies.

Stu: How much do you get charge?

Pro: Seven cents a copy.

Stu: Hum, that is not too bad. Thanks. Hum, where is the collection of the rare books?

Pro: Rare books are upon the second floor. There is in the separate room where the temperature controlled, to preserved old paper in them. You need to get special permission to access, and then you have to need to wear gloves to handle them because the oil in our hands, you know, can destroy the paper. And gloves prevent that so we have a basket of gloves in the room.

Stu: Ok. Thanks. I suppose that all I need to know. You've been very helpful. Thanks.

Pro: Anytime. Bye

Stu: Bye.

TPO 7 Lecture 3 Anthropology

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focus on Iroquois and Hooray peoples. They lived in the northeastern great lakes region of North America. Now, back then, their lives depended on the natural resources of the forests, especially the birch tree. The birch tree can grow in many different types of soils and it's prevalent in that area. Now can anyone here describe the birch tree?

Stu: They are tall and white, the bark, I mean.

Pro: Yes. The birch tree has white bark, and this tough protective outer layer of the tree, this white bark, is waterproof. And this waterproof quality of the bark, it made it useful for ** things like cooking containers, a variety of utensils. And if you peel birch bark in the winter, we call it ‘the winter bark', another layer a tougher inner layer of the tree adheres to the bark, producing a stronger material. So the winter bark was used for larger utensils and containers.

Stu: I know people make utensils out of wood, but utensils out of tree bark?

Pro: Well, birch bark is pliable and very easy to bend. The Native Americans would cut the bark and fold it into any shape they needed, then secure with cords until it dried. They could fold the bark into many shapes.

Stu: So if they cooked in bowls made of birch bark, wouldn't that make the food taste funny?

Pro: Oh, that's one of the great things of birch bark. The taste of the birch tree doesn't get transferred to the food. So it was perfect for cooking containers. But the most important use of the bark, by far, was the canoe. Since the northeastern region of North American is interconnected by many streams and waterways, water transportation by vessels like a canoe was most essential. The paths through the woods were often over-grown, so water travel was much faster. And here's what the Native Americans did. They would peel large sheets of bark from the tree to form light-weight yet sturdy canoes. The bark was stretched over frames made from tree branches, stitched together and sealed with resin. You know that sticky liquid that comes out of the tree? And when it dries, it's watertight. One great thing of these birch bark canoes was that they could carry a large amount of cargo. For example, a canoe weighing about 50 pounds could carry up to nine people and 250 pounds of cargo.

Stu: Wow! But how far could they drive that way?

Pro: Well like I said, the northeastern region is interconnected by rivers and streams and the ocean at the coast. The canoes allow them to travel over a vast area that today it would take a few hours to fly over. You see, the Native Americans made canoes of all types, for travel on small streams or on large open ocean waters. For small streams, they made narrow, maneuverable boats, while a large canoe was needed for the ocean. They

could travel throughout the area only occasionally having to portage, to carry the canoe over a land short distance to another nearby stream. And since the canoes were so light, this wasn't a difficult task. Now how do you think this affected their lives?

Stu: Well if they could travel so easily over such a large area, they could trade with people from other areas which I guess would lead them to form alliances?

Pro: Exactly. Having an efficient means of transportation, well, that helps the Iroquois to form a federation linked by natural waterways. And this federation expanded from what is now Southern Canada all the way south to the Dalever River. And this efficiency of birch bark canoe also made an impression on newcomers of the area. French traders in the 17 century modeled their...well they adopted the design of Yreka’s birch bark canoes, and they found they could travel great distances more than 15 kilometers a month. Now besides the bark, Native Americans also used the wood of the birch tree. The young trees were used to support for loggings with the waterproof bark used as roofing. Branches were folded into snow shoes and the Native American people were all adept to running very fast over the snow in these birch brand snow shoes which if you ever tried walking in snow shoes you know wasn't easy.

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TPO 7 Lecture 4 Geology

Last time, we started to talk about the glaciers, and how these masses less forms from crystallized snow, and some of you were amazed at how huge some of the these glaciers are. Now, even though it may be difficult to understand how a huge mass less can move or flow, in another word for it, it's really known that the secret that the glaciers flow, because of gravity. But how they flow, and why they flow needs some explaining. Now, the first type of the glaciers flow is called: basal slip.

Basal slip or its sliding as it's often called, basically refers to the slipping or sliding of glacier across bedrock, actually across the thin layer of water, on top of the bedrock. So, this process shouldn't be too hard to imagine. What happens is that the ice of the base of the glacier is under gradual depression--the depression coming from the weights of the overlaying ice. And you probably know that the under pressure, the melting temperature of water as the ice I mean, is reduced. So, ice at the basis of glacier melts, even though it's below zero degree thaws. And this results in thin layer of water between the glacier and ground. This layer of water reduces friction is... is like a lubricant. And it allows the glacier to slat or slip over the bedrock.

Ok, now the next type movement we will talk about is called: deformation. You already known that the ice brittle, if you heated with hammer, it will shatterly glass. But ice also plastic, you can change the shapes without breaking. If you leave, for example, a bar of ice supported only at one end, they end, they unsupported end will deform under its own way due---kind of flatten out one in to get stored it deformed it. Think deformation a very slow oozing. Depending on the stresses on the glacier, the ice crystal was in the re-organized. And during this re-organization the ice crystal re-allied in a way that allows them to slide pass each other. And so the glacier oozes downhill without any ice actually melting. Now, there are a couple of the factors that affects the amounts of deformation that takes place or the speed of the glaciers movement for example. Deformation is more likely to occur the thicker the ices, because at the gravity of the weight its ice. And temperature also plays part here, in that XX does not moves easily. As the ice that is close to the mounting points, in fact, it is not to different from… the weight oil is, thicker at the lower temperature. So, if you had a glacier in the slightly warmer region, it will flow faster than the glacier in the cooler region.

Ok, um… Now, let's touch briefly on extension and compression. You textbook includes this as type as a particular type of glacier movement, but you will see that these are … cause many textbooks that omitted as type of movement as included. And I might not include right now, if there won't in your textbooks. But, basically, the upper parts of the glacier have less pressure on them. So, they don't deform easily, they tend to be more brittle. And crevasses can form in this upper layer of glacier. When the glacier comes into contact with bedrock walls or the otherwise under some kinds of stresses, but can deform quickly enough. So, the ice would expand or constrict, and that can cause XXX be crack to form in the surface of the layer of ice, and that brittle the surface ice moving, is

sometimes considered a type of glacier movement depending on which source you can thaw to. Now, as you probably know, glaciers generally move really slowly. But sometimes, they experience surges, and during these surges, in some places, they can move its speeds as high as 7000 meters per year. Now, a speed like that are pretty unusual, 100 of times faster than the regular movement of glaciers, but you can actually see glacier move during these surges, though it is rare.

TPO 8 Conversation 1

Stu: Hi, I'd like to drop of my graduation form; I understand you need this in order to process my diploma.

Pro: Ok, I will take that. Before you leave, let's me check our computer. Looks like you are OK for graduation, and actually, I am getting a warning fly on your academic record here.

Stu: Really?

Pro: Yeah. Let's see was what. Are you familiar with your graduation requirements?

Stu: Yes, I think so

Pro: Then you know you need 48 credits in your major field to graduate and at least 24 credits in the intermediate level or higher. Also, after your second year, you have to meet with your department chair to outline a plan for the rest of your time here. In the past, we also issue letters before students' final year began to let them know what they needed to take in the final year to be OK, but we don't do that anymore.

Stu: I definitely met with my chair person 2 years ago; he told me that I need 8 more courses at the intermediate level or higher in the last 2 years to be OK. So I am not sure what the problem is, I make sure I got these credits.

Pro: Unfortunately, the computer is usually pretty reliable; I am not sure what was going on here.

Stu: It could be that I have taken 2 basic courses but couple both of them with a few experiences.

Pro: What do you mean?

Stu: I could only take intro courses because there were no intermediate level courses available for those particular topics. My chair person told me that if I did the independent field researches in addition to the science work each course; they would count as the intermediate level courses. My classmates, some of my classmates, did this for an easy way to meet their intermediate course requirement, but I did it to get the kind of depth in those topics was going for. As I turned out I was really enjoy the field work, which I supplement just sitting and listening the lectures

Pro: I am sure that's true, but the computer still showing the miss basic level courses despite the field work.

Stu: I am not sure what to do then, I mean, should I cancel my graduation party?

Pro: No, no reason to get worry like that, just contact your chair person immediately, ok, tell him to call me as soon as possible so that we can verify your field work arrangement and certify these credits right away. It's not only there is an actual deadline to date you anything. But if more than a few weeks go by, we might have a real problem that would difficult to fix in time for you to

graduate. In fact, there probably would be nothing we could do.

Stu: I will get on that.

TPO 8 Lecture 1 Animal Behavior

Pro: Well, last time we talked about passive habitat selection, like plants for example, they don't make active choices about where to grow. They are dispersed by some other agent, like the wind. And if the seeds land in a suitable habitat, they do well and reproduce. With active habitat's selection, an organism is able to physically select where to live and breed. And because the animal breeding habitat is so important, we expect animal species to develop preferences for particular types of habitats. Places where their offspring have the best chance for survival. So let's look at the effect the preference can have by looking at some examples, but first let's recap. What do we mean by habitat? Frank?

Stu: Well, it's basically the place or environment where an organism normally lives and grows.

Pro: Right, and as we discussed, there are some key elements that habitat must contain, food obviously, water, and is got have a right climate and basics for physical protection. And we were sound how important habitat selection is when we look at the habitat were some of the factors are removed, perhaps through habitats' destruction. I just read about a short bird, the plover. The plover lives by the ocean and feeds on small shellfish insects in plants. It blends in with the sand, so it well camouflage from predator birds above. But it lags eggs in shallow depressions in the sand with very little protection around them. So if there are people or dogs on the beach, the eggs and fledglings in the nest are really vulnerable. Outing California weather has been a lot of human development by the ocean. The plovers are now is threaten species. So conservation is tried to recreate a new habitat for them. They made artificial beaches and sun bars in area inaccessible to people and dogs. And the plover population is up quite a bit in those places.
Ok. That is an incidence where a habitat is made less suitable. But now, what about the case where animal exhibits a clear choice between two suitable habitats in cases like that. Dose the preference matter? Let's look at the blue warbler.
The Blue warbler is a songbird that lives in the North America. They clearly prefer hard wood forests with dense shrubs, bushes underneath the trees. They actually nest in the shrubs, not the trees. So they pretty close to the ground, but these warblers also nest in the forests that have low shrub density. It is usually the younger warblers that next to the area because prefers spots where a lot of shrubs are taken by order more dominant birds.
And the choice of habitat seems to affect the reproductive success. Because the order and more experienced birds who nest in the high density shrub areas have significantly more offspring than those in low density areas, which suggests that the choice of where to nest does have impact on the number of chicks they have. But preferred environment doesn't always seem to correlate with greater reproductive success. For example, In Europe, study has been done of blackcap warblers. We just call them blackcaps.
Blackcaps can be found in two different environments. Their preferred habitat is forest that near the edge of streams. However, blackcaps also live in pine woods away from water. Study has been done on the reproductive success rate for birds in both areas, and the result showed surprisingly that the reproductive success was essentially the same in both areas--- the preferred and the second choice habitat. Well. Why?
It turns out there were actually four times as many bird pairs or couples living in the stream edge habitat compared to the area away from the stream, so this stream edge area had much denser population which meant more members of same species competing for the resources. When into

feed on same thing or build their nests in the same places, which lower the suitability of the prime habitat even though its their preferred habitat. So the results of the study suggests that when the number of the competitors in the prime habitat reaches a certain point, the second random habitat becomes just as successful as the prime habitat, just because there are fewer members of the same species living there. So it looks like competition for resources is another important factor in determining if particular habitat is suitable.

TPO 8 Lecture 2 Art History

Pro: We had been talking about the art world in the late century in Paris. Today I'd like to look at the woman who went to Paris at that time to become artists. Now from your reading what do you know about Paris about the art world of Paris during the late nineteen centuries?

Stu: People came from all over the world to study.

Stu: It had a lot of art schools and artists who taught painting. There were, our book mention is classes for women artists. And it was a good place to go to study art.

Pro: If you want to become an artist, Paris was not a good place to go; Paris is THE place to go. And women could find skills and instructors there. Before the late 19 century. If they women who want to become an artist have to take private lessons or learn from family members. They have more limited options than men did.
But around 1870s, some artists in Paris began to offer classes for female students. These classes are for women only. And by the end of the 19 century, it became much more common for woman and man to study together in the same classes. So within few decades, things had changed significantly. Ok let back up again and talk about the time period from 1860 to the 1880s and talk more about what had happened in the woman art classes. In 1868, a private art academy open in Paris, and for decades it was the probably the most famous private art school in the world. It is founder Rudolph Julian was a canny business man. And quickly establish his school as a premiere destination for women artists. What he did was? After an initial trail period of mixed class, He changed the schools' policy. He completely separated the man and woman students.

Stu: Any reason why he did that?

Pro: Well. Like I said Julian was a brilliant business man, with progressive ideas. He thought another small private art school where all the students were women was very popular at that time. And that's probably why he adopted the women only classes. His classes were typically offer by an established artist and were held in the studio, the place where they painted. This was a big deal because finally women could study art in a formal setting. And there was another benefit to the group setting in these classes. The classes included weekly criticism. And the teacher would rank the art of all the students in the class from best to worst. How would you like if I did that in this class?

Stu: Hah…No way. But our test book said the competitive…competition was good for women. It helps them see where they need to improve.

Pro: Isn't that interesting? One woman artist, her name was Marry Bashkirtseff. Bashkirtseff once wrote how she felt about classmate's work. She thought her classmates' art was much better than her own and it gave her an incentive to do better. Overall the competition in the women's art classes gave women more confidence. Confidence they could also compete in the art world after their schooling. And even though Bashkirtseff could not study in the same classes as man, she was having an impact as an artist. Just look like the salon, what do you know about the salon?

Stu: It was a big exhibition, a big art show and they had in Pairs every year. They art had to be accepted by judges.

Stu: It was a big deal you can make a name for yourself.

Pro: You can have a painting or sculpture in the salon and go back to your home country saying you were been success in the Paris.

It was sort of, see of approval. It was a great encouragement for an artist career. By the last two decades of 19 century, one fifth of the paintings in the salon were by woman, much higher than in the past. In fact, Marry Bashkirtseff self had a painting in the salon in the 1881. Interestingly this masterpiece called In the Studio is a painting of interior of Julian's art school. It is not in your test book I will show you the painting next week, the painting depiction active crowd studio with woman drawing and painting life model. It was actually Bashkirtseff actually follow Julian savvy suggestion and painted her fellow students in a class at the school was the artist herself at far right. A great advertisement for the school when the painting eventually hung up at the salon, for a woman studio had never been painted before.

TPO 8 Conversation 2

Pro: So, Richer, what is up?

Stu: I know we will have a test coming up on chapter on.

Pro: Chapter 3 and 4 from text book.

Stu: Right, 3 and 4, I didn't get something you said on class Monday.

Pro: Alright? Do you remember what was it about?

Stu: Yes, you were talking about a gym health club where people can go to exercise that kind of thing.

Pro: Ok, but the health club model is actually from chapter 5.so…

Stu: Ok, chapter 5 so it not--Ok but I guess I still want to try to understand…

Pro: Of course, I was talking about an issue in strategic marketing, the healthy club model; I mean with a health club you might think they would trouble attracting customs right?

Stu: Well, I know when I pass by a healthy club and I see although people working out, the exercising, I just soon walk on by.

Pro: Yes, there is that. Plus, lots of people have exercise equipment at home, or they can play sports with their friends. right?

Stu: Sure.

Pro: But nowadays in spite of all that, and expensive membership fees, health club are hugely popular, so how come?

Stu: I guess that is I didn't understand.

Pro: Ok, basically they have to offer things that most people can find anywhere else, you know quality, that means better exercise equipment, higher stuff, and classes-exercise classes may be aerobics.

Stu: I am not sure if I…ok I get it. And you know another thing is I think people probably feel good about themselves when they are at gym. And they can meet new people socialize.

Pro: Right, so health club offer high quality for facilities. And also they sold an image about people having more fun relating better to others and improving their own lives if they become members.

Stu: Sure that makes sense.

Pro: Well, then, can you think of another business or organization that could benefit from doing this? Think about an important building on campus here, something everyone uses, a major sources of information?

Stu: You mean like an administrative building?

Pro: Well, that is not what I had in my mind.

Stu: You mean the library.

Pro: Exactly. Libraries, imagine publish libraries; there are information resource for the whole community right?

Stu: Well they can be, now, with the internet and big book stores, you can probably get what you

need without going to a library.

Pro: That's true. So if you were the director of a public library, what will you do about that?

Stu: To get more people to stop in, well, like you said, better equipments, maybe a super fast internet connection, not just a good variety of books but also like nice and comfortable areas where people can read and do research. Things make them want to come to the library and stay.

Pro: great.

Stu: Oh, maybe have authors come and do some readings or special presentations. Something people couldn't get home.

Pro: Now, you are getting it.

Stu: Thanks, professor Williams, I think too.

TPO 8 Lecture 3 History

Pro: So we've been talking about the printing press. How it changes people's lives, ** books more accessible to everyone. More books mean more reading, right? But, as you know, not everyone has perfect vision. This increasing literacy, um, in reading, led to an increasing demand for eye glasses. And here's something you probably haven't thought of. This increased demand impacted the societal attitudes toward eye glasses. But, first let me back up a bit and talk about vision correction before the printing press. And, um, what did people with poor vision do, I mean, especially those few people who were actually literate? What did they do before glasses were invented? Well, they had different ways of dealing with not seeing well. If you think about it, poor vision wasn't their only problem. I mean, um, think about the conditions they lived in: houses were dark, sometimes there weren't any windows; candles were the only source of light. So in some places, um, like ancient Greece for example, the wealthiest people with poor vision could have someone else read to them- easy solution if you could afford it. Another solution was something called a "reading stone". Around 1000 C.E. European monks would take a piece of clear rock, often quartz, and place it on top of the reading material. The clear rock magnified the letters, ** them appear larger, um, looks like what happens when a drop of water falls on something, whatever 's below the drop of water appears larger, right? Well, the "reading stone" works in a similar way. But rocks like quartz, well, quartz of optical quality weren't cheap. Late in the 13th century, glass maker in Italy came up with a less expensive alternative. They made reading stones out of clear glass. And these clear glass reading stones evolved into the eye glasses we know today. So we're pretty sure that glasses were invented about the late 1200's, well, over a hundred years before the printing press. But it's not clear who exactly invented them first or exactly what year. But record shows that they were invented in both Europe and China at about the same time. By the way, we call this "independent discovery".

Independent discovery means when something is invented in different parts of the world at the same time and it's not as unusual as it sounds. You can look at the timeline chart at the back of your textbook to see when things were invented in different cultures at about the same time to see what I'm talking about.

So now let's tie this to what I've said before about societal attitude towards glasses. Initially in parts of Europe and in China, glasses were a symbol of wisdom and intelligence. This is evidence in an artwork from the period. European paintings often portrayed doctors or judges wearing glasses. In China, glasses were very expensive. So in addition to intelligence, they also symbolize affluence, um, wealth. In 14th century Chinese portrays the bigger the glasses, the smarter and wealthier this object was. So glasses were a steady symbol in some parts of the world. Now let's go back to the invention of the painting press in 1440. What happened? Suddenly, books became widely available and more people wanted to read. So the need, oh well, actually not only the need but the demand for more affordable glasses rose drastically. Eventually, inexpensive glasses were produced, and then glasses were available to everyone. People could purchase them easily from a traveling peddler.

TPO8 Lecture 4 Chemistry

Pro: So, are there any questions?

Stu: Yes, um, Professor Harrison, you were saying that the periodic table is predictive. What exactly does that mean? I mean I understand how it organize the elements but where's the prediction?

Pro: Ok, let's look at our periodic table again. Ok, it is a group of elements in the categories that share certain properties, right?

Stu: Um-huh~

Pro: And it is ranged according to increasing atomic number, which is…

Stu: The number of protons in each atom of an element.

Pro: Right, well, early versions of the periodic table had gaps, missing elements. Every time you had one more proton, you had another element. And then, oops, there have been atomic number, for which there's no known element. And the prediction was that the element, with that atomic number existed someway, but it just haven't been found yet. And its location in the table would tell you what properties that you should have. It was really pretty exciting for scientists at that time to find these missing elements and confirm their predictive properties. Um, actually, that reminds other, other very good example of all these, element 43. See on the table, the symbol for element 42 and 44.
In early versions of the table, there was no symbol for element 43 protons because no element with 43 protons had been discovered yet. So the periodic table had gap between elements 42 and 44. And then in 1925, a team of chemists led by scientist named Ida Tack's claimed they had found element 43. They had been using a relatively new technology called X-ray spectroscopy, and they were using this to examine an ore sample. And they claimed that they'd found an element with 43 protons. And they named it Masuria.

Stu: Um, Professor Harrison, then, how come in my periodic table, here, element 43 is Tc, that's Technetium, right?

Pro: Ok, let me add that.

Actually, um, that's the point I'm coming to. Hardly anyone believed that Tack's discovered the new element. X-ray spectroscopy was a new method at that time. And they were never able to isolate enough Masurium to have available sample to convince everyone the discovery. So they were discredited. But then, 12 years later in 1937, a different team became the first to synthesize the element using a cyclotron. And that element had…

Stu: 43 protons?

Pro: That's right, but they named it Technetium to emphasize that it was artificially created with

technology. And people thought that synthesizing these elements, ** it artificially was the only way to get it. We still haven't found it currently in nature. Now element 43 would be called Masurium or Technetium is radioactive. Why is that matter? What is true of radioactive element?

Stu: It decays it turns into other elements. Oh, so does that explain why was missing in periodic table?

Pro: Exactly, because of radioactive decay, element 43 doesn't last very long. And therefore, if that ever had been present on earth, it would decay ages ago. So the Masurium people were obviously wrong, and the Technetium people were right. Right? Well, that was then, now we know that element 43 does occur naturally. It can be naturally generated from Uranium atom that has spontaneous split. And guess what, the ore sample that the Masurium group was working with had plenty of Uranium enough to split into measurable amount of Masurium. So Tack's team might very well have found small amounts of Musurium in the ore sample just that once was generated from split Uranium decayed very quickly. And you know here's an incredible irony, Ida Tack, led the chemist of that Musurium team, and were she the first to suggest that Uranium could break up into small pieces but she didn't know that that was the defense of her own discovery of element 43.

Stu: So is my version of periodic table wrong? Should element 43 really be called Musurium?

Pro: Maybe, but it's hard to tell for sure after all this time, if Ida Tack's group did discover element 43. They didn't, um, publish enough details on their method or instruments for us to know for sure. But I'd like to think element 43 was discovered twice. As Musurium, it was first element to discover that occurs in nature only from spontaneous vision, and as Technetium, it was the first element discovered in the laboratory. And of course, it was an element the periodic table let us to expect existed before anyone had found it or made it.

TPO 9 Conversation 1

Listen to a conversation between a student and her professor.

P: Before we get started, I...I just wanted to say I’m glad you chose food science for your major courses study.

S: Yeah, it seems like a great industry to get involved with. I mean with the four-year degree in food science, I'll always be able to find a job.

P: You're absolutely right. Before entering academia, I worked as a scientist for several food manufacturers and for the US Food and Drug Administration. I even worked on a commercial fishing boat in Alaska a couple of summers while I was an undergraduate. We bring in the day's catch to a floating processor boat where the fish got cleaned, packaged and frozen right at sea.

S: That's amazing! As a matter of fact, I'm sort of interested in food packaging.

P: Well, for that, you'll need a strong background in physics, math and chemistry.

S: Those are my best subjects. For a long time, I was leading towards getting my degree in engineering.

P: Well, then you should have a problem. And fortunately, at this university, the department of food science offers a program in food packaging. Elsewhere, you might have to hammer courses together on your own.

S: I guess I like it a lot then. I am… so since my appointment today is to discuss my term paper topic, I wanted to ask, could I write about food packaging? I realize we're supposed to research food-born bacteria, but food packaging must play a role in all of that, right?

P: Absolutely! Maybe you should do some preliminary research on that.

S: I have! That's the problem. I'm overwhelmed.

P: Well, in your reading, did anything interest you in particular? I mean something you’d like to investigate.

S: well, I was surprised about the different types of packaging used for milk.

You know, clear plastic bottles, opaque bottles, carton board containers...

P: True! In fact, the type of packaging has something to do with the way milk's treated against bacteria.

S: Yeah, and I read a study that showed how light can give milk a funny flavor and decrease the nutritional value. And yet most milk bottles are unclear. What's up about that?

P: Well consumers like being able to visually examine the color of the milk. That might be one reason that opaque bottles haven't really called on. But that study... I'm sure there is more study on the subject. You shouldn't base your paper on only one study.

S: Maybe I should write about those opaque plastic bottles. Find out if there are any scientific reasons they aren't used more widely? Maybe opaque bottles aren't as good at keeping bacteria from growing in milk after the bottle has been opened for something… but where to begin researching this? I don't have a...

P: You know, there is a dairy not far from here in Chelsea. It was one of the first diaries to bottle milk in opaque plastic, but now they're using clear plastic began. And they're always very supportive of the university and our students, and if you want it...

S: Yeah, I like that idea.

TPO 9 Lecture 1 Theater

Listen to part of a lecture in a theater class

Pro: As we have seen, the second half of the 18th century was an exciting time in Europe: it was not only an age of great invention, but social changes also led to a rise in all sorts of entertainment, from reading to museums, to travel. And finding himself in the middle of this excitement was an accomplished French painter named Philippe Jacques de Loutherbourg. Loutherbourg arrived in England in 1771, and immediately went to work as a site designer at the famous Drury Lane Theater in London. From his first shows, Loutherbourg showed a knack for imagination and stage design, all in the interest of creating illusions that allowed the audience to suspend disbelief completely. He accomplished this by giving the stage a greater feeling of depth, which he did by cutting up some of the rigid background scenery, and placing it at various angles and distances from the audience. Another realistic touch was using three-dimensional objects on the set, like rocks and bushes as opposed to two-dimensional painted scenery. He also paid much more attention to lighting and sound than had been done before.

Now, these sets were so elaborate that many people attended the theater more for them than for the actors or the stories. At the time, people were wild for travel and for experiencing new places; but not everyone could afford it. Loutherbourg outdid himself however, with a show that he set up in his own home. He called it the "Eidophusikon".

"Eidophusikon" means something like representation of nature, and that's exactly what he intended to do: create realistic moving scenes that change before the audiences' eyes. In this, he synthesized all his tricks from Drury Lane: mechanical motions, sound, light, other special effects to create, if you will, an early ** production.

The "Eidophusikon" was Loutherbourg's attempt to release painting from the constraints of the picture frame. After all, even the most action field exciting painting can represent only one moment in time; and any illusion of movement is gone after the first glance. But Loutherbourg, like other contemporary painters, wanted to add the dimension of time to his paintings. You know, the popular thinking is that Loutherbourg was influenced by landscape painting. But why can't we say that the "Eidophusikon" actually influenced the painters? At the very least we have to consider that it was more ... it was more of a mutual thing. We know, for example, that the important English landscape painter Thomas Gainsborough attended almost all of the yearly performances, and his later paintings are notable for their increased color and dynamic use of light. Loutherbourg's influence on the theater though, he was incredibly influential: the way he brought together design and lighting and sound as a unified feature of the stage, can easily be seen in English theater's subsequent emphasis on lighting and motion.

Now, the "Eidophusikon" stage was actually a box: a few meters wide, a couple meters tall and a couple meters deep. That is, the action took place

within this box. This was much smaller of course than the usual stage. But, it also allowed Loutherbourg to concentrate the lighting to better effect. Also, the audience was in the dark, which wouldn't be a common feature of the theater until a hundred years later. The show consisted of a series of scenes, for example, a view of London from sunrise that changes as the day moves on; mechanical figures, such as cattle, moved across the scene, and ships sailed along the river. But what really got people was the attention to detail, much like his work in Drury Lane. So, for example, he painted very realistic ships, and varied their size depending on their distance from the audience. Small boats moved more quickly across the foreground than larger ones did that were closer to the horizon. Other effects, like waves, were also very convincing. They reflected sunlight or moonlight depending on the time of day or night. Even the colors changed as they would in nature. Sound and light were important in ** his productions realistic. He used a great number of lights, and he was able to change colors of light by using variously colored pieces of glass, to create effects like passing clouds that suddenly change in color. Furthermore, he used effects to make patterns of shadow and light, rather than using the uniform lighting that was common at the time. And many of the sound effects he pioneered are still in use today, like creating thunder by pulling on one of the corners of a thin copper sheet. One of his most popular scenes was of a storm. And there is a story that on one occasion, an actual storm passed over head during the show. And some people went outside, and they claimed Loutherbourg's thunder was actually better than the real thunder.

TPO 9 Lecture 2 Environmental Science

Listen to a part of lecture in an environmental science class.

Lecturer: So since we're around the topic of global climate change and its effects, in Alaska, in the northern Arctic part of Alaska, over the last thirty years or so, temperature has increased about half a degree Celsius per decade, and scientists have noticed that there've been changes in surface vegetation during this time. Shrubs are increasing in the "tundra". Tundra is flat land with very little vegetation. Just a few species of plants grow there because the temperature is very cold, and there's not much precipitation. And because of the cold temperatures, the tundra has two layers: top layer, which is called the active layer, is frozen in the winter and spring, but thaws in the summer. Beneath this active layer is the second layer called "permafrost", which is frozen all year around, and is impermeable to water.

Female Student: So because of the permafrost, none of the plants that grow there can have deep roots, can they?

Lecturer: No, and that's one of the reasons that shrubs survive in the Arctic. Shrubs are little bushes. They're not tall and being low in the ground protect them from the cold and wind. And their roots don't grow very deep, so the permafrost doesn't interfere with their growth. OK? Now since the temperatures have been increasing in Arctic Alaska, the growth of shrubs has increased. And this is presented to climate scientists with a puzzle...

Male Student: I'm sorry, when you say the growth of shrubs has increased, do you mean the shrubs are bigger, or that there are more shrubs?

Lecturer: Good question! And the answer is both. The size of the shrubs has increased and shrub cover has spread to what was previously shrub-free tundra. Ok, so what's the puzzle? Warmer temperatures should lead to increased vegetation growth, right? Well, the connections are not so simple. The temperature increase has occurred during the winter and spring, not during the summer. But the increase in shrubs has occurred in the summer. So how can increase temperatures in the winter and spring result in increased shrub growth in the summer? Well, it may be biological processes that occur in the soil in the winter, that cause increased shrub growth in the summer, and here's how: there are "microbes", microscopic organisms that live in the soil. These microbes enable the soil to have more nitrogen, which plants need to live and they remain quite active during the winter. There're two reasons for this: first, they live in the active layer, which, remember, contains water that doesn't penetrate the permafrost. Second, most of the precipitation in the Arctic is in the form of snow. And the snow, which blankets the ground in the winter, actually has an insulating effect on the soil beneath it. And it allows the temperature of the soil to remain warm enough for microbes to remain active.

So there's been increase in nutrient production in the winter. And that's what's responsible for the growth of shrubs in the summer and their spread to new areas of the tundra. Areas with more new nutrients are the areas with the largest increase in shrubs.

Female student: But, what about run-off in the spring, when the snow finally melts? Won't the nutrients get washed away? Spring thaw always washes away soil, doesn't it?

Lecturer: Well, much of the soil is usually still frozen during peak run-off. And the nutrients are deep down in the active layer anyway, not high up near the surface, which is the part of the active layer most affected by run-off. But as I was about to say, there's more to the story. The tundra is windy, and the snow is blown across the tundra, it's caught by shrubs. And deep snow drifts often form around shrubs. And we've already mentioned the insulating effect of snow. So that extra warmth means even more microbial activity, which means even more food for the shrubs, which means even more shrubs and more snow around etc.. It's a circle, a loop. And because of this loop, which is promoted by warmer temperatures in winter and spring, well, it looks like the tundra may be turning into shrub land.

Female student: But will it be long term? I mean maybe the shrubs will be abundant for a few years, and then it'll change back to tundra.

Lecturer: Well, shrub expansion has occurred in other environments, like semiarid grassland, and tall grass prairies. And shrub expansion in these environments does seem to persist, almost to the point of causing a shift. Once is established, shrub land thrives, particularly in the Arctic, because Arctic shrubs are good at taking advantage of increased nutrients in the soil, better than other Arctic plants.

TPO 9 Conversation 2

Listen to a conversation between a student and a librarian employee.
S: Excuse me. Can you help me with something?

L: I'll do my best. What do you need?

S: Well, I've received a letter in my mailbox saying that I'm supposed to return a book that I checked out back in January, it's call "Modern Social Problems". But because I'm writing my senior thesis, I'm supposed to be able to keep the book all semester.

L: So you signed up for extended borrowing privileges?

S: Yeah.

L: But we are still asking you to bring the book back?

S: En-hen.

L: Well, let me take a look and see what the computer says. The title was "Modern Social Problems"?

S: Yeah.

L: OK. Oh, I see, it's been recalled. You can keep it all semester as long as no one else
requests it. But, someone else has. It looks like one of the professors in the sociology
department requested it. So you have to bring it back, even though you've got extended borrowing privileges. You can check out the book again when it's returned in a couple of weeks.

S: But I really need this book right now.

L: Do you need all of it or is there a certain section or chapter you're working with?

S: I guess there is one particular chapter I've been using lately for a section of my thesis. Why?

L: Well, you can photocopy up to one chapter of the book. Why don't you do that for the chapter you're working on right now? And by the time you need the rest of the book, maybe it will have been returned. We can even do the photocopy for you because of the circumstances.

S: Oh, well, that would be great.

L: I see you've got some books there. Is that the one you were asked to return?

S: No, I left it in my dorm room. These are books I need to check out today. Is it Ok if I bring that one by in a couple of days?

L: Actually, you need to return it today. That is if you want to check out those books today. That's our policy.

S: Oh, I didn't know that.

L: Yeah, not a lot of people realize that. In fact, every semester we get a few students who have their borrowing privileges suspended completely because they haven't returned books. They're allowed to use books only in the library. They're not allowed to check anything out because of unreturned books.

S: That's not good. I guess I should hand back onto the dorm right now then.

L: But, before you go, what you should do is fill out a form requesting the book back in two weeks. You don't want to waste any time getting it back.

S: Thanks a lot. Now I don't feel quite so bad about having to return the book.

TPO 9 Lecture 3 Geology

Lecturer: So, continuing our discussion of desert lakes, now I want to focus on what's known as the "Empty Quarter". The "Empty Quarter" is a huge area of sand that covers about a quarter of the Arabian Peninsula. Today it's pretty desolate, barren and extremely hot. But there've been times in the past when monsoon rains soaked the Empty Quarter and turned it from a desert into grassland that was dotted with lakes and home to various animals. There were actually two periods of rain and lake formation: the first one began about 35000 years ago; and the second one dates from about 10000 years ago.

Female Student: Excuse me, Professor. But I'm confused. Why would lakes form in the desert? It's just sand, after all.

Lecturer: Good question! We know from modern day desert lakes, like Lake Eyre, South Australia, that under the right conditions, lakes do form in the desert. But the Empty Quarter lakes disappeared thousands of years ago. They left behind their beds or basins as limestone formations that we can still see today. They look like low-lying, white or grey builds, long, narrow hills with flat tops, barely a meter high. A recent study of some of the formations presents some new theories about the area's past. Keep in mind though that this study only looked at 19 formations. And about a thousand have been documented. So there's a lot more work to be done.
According to the study, two factors were important for lake formation in the Empty Quarter: first the rains that fell there were torrential. So it would've been impossible for all the water to soak into the ground. Second, as you know, sand dunes contain other types of particles, besides sand, including clay and silt. Now, when the rain fell, water ran down the sides of the dunes, carrying clay and silt particles with it. And wherever these particles settled, they formed a pan, a layer that water couldn't penetrate. Once this pan formed, further run-off collected, and formed a lake.
Now, the older lakes, about half the formations, the ones started forming 35000 years ago, the limestone formation we see, they're up to a kilometer long, but only a few meters wide, and they're scattered along the desert floor, in valleys between the dunes. So, the theory is, the lakes formed there, along the desert floor, in these long narrow valleys. And we know, because of what we know about similar ancient desert lakes, we know that the lakes didn't last very long, from a few months to a few years on average. As for the more recent lakes, the ones from 10000 years ago, well, they seemed to have been smaller, and so may have dried up more quickly. Another difference, very important today for distinguishing between older lake beds and newer ones, is the location of the limestone formations. The more recent beds are high up in the dunes. Why these differences? Well, there are some ideas about that, and they have to do with the shapes of the sand dunes, when the lakes were formed. 37000 years ago, the dunes were probably nicely rounded at the top, so the water just ran right down their sides to the desert floor. But there were

thousands of years of wind between the two rainy periods, reshaping the dunes. So, during the second rainy period, the dunes were kind of chopped up at the top, full of hollows and ridges, and these hollows would've captured the rain right there on the top.

Now, in grassland of Lake Ecosystem, we'd expect to find fossils from a variety of animals, and numerous fossils have been found at least at these particular sites. But, where did these animals come from? Well, the theory that has been suggested is that they migrated in from nearby habitats where they were already living. Then as the lakes dried up, they died out. The study makes a couple of interesting points about the fossils, which I hope will be looked at in future studies. At older lake sites, their fossil remains from hippopotamuses, water buffalo, animals that spend much of their lives standing in water, and also, fossils of cattle. However, at the sites of the more recent lakes, there’re only cattle fossils, additional evidence for geologists that these lakes were probably smaller, shallower, because cattle only use water for drinking. So they survive on much less. Interestingly, there are clams and snail shells; but, no fossils of fish. We're not sure why. Maybe there is a problem with the water. Maybe it was too salty. That's certainly true of other desert lakes.

TPO 9 Lecture 4 Linguistic

Listen to part of a lecture in a linguistics class. The professor has been discussing Animal communication systems.

L: OK, so last time, we covered the dances honey bees due to indicate where food can be found and the calls and sounds of different types of birds. Today, I'd like to look at some communication systems found in mammals, particularly in primates, such as orangutans, chimpanzees, gorillas... Yes, Thomas?

T: Excuse me, Professor. But when you talk about gorilla language, do you mean like, those experiments where humans taught them sign language or a language like...

L: OK, wait just a minute. Now, who in this class heard me use the word "language"? No one I hope. What we're talking about here, are systems of communication, all right?

T: Oh, sorry, communication, right. But could you maybe, like, clarify with the differences?

L: Of course, that's a fair question. OK, well, to start with, let's make it clear that language is a type of communication, not the other way around. OK, so all communication systems, language included, have certain features in common. For example, the signals used to communicate from the bee's dance movements, to the word and sentences found in human languages. All these signals convey meaning. And all communication systems serve a purpose, a pragmatic function of some sort. Warning of danger perhaps or offering other needed information. But there're several features peculiar to human language that have, for the most part, never been found in the communication system of any other species. For one thing, learn ability. Animals have instinctive communication systems. When a dog, a puppy gets to certain age, it's able to bark. It barks without having to learn how from other dogs, it just barks. But much of human language has to be learned from other humans. What else makes human language unique? What makes it different from animal communication? Debber?

D: How about grammar? Like having verbs, nouns, adjectives?

L: OK, that's another feature. And it's a good example...

D: I mean I mention this cause like in my biology class last year, I kind of remember talking about a study on prairie dogs, where, I think the researchers claimed that the warning cries of prairie dogs constitute language, because they have this, different parts of speech. You know, like nouns, to name the type of predator they spotted, adjectives to describe its size and shape,

verbs..., but now it seems like...

L: All right, hold on a moment. I'm familiar with the study you're talking about. And for those of you who don't know, prairie dogs are not actually dogs. They're type of rodent who burrows in the ground and the grasslands of the west United States and Mexico. And in this study, the researchers looked at the high-pitched barks a prairie dog makes when it spots predator. And from this they made some pretty.., well, they made some claims about these calls qualifying as an actual language, with its own primitive grammar. But actually, these warning calls are no different from those found among certain types of monkeys. Well, let's not even get into the question whether concepts like noun and verb can be meaningfully applied to animal communication. Another thing that distinguishes a real language is a property we call "discreteness". In other words, messages are built up out of smaller parts, sentences out of words, words out of individual sounds, etc. Now maybe you could say that the prairie dog's message is built from smaller parts, like say for example, our prairie dogs spot a predator, a big coyote approaching rapidly. So the prairie dog makes a call that means "coyote", then one that means "large", and then another one to indicate its speed. But you really suppose it makes any difference what order these calls come in? No. But the discrete units that make up language can be put together in different ways. Those smaller parts can be used to form an infinite number of messages, including messages that are completely novel, that have never been expressed before. For example, we can differentiate between: "A large coyote moves fast." and say "Move the large coyote fast." or "Move fast, large coyote.", and I truly doubt whether anyone has ever uttered either of these sentences before. Human language is productive and open-ended communication system, whereas no other communication system has this property. And another feature of language that's not displayed by any form of animal communication is what we call "displacement". That is, language is abstract enough that we can talk about things that aren't present here and now. Things like "My friend Jo is not in the room." or "It will probably rain next Thursday." Prairie dogs may be able to tell you about a hawk at circling over head right now, but they never show any inclination to describe the one they saw last week.

TPO 10 Conversation 1

Narrator
Listen to a conversation between a student and her Photography Professor.

Student
Professor Jason, there is something that's been on my mind.

Professor
Ok.

Student
Remember last week, you told us that it's really important to get our photography into a show, basically as soon as we can?

Professor
Yes up, it's a big step, no question.

Student
Thing is, I am sitting here and I am just not sure how I get there. I mean I've got some work I like, but is it the really what the gallery is looking for? How would I know, how do I make the right context to get it into show, I just really don't...

Professor
Ok, slow on, slow on. Um…these are questions, well, just about every young artist has to struggle with. Ok, the first thing you should do is you absolutely have to stay true to your artistic vision; take the pictures you want to take.

Don't start trying to catch the flavor the monsoon, be trendy because you think you are getting into a show--- that never works, because you wanna them creating something you don't really believe in. That sounds uninspired, and won't make any shows. I've seen that have happened so many times. This doesn't mean that you should go into the caves. Keep up with the trends, even think about how your work might fit in with them, but don't mindlessly follow them.

Student
Well, yeah, I can see that. I think though I have always been able to stay pretty true to what I want to create, not what others want me to create. I think that comes through my work.

Professor
Ok, just remember that is one thing to create works that you really want to create one that in the classroom. The only thing is stake is your grade. But what create outside the classroom? That could be in different story. Eh, I'm not talking about techniques or things like that. It's just there is so much more

stake when you are out there ** art for living. There are a lot of pressures to become something you are not, and people often surrendered to that pressure.

Student
But to get stuff it exhibited…

Professor
Well, you need to be a bit of opportunists. Now, a common sense things like always having a sample if you worked on hand to give the people. You won't believe the kind of contacts and opportunists you get it in this way. And try to get your work seen in the places like restaurants, bookstores, you will be surprised how world get surround it about photography in places like then.

Student
Ok it's just so hard to think about all of these practical things and make good work, you know

TPO 10 Lecture 1 Marine Biology

Narrator
Listen to part of a lecture in a Marine Biology Class

Professor
We know whales are mammals and that they evolved from land creatures. So the mystery is figuring out how they became ocean dwellers. Because until recently there was no fossil record of what we call “the missing link”- that is evidence of species that show the transition between land-dwelling mammals and today’s whales. Fortunately, some recent fossil discoveries have made the picture a little bit clearer. For example, a few years back in Pakistan, they found a skull of a wolf-like creature. It’s about 50 million years old. Scientists had seen this wolf-like creature before, but this skull was different. The ear area of the skull had characteristics seen only in aquatic mammals, specifically whales.
Err, well, then also in Pakistan they found a fossil of another creature, which we call Ambulocetus natans That’s muffle lay. The name Ambulocetus natans comes from Latin of course, and means “walking whale that swims”. It clearly had four limbs that couldn’t have been used for walking. It also had a long thin tail, typical of mammals, something we don’t see in today’s whales. But, it also had a long skeletal structure. And that long skeletal structure suggests that it was aquatic. And very recently in Egypt, they found a skeleton of Basilosaurus. Basilosaurus was a creature that we’ve already known about for over a hundred years. And it has been linked to modern whales because of its long whale-like body. But this new fossil find showed a full set of leg bones, something we didn’t have before. The legs were too small to be useful. They weren’t even connected to its Power San and couldn’t have supported its weight. But it clearly shows Basilosaurus an evolution from land creature. So that’s a giant step in the right direction. Even better, it established Ambulocetus natans as a clear link between the wolf-like creature and Basilosaurus. Now these discoveries don’t completely solve the mystery. I mean, Ambulocetus natans is a mammal that shows a sort of bridge between walking on land and swimming. But it also is very different from the whales who know today. So really we are working just a few pieces of a big puzzle.
Emm…a related debate involved some recent DNA studies. Remember, DNA is the genetic code for any organism. And when the DNA from two different species is similar, it suggests that those two species are related. And when we compared some whale DNA with DNA from some other species, we got quite a surprise. The DNA suggests that whales are descendants of the hippopotamus.

Yes, the hippopotamus! Well, it came as a bit of a shock. I mean, that a four-legged land and river dweller could be the evolutionary source of a completely aquatic creature up to 25 times its size. Unfortunately this evolution of the hippopotamus apparently contradicts the fossil record, which suggests that the hippopotamus is only a very distant relative of the whale, not an

ancestor. And of course as I mentioned, that whales are descendent not from hippos but from that distant wolf-like creatures. So we have contradictory evidences. And more research might just raise more questions and create more controversies. At any rate, we have a choice. We can believe the molecular data- the DNA, or we can believe the skeleton trail, but unfortunately, not both.

Err… and there have been some other interesting findings from DNA research. For a long time, we assumed that all whales that had teeth including sperm whales and killer whales were closely related to one another. And the same for the toothless whales, like the blue whale and other baleen whales, we assumed that they be closely related. But recent DNA studies suggest that that's not the case at all. The sperm whale was actually closely related to the baleen whale, and it's only distantly related to the toothed-whales. So that's the real surprise to all of us.

TPO10 Lecture 2 European History

Narrator: Listen to part of a lecture in a European History Class.</BR>

Professor
So would it surprise you to learn that many of the food that we today consider traditional European dishes that their key ingredients were not even known in Europe until quite recently, until the European started trading with the native people in North and South America? I mean, you probably aware that the Americas provide Europe and Asia with food like squash, beans, turkey, peanuts. But what about all those Italian tomato sauces, humgarengurush or my favorite, French fries? Those yummy fried potatoes.

Student
Wait. I mean I knew potatoes were from where, South America?

Professor
South America. Right, the Andes Mountains.

Student
But you are saying tomatoes too? I just assume since there used to so many Italian dishes.

Professor
No, like potatoes, Tomato grew widely in the Andes. Although unlike potatoes, they weren't originally cultivated there. That seems to occur first in Central America. And even then the tomato doesn't appear to have been very important as a food plant until the European came on the scene. They took it back to Europe with them around 1550. And Italy was indeed the first place where it's widely grown as food crop. So in a sense, it really is more Italian than American. And another thing and this is true of both potato and tomato. Both of the plants are members of Nightshade family. The Nightshade family is a category of plants which also includes many that you wouldn't want to eat, like mandrake, belladonna, and even tobacco. So it's no wonder that people once considered potatoes and tomatoes to be inedible too, even poisonous. And in fact, the leaves of the potato plant are quite toxic. So, too it took both plants quite a while to catch on in Europe. And even longer before it made a return trip to North America and became popular food items here.

Student
Yeah, you know, I remember, I remember my grandmother telling me that when her mother was a little girl, a lot of people still thought tomatoes are poisonous.

Professor
Oh, sure. People didn't really start eating them here until the mid-eighteen

hundreds.
Student
But seems like I heard didn't Tom Jefferson grow them or something?

Professor
Well, that's true. But then Jefferson is known not only as the third president of the United States but also as a scholar who was way ahead of his time in many ways. He didn't let the conventional thinking of his day restrain his ideas. Now, potatoes went through a similar sort of rejection process, especially when they were first introduced in Europe. You know how potatoes can turn green if they are left in the light too long? And that green of skin can make the potatoes tastes bitter; even make you ill. So that was enough to put people off for over 200 years. Yes, Bill?

Student
I'm sorry professor Jones. But I mean yeah ok. American crops have probably contributed a lot to European cooking over the years. But…

Professor
But have they really played any kind of important role in European history? Well, as a matter of fact, yes. I was just coming to that. Let's start with North American corn or maize, as it's often called. Now before the Europeans made any contact with the Americas, they subsist mainly on grains, grains that often suffered from crop failures. And largely for this reason, the political power in Europe was centered for centuries in the South, around the Mediterranean Sea which was where they could grow these grains with more reliability. But when corn came to Europe from Mexico, wow, now they had a much hardier crop that could be grown easily in more northerly climates and centers of power began to shift accordingly. And then, well as I said potatoes weren't really popular at first. But when they finally catch on which they did in Ireland around 1780. Well, why do you suppose it happen? Because potatoes have the ability to provide abundant and extremely nutritious food crop, no other crop grew in North Europe at the time had anything like the number of vitamins contained in potatoes. Plus, potatoes grow on the single acre of land could feed many more people than say, wheat grow on the same land. Potatoes soon spread to France and other Northern European countries. And as a result, the nutrition of the general population improved tremendously and population soared in the early 1800 and so the shift of power from southern to northern Europe continued.

TPO10
Conversation 2

Narrator
Listen to a conversation between a student and an employee in the University bookstore.

Student
Hi, I brought this book at the beginning of this semester, but, some things come up and… I'd like to return it.

Employee
Well, for full refund: store policy is that you have to return merchandises 2 weeks from the time it was purchased. Er~~but for science text books or anything having to do with specific courses. Wait...What is it for specific course?

Student
Yeah, but actually…

Employee
Well... for course books, the deadline is 4 weeks after the beginning of the semester. So this forth semester, the deadline was October. 1st.

Student
Ouch, then I missed it. But, why October.1st?

Employee
Well, I guess the reasoning is the by October. 1st, the semester is for gear. And everyone kind knows what courses all we are taking that semester

Student
I get it, so it mainly for people who decided to its drop from… to changes new courses early on.

Employee
Exactly!!! The books have to been in perfect condition of course. They can be marked up or looked use in any way for the full refund, I mean.

Student
Well, but, my situation is a little different. I hoped you might be able to make an exception.

Employee
Well, the policy is generally pretty rigid and this semester is almost over.

Student
Okay~ here what's happen? Um~ I think my professor really miscalculated.

Anyway the syllabus was away too ambitious in my opinion. There’re only 2 weeks of classes last semester and there are I‘d like 6 books on the syllabus that we haven’t even touched.

Employee
I see. So you’re hoping to return in this one.

Student
Yeah, professor already announce that we want be reading this one by Jane Boons and all the others I bought used

Employee
Jane Boons? Which book of hers?

Student
It called “Two serious ladies”

Employee
Oh, but you should keep it that one. Are you interested in literature?

Student
Well. I am in English major.

Employee
You are lucky to have professor who includes the last note writer like her on the syllabus, you know, not the usual authors we’ve all read.

Student
So you really think..

Employee
I do. And especially if you into literature

Student
Hem~~ well, this I wasn’t it expecting. I mean… er~em.. Wow~

Employee
I am hoping you were done to get been too pushy. If you prefer, you can return the book and arrange for store credit, you don't qualified for refund. Policy is policy after all, but you can make it exchange and you can use the credit for your books for the next semester. The credit carries over for one semester to the next.

Student
Emm…that’s good to know, but now I am really entry, I guess that just because we run out of time to read this book in class, doesn't mean that I cannot read it on my own time. You know, I think I’ll give it a try.

TPO10 Lecture 3 Ecology

Narrator
Listen to part of a lecture in an Ecology Class.

Professor
So we've been talking about nutrients, the elements in the environment that are essential for living organisms to develop, live a healthy life and reproduce. Some nutrients are quiet scarce; there just isn't much of them in the environment. But fortunately they get recycled. When nutrients are used over and over in the environment, we call that a nutrient cycle. Because of the importance of nutrients and their scarcity, nutrient recycling is one of the most significant eco-system processes that will cover in this course. The three most important nutrient recycles are the nitrogen cycle, the carbon cycle and the one we are going to talk about today, the Phosphorus cycle.
So the Phosphorus cycle has been studied a lot by ecologists because like I said, Phosphorus cycle is a most important nutrient and it's not so abundant. The largest quantities are found in rocks at the bottom of the ocean. How the Phosphorus get there? Well, let's start with the Phosphorus in rocks. The rocks get broken down into smaller and smaller particles as they are weathered. They are weathered slowly by rain and wind over long periods of time. Phosphorus is slowly released as the rocks are broken down and then it gets spread around into the soil. Once it's in the soil, plants absorb it through their roots.

Student
So that's the reason people mine rocks that contain a lot of Phosphorus to help the agriculture?

Professor
Hum, they mined the rock, artificially break it down and put the Phosphorus into the agricultural fertilizers. So humans can play a role in a first part of the Phosphorus cycle -- the breaking down of rocks and the spreading Phosphorus into the soil by speeding up the rate at which this natural process occurs. You see. Now after the Phosphorus is in the soil, plants grow. They use Phosphorus from the soil to grow. And when they die, they decompose. And the Phosphorus is recycled back into the soil; same thing with the animals that eat those plants, or eat other animals that have eaten those plants. We call all of this – the land phase of the Phosphorus cycle. But a lot of the Phosphorus in the soil gets washed away into rivers by rain and melting snow. And so begins another phase of the cycle. Can anyone guess what it is called? Nancy

Nancy
Well, if the one is called the land phase, then this has to be called the water phase, right?

Professor
Yes, that's such a difficult point isn't it? In a normal water phase, rivers eventually empty into oceans, and once in the oceans, the Phosphorus gets absorbed by water plants like algae. Then fish eats the algae or eat other fish that have eaten those plants. But the water phase is sometime affected by excessive fertilizers. If not all of Phosphorus gets used by the crops and larger amounts of Phosphorus gets into the rivers. This could cause a rapid growth of water plants in the river, which can lead to the water waste getting clogged with organisms, which can change the flow of the water. Several current studies are looking at these effects and I really do hope we can find the way to deal with this issue before these ecosystems are adversely affected. Ok? Of course, another way that humans can interrupt the normal process is fishing. The fishing industry helps bring Phosphorus back to land. In the normal water phase the remaining Phosphorus makes its way, settles to the bottom of the ocean and gets mixed into the ocean sediments. But remember, this is a cycle. The Phosphorus at the bottom of the ocean has to somehow make its way back to the surface, to complete the cycle, to begin the cycle all over again. After millions of years, powerful geological forces, like under water volcanoes lift up the ocean sediments to form new land. When an under volcano pushes submerge rock to the surface, a new island is created. Then over many more years the Phosphorus reach rocks of the new land begin to erode and the cycle continues.

Guy
What about, well, you said that the nitrogen cycle is also an important nutrient cycle. And there is a lot of nitrogen in the atmosphere, so I was wondering, is there a lot of Phosphorus in the atmosphere too?

Professor
Good question, George. You're right to guess the Phosphorus can end up in earth atmosphere. It can move from the land or from the oceans to the atmosphere, and vice versa. However, there's just not as substantial amount of it there, like there is with nitrogen, it's a very minimal quantity.

TPO10 Lecture 4 Psychology

Narrator
Listen to part of a lecture in a Psychology Class.

Professor
OK. If I ask about the earliest thing you can remember, I will bet for most of you, your earliest memory would be about from age of 3, right? Well, that's true for most adults. We cannot remember anything that happened before age of 3. And this phenomenon is so widespread and well-documented it has a name. It is called child amnesia and it was first documented in 1893.
As I said, this phenomenon refers to the adults not being able to remember the childhood incidents. It's not children trying to remember events from last month or last years. Of course you follow that if you can't remember incidents as your child, you probably won't remember as an adult. OK, so … why is this? What is the reason from the child amnesia? Well, once a popular explanation was that child memories are always repressed and memories are disturbing so that is adults we keep them in barricade. And so we can recall them and this is base on…well it's not base on, on, on… the kind of self-research in the lab testing we want to talk about today. So let's put that explanation aside and concentrate on just two. OK? It could be that as children we do form memories of things prior to age of 3, but forget as we get grew older, let's one explanation. Another possibility is that children younger than 3 lack some cognitive capacity for memory. And that idea, that children are unable to form memories that have been the dominant belief psychology for the past 100 years. And this idea is very much tied to things, the theory of Jean Piaget and also to language development in children.
So PRJ's theory of cognitive development--- PRJ's suggested that because they don't have language, children younger than 18-24 months leave in the here and now that is they lack the mean to symbolic represent object, and events, that will not physically presented. Everybody get that? PRJ proposed that young children don't have way to represent things that aren't wide in front of them. That's what language does, right? Words represent things, ideas. Once language started to develop for about age 2, they do has a system for symbolic representation and can talk about things which are not in there in immediate environment including the past. Of course he didn't claim that infants don't have any sort of memory it is acknowledged that they can recognize some stimuli, like faces. And for many years this model were very much in favors in psychology, even thought memory tests were never performed on young children.
Well, finally in the 1980s, study was done. And this study show that very young children under age of 2 do have capacity for recall. Now if we children cannot talk, how was the recall tested? Well, that is a good question, since the capacity for recall has always been linked with the ability to talk. So the researcher set up an experiment using imitation based texts. The adults use probable toys or other objects to demonstrate action that has 2 steps. The

children were asked to imitate the steps immediately and then he again after lays off one or month. And even after delay, the children could…couldn't call or replicate the action, the objects they used, and the steps involved and the order of the steps. Even children young is 9 months, now, test showed that there was a faster way of forgetting among the youngest children but most importantly it shows that the development of the recall did not depend on language development. And that was the importance finding. I guess I should add that the findings, don't say there was no connection between the development of language and memory. There are some of evidence that are being able to talk about the event does lead to having a strong memory of that event. But that does not seem the real issue here.

So, back to our question about the cause of the childhood amnesia, well, there is something called the rate of forgetting. And childhood amnesia may reflect high rate of forgetting, in other words, children under age of 3 do form memory and do so without language. But they forget the memories at a fast rate, probably faster than adults do. Researcher has set standards….sort of unexpected rate of forgetting, but that expected rate was set based on the tests done on the adults. So what is the rate of forgetting for children under the age of 3? We expected to be high, but the tests disproved these really haven't been done yet.

TPO 11 Conversation 1

Narrator
Listen to a conversation between a student and a university employee.

Student
Hi, I need to pick up the gym pass.

Employee
OK. I'll need your name, year, and university ID.

Student
Here's my ID card. And my name is Gina Kent, and I'm first year.

Employee
OK. Gina. I'll type up the pass for you right away.

Student
Great! This is exciting. I can't wait to get started.

Employee
Oh, this is a wonderful gym.

Student
That's what everybody has been saying. Everyone is talking about the new pool, the new indoor course. But what I love is all the classes.

Employee
The classes…?

Student
Yes, like the swimming and tennis classes and everything.

Employee
Oh yeah, but this pass doesn't entitle you to those.

Student
It doesn't?

Employee
No, the classes fall into separate category.

Student
But, that's my whole reason for getting a pass. I mean, I was planning to take a swimming class.

Employee
But that’s not how it works. This pass gives you access to the gym and to all the equipments, into the pool and so forth. But not with team practicing, so you have to check the schedule.

Student
But what do I have to do if I want to take a class?

Employee
You have to: one, register; and two, pay the fee for the class.

Student
But that’s not fair.

Employee
Well, I think if you can think about it. You’ll see that it’s fair.

Student
But people who play sports in the gym… they don’t have to pay anything.

Employee
Yes, but they just come in, and play or swim on their own. But, taking a class---that is a different story, I mean, someone has to pay the instructor.

Student
So, if I want to enroll in a class.

Employee
Then you have to pay extra. The fee isn't very high, but there’s a fee. So, what class did you say you want to take?

Student
Swimming…

Employee
OK. Swimming classes are thirty dollars a semester.

Student
I guess I could swing that. But I’m still not convinced it’s fair. So, do I pay you?

Employee
Well, first, you need to talk to the instructor. They have to assess your level and steer you into the right class, you know, beginner, intermediate…

Student
You mean, I have to swim for them? Show them what I can do?

Employee

No, no, you just tell them a little bit about your experiences and skills, so they know what level you should be in.

Student
Oh, OK. So, I guess I'll need an appointment.

Employee
And I can make that for you right now. And I'll tell up you about your gym ID card. You'll need it to get into the building. Now about that appointment… how does Wednesday at three sounds?

Student
Fine…

Employee
OK. Then you'll be meeting with Mark Guess. He's a swimming instructor. He also coaches the swim team. And here, I've jotted it all down for you.

Student
Great! Thanks.

TPO11 Lecture 1 Biology

Narrator
Listen to part of a lecture in a Biology Class. The class has been learning about birds.

Professor
Ok, today we are going to continue our discussion of the parenting behaviors of birds. And we are going to start by talking about what are known as distraction displays. Now if you were a bird and there was a predator around. What are you going to do? Well, for one thing you are going to try to attract as little attention as possible, right? Because if the predator doesn't know you are there, it is not going to try to eat you. But sometimes certain species of birds do the exact opposite when the predator approaches they do their best to try to attract the attention of that predator. Now why would they do that? Well, they do that to draw the predator away from their nests, away from their eggs or their young birds. And the behaviors that the birds engaging in to distract predators are called distraction displays. And there are a number of different kinds of distraction displays. Most of the time, when birds are engaging in distraction displace they are going to be pretending either that they have injury or that they're ill or that they're exhausted. You know something that'll make the predator thinks Hum… here is an easy meal. One pretty common distraction display was called the broken wing display. And in a broken wing display the bird spreads and drags the wings or its tail, and while it does that, it slowly moves away from the nests so it really looks like a bird with a broken wing. And these broken wing displays can be pretty convincing.

Another version of this kind of distraction display is where the birds create same impression of a mouse or some other small animals that running along the ground. A good example of that kind of display is created by a bird called the purple sandpiper. Now what's the purple sandpiper does is when a predator approaches, it drags its wings but not to give it the impression that its wings are broken but to create the illusion that it has a second pair of legs. And then it raises its feathers, so it looks like it got a coat of fur. And then it runs along the ground swirling left and right you know like running around a little rocks and sticks. And as it goes along it makes a little squeezing noises. So from a distance it really looks and sounds like a little animal running along the ground trying to get away. Again to the predator, it looks like an easy meal. Now what's interesting is the birds have different levels of performance of these distraction displays. They don't give their top performance, their prime time performance every time. What they do is they save their best performances they're most conspicuous and most risky displays for the time just before the baby birds become able to take care of themselves. And the time that way because that when that make the greatest investment in parenting their young. So they are not going to put their best performance just after they laid their eggs because they have to invest that much more time and

energy in parenting yet. The top performance is going to come later. Now you have some birds that are quiet mature, are quite capable almost as soon as they hatch. In that case, the parent will put on the most conspicuous distractions displays just before the babies' hatch because once the babies are hatch they can pretty much take care themselves, and then you have others birds that helpless when have hatch. In that case, the parents will save the best performance until just before the babies get their feathers.

TPO11 Lecture 2 Architecture

Narrator
Listen to part of a lecture in an Architecture Class.

Professor
Today, we are taking a little detour from the grand styles of public architecture we've been studying to look at residential architectures in the United States. Since this is something we can all identify with, I think it will help us see the relationship between the function of a structure and its style or form. This has been an ongoing theme in our discussion, and we will be getting back to it just a moment. But before we get started, I want you to take a moment to think: does anyone know what the single most popular style for a house in the United States is today? Bob?

Student 1
"I bet it is the ranch-style house."

Professor
"Well, in this area, probably. But aren't we typical? Yes, Sue."

Student 2
"How about the kind of house my grandparents live in? They call it a Cape Cod.

Professor
That's the one. Here is a drawing of what we consider of a classic Cape Cod house. These days, you see this style all over the United States. But it first showed up in U.S. northeast, in the New England region, around the late 1600s. For those of you who don't know the northeast costal region, Cape Cod is a peninsula, a narrow strip of land that jets out into the Atlantic, and so many houses in this particular style were built on Cape Cod, that the name of the place became the name of the style. Now why did the Cape Cod style house become so popular in the northeast? Well, one reason is that it's a great example of form following function. We've talked about this design principle a lot about form following function. And what did we say it's meant? Someone give me an application of this principle. What did this concept that form should follow function? How would it be applied to housing design?

Student 2
Well, if it means the design of the building, it should be based on the needs of people who use it. Then, well, the architect has to be very practical to think about the people who actually be living in the house or working in the office building, whatever, so for the architect, it's all about users not about showing off how creative you can be.

Professor
Good, of course, for a Cape Cod house, it might be even more accurate to say that form also follows climate. Who knows what the climate like on Cape Cod?

Student 1
Cold in the winter…

Student 2
And whenever I visit my grandparents, it's really wet. It's usually either raining or snowing or foggy and windy, too. I guess because it's so exposed to the ocean?

Professor
That's right. So take another look at this drawing, and you can image how this design might be particularly helpful in that kind of climate. Notice how the house is fairly low to the ground. This relatively low compact structure helps the house withstand the strong winds blowing off the ocean. And look at the slope of the roof, the steep angle helps keep off all that rain and snow that accumulates in the winter. Another thing, Cape Cod houses usually face south to take advantage of the sun's warm through the windows. That's helpful in winter. Now what can you tell me about the chimney, about its location.

Student 2
Well, it's in the middle. Because, does that have something to do with heating the houses? I mean since the heat never has to travel very far.

Student 1
That means you can heat the house more efficiently, right?

Professor
Exactly, now see how the house has very little exterior decoration, that's also typical of early Cape Cod houses. The wind was one reason, nothing sticking out might blow away in the harsh weather, but there was probably another reason, not related to the climate, more reflection of a rural New England society back then, you see Cape Cod houses were not built in the big cities, where all the rich people lived back then. These were the modest dwellings the people who built them simply couldn't afford lots of expensive decorated details. But that was more than just matter of money. In these rural areas, people depended on each other for survival. Neighbors had to help and supported each other in the difficult environment, so you didn't want to appear to be showing off. You wanted to avoid anything that might set you apart from your neighbors, the same people you might need to help you someday. So all these help to create an attitude of conformity in the community, and you can see why a modest, a very plain style would become so widely imitated through out rural New England.

Student 2
It is plain, but you know its nice looking.

Professor

Good point, and in fact it’s precisely that as aesthetic appeal, the…the purity, the nearly perfect proportion of the houses…that’s another reason for the cape cod enduring popularity even in the places where the climate was so mild, it’s functional design doesn't matter.

TPO 11 Conversation2

Narrator
Listen to a conversation between a student and a Professor.

Student
Hi professor, I guess you want to see me.

Professor
Hi Bill thanks for coming. I want to talk to you about …..

Student
Is there something wrong with my research paper?

Professor
No, not at all, in fact it's very good. That’s why I want to talk to you.

Student
Oh, thanks

Professor
I think you know that the department is looking to hire a new professor, are you familiar with our hiring process.

Student
No, but what is that got to do with me.

Professor
Well, Bill, we have several qualified applicants for serious about and this part of this interview process we have to meet with the committee of the professors and students in our department. They also have to give a talk.

Student
You mean like a lecture?

Professor
Yes, like a sample lecture on one of their academic interests

Student
Oh, see you can see their teaching style

Professor
Exactly

Student
Hah…Make sense

Professor
So I’d like to know if you be willing to join us as the student’s representatives on the interview committee. It’ll be a good experience for you. You could put it on your resume.

Student
Oh… better looks good for my graduate application, I guess, so, what do I have to do

Professor
The department's secretary will give you a schedule of the applicant’s thesis if you are free, we’d like you to attend our talks and then later you can give us your opinion. Oh and we usually serve lunch and snacks depending on what time the talk is.

Student
Cool, that’s another good reason to do this. Um… when is the next talk?

Professor
We actually haven't any yet, the first one is next Friday. It’s 10 AM, then lunch, then the formal discussion with the applicant right after.

Student
Oh well, I’m free on Fridays if all the talks are on Fridays, I will be able to make all of them.

Professor
That’s great, now you should know this job candidate is interested in the life cycle in the forest.

Student
That’s what my research about.

Professor
Yes, I know that’s why I feel necessary to point out that even though these applicants’ research interests were similar to yours; we want you to tell us what you think about the teaching of all these applicants. Your perspective is as a student, how the applicant teaches in the classroom that was important to us.

Student
I understand so how many applicants are there?

Professor
Let’s see, we have 4, all very good candidates, that we will be looking at over the next few weeks. It's going to be a tough decision. But it'll be a good experience for you, especially if you’re going to graduate school.

Student
Thank you. It'll be cool to do this. I'll get the copy of the schedule from the secretary on my way out.

Professor
You're welcome, seeing you in class this afternoon

TPO11 Lecture 3 Environmental science

Narrator
Listen to part of a lecture in an environmental science class.

Professor
When land gets develop for human use, the landscape changes. We don't see as many types of vegetation, trees, grasses and so forth. This in turn leads to other losses: the loss of animal that once lived there. Err…but these are the obvious changes, but there are also less obvious changes like the climate. One interesting case of this…of…of changes in the local land use causing changes in climate, specifically the temperature is in Florida. Now what comes to mind when you think of the state of Florida?

Student A
Sunshine, beaches.

Student B
Warm weather, oranges…

Professor
Yes, exactly. Florida has long had a great citric industry; large growth of oranges, lemons and the like. Florida's winter is very mild; the temperature doesn't often get below freezing. But there are some areas in Florida that do freeze. So in the early 1900s, farmers moved even further south in Florida, to areas that were even less likely to freeze. Obviously, freezing temperatures are danger to the crops. A bad barrier of cold weather, a long spell of frosts could ruin a farm and the entire crop, anyway, before these citric growers moved south, much of the land in south Florida, was what we called wetlands. Wetlands are areas of marshy, swampy land, areas where water covers the soil, or is present either at or near the surface of the soil for large part of the year. Wetlands have their own unique ecosystem, with plants and animals with special an interesting adaptation. Very exciting, but it's not what we are talking about today. Emm…where was I?

Student A
Farmers moved south?

Professor
Oh, yes. Farmers moved south. But the land was not suitable for farming. You can't grow orange in wetland, so farmers had to transform the wetlands into lands suitable for farming. To do that, you have to drain the water from the land, move the water elsewhere, and divert to the water sources such as rivers. Hundreds of miles of drainage canals were built in the wetlands. Now these areas, the new areas the farmers moved to, used to be warm and unlikely to freeze, however, recently the area has become susceptible to freezes. And we

are trying to understand why.

Student B
Is it some global temperature change or weather pattern like El Ni?o or something?

Professor
Well, there are two theories. One idea is as you suggested that major weather patterns, something like El Ni?o, are responsible. But the other idea and this is the one that I personally subscribe to, is of the changes in the temperature pattern had been brought about by the loss of wetlands.

Student A
Well, how would the loss of wetlands make a difference?

Professor
Well, think about what we've been studying so far. We discussed the impact of landscapes on temperature, right? What affects does the body of water have on an area?

Student A
Oh, yeah. Bodies of water tend to absorb the heat during the day, and then they release the heat at night.

Professor
Yes, exactly. What you just said is what I want you all to understand. Bodies of water release heat and moisture back into the environment. So places near large bodies of water are generally milder, err...slightly warmer than those without water. And what I, another think is that the loss of the wetlands has created the situation where the local temperatures in the area are not slightly different, slightly colder than they were 100 years ago, before the wetland were drained.

Student B
Emm…do we know what the temperature was like back then?

Professor
Well, we were able to estimate this. We have data about South Florida's current landscape, emm…the plant cover. And we were able to reconstruct data about the landscape prior to 1900. Then we enter those data, information about what the landscape look like before and after the wetlands were drained. We enter the data into a computer weather model. This model can predict temperatures. And when all the data were entered, an overall cooling trend was predicted by the model.

Student B
How much colder does it get now?

Professor

Well, actually the model shows a drop of only a few degrees Celsius. But this is enough to cause dramatic damage to crops. If temperatures over night are already very close to the freezing point, then this drop of just a few degrees can take the temperature below freezing. And freezing causes frosts, which kill crops. These damaging frosts wouldn't happen if the wetlands were still in existence, just as the tiny temperature difference can have major consequences.

TPO11 Lecture 4 Business

Narrator
Listen to part of a lecture in a Business Class.

Professor
Let's get started. Um, last time we were talking about the need for advertising. Now, let's look at how you can successfully call attention to the service or product you want to sell. To succeed, you've got to develop a systematic approach. If you don't come up with a system, um, a plan, you risk ** decisions that waste money, or even drive away potential customers. But what does a systematic advertising plan look like? Well, it covers what we call -- the 'Four Ms'. The 'Four Ms': Market, Media, Money, Message. All are important areas to focus on when creating your advertising plan. We will look at them one by one.
The First step is to look at your Market, that's the people who might become customers, buyers of your service or product. You need to know all about your possible customers： Who are they？ What age group are they? What do they like, or dislike? How do they shop? So, you got that? A market is a group of potential customers.
Next, Media… Obviously the major media are television, radio, newspapers, magazines, um, billboards, and so forth. There are all avenues of communication. And you need to figure out: Which media you should advertise through? Which media will reach your intended audience -- your market? So, you do research, trying to determine which media will reach the most potential customers for the lowest cost. For instance, if you have a product, that we'll say teachers would like, then teachers are your market. So you ask yourself: What magazines do the majority of teachers read? What TV programs do teachers watch? Do teachers listen to much radio? At what times of the day? Say, now your research turns up two magazines that teachers read. And it also shows that the majority of teachers - say ages twenty to thirty - read the magazine about classroom activities. While most teachers older than that read the other magazine, the one about, oh, let's say—'Educational Psychology'. You think your product will appeal most to teachers aged twenty to thirty, so you decide to put your advertisement in their favor magazine, the one about classroom activities. You don't waste money advertising in the 'Educational Psychology' magazine, you know the one that the younger teachers generally don't read. And since you're reaching the majority of the teachers in your target age group, you're probably spending your money well, which bring us to the third M -- Money.
You have an advertising budget to spend, but how do you to spend it wisely. Again, research is the key. Good research gives you facts, facts that can help you decide, well, as we already mentioned, decide the right market to target, and the best media to use. But also: When to advertise? or…or how to get the best rates? Like, may be you're advertising Sport equipment, and you have been spending most of your budget during the holiday season when people

buy gifts for each other. Now, in theory, that would seem a great time to advertise, but may be a research shows you're wrong, that the customers who buy sports equipment tend not to give it as a holiday gift, but want to use it themselves. In that case, advertising during a different season of the year might give you better results. And, um, may be it even lower, non-holiday rates, so you actually save money. But you need to get the facts; facts that come from good research to be certain and know for sure that you're getting your money's worth.

OK, finally, there is your message: What you want to say about your product? Why buying it will make the customer's life easier, or safer or better somehow. Whatever the message is, make sure you get it right. Let me give you an example of not getting it right, Ha...ha...ha... you are going to love this one: There was this Soup Shop, the soup was really tasty, but there weren't a lot of customers. The owner thought that may be if they give something away for free with each purchase, then more people would come buy soup. So they got some cheap socks, and they advertise to give a pair away with each bowl of soup. But, then even fewer people came to the restaurant. Well, you can imagine why. People started to associate the soup with feet; they began to imagine the soup smelled like feet. The advertising massage, soup means free socks, was a bad choice; it was a waste of money. And worse, it caused the loss of customers.

Now, I want everyone to get into small groups and come up with some examples, not of good advertising messages, but of truly disastrous ones. Think of real examples and make them up, and talk about the reasons those messages are unsuccessful. And then we'll get back together and share.

TPO 12 Conversation 1

Narrator
Listen to a conversation between a student and a professor.

Student
So Professor Tibets, your notes said that you want to see me about my heavy-weight paper. I have to say that grade wasn't what I was expecting. I thought I'd done a pretty good job.

Professor
Oh, you did. But do you really want to settle for pretty good when you can do something very good?

Student
You think it can be very good?

Professor
Absolutely!

Student
Would that mean you'd…I could get a better grade?

Professor
Oh, sorry! It's not for your grade. It's…I think you could learn a lot by revising it.

Student
You mean, rewrite the whole thing? I really swamped. There're deadlines wherever I turn and… and I don't really know how much time I could give it.

Professor
Well, it is a busy time, with spring break coming up next week. It's your call. But I think with all a little extra effort, you could really turn this into a fine essay.

Student

No… yeah…I mean, after I read your comments, I...I can see how it tries to do too much.

Professor
Yeah. It's just too ambitious for the scope of the assignment.

Student
So I should cut out the historical part?

Professor

Yes. I would just stick to the topic. Anything unrelated to the use of nature EMITRY has no place in the paper. All that tangential material just distracted from the main argument.

Student
Yeah, I never know how much to include. You know…where to draw the line?

Professor
Tell me about it! All writers struggled without one. But it's something you can learn. That will become more clear with practice. But I think if you just cut out the…emm…

Student
The stuff about history, but if I cut out those sections, won't it be too short?

Professor
Well, better a short well-structured paper than a long paper that poorly-structured and wanders off topic.

Student
So all I have to do is to leave those sections?

Professor
Well, not so fast. After you cut out those sections, you'll have to go back and revise the rest, to see how it all fits together. And of course, you'll have to revise the introduction too, to accurately describe what you do in the body of

the paper. But that shouldn't be too difficult. Just remember to keep the discussion focused. Do you think you can get it to me by noon tomorrow?

Student
Wow…emm…I have so much…er…but I'll try.

Professor
OK, good! Do try! But if you can't, well, sure for after spring break, OK?

TPO12 Lecture 1 Biology

Narrator
Listen to part of a lecture in a Biology Class.

Professor
As we learn more about the DNA in human cells and how it controls the growth and development of cells, then maybe we can explain a very important observation, that when we try to grow most human cells in libratory, they seem programmed to divide only a certain number of times before they die. Now this differs with the type of cell. Some cells, like nerve cells, only divide seven to nine times in their total life. Others, like skin cells, will divide many, many more times. But finally the cells stop renewing themselves and they die. And in the cells of the human body itself, in the cells of every organ, of almost every type of tissues in the body, the same thing will happen eventually.

OK, you know that all of persons' genetic information is contained on very long pieces of DNA called Chromosomes. 46 of them are in the human cells that's 23 pairs of these Chromosomes are of very lengths and sizes. Now if you look at this rough drawing of one of them, one Chromosome is about to divide into two. You see that it sort of looks like, well actually it's much more complex than this but it reminds us a couple of springs linked together to coil up pieces of DNA. And if you stretch them out you will find they contain certain genes, certain sequences of DNA that help to determine how the cells of the body will develop. When researchers look really carefully at the DNA in Chromosomes

though, they were amazed, we all were, to find that only a fraction of it, maybe 20-30%, converts into meaningful genetic information. It's incredible; at least it was to me. But if you took away all the DNA that codes for genes, you still have maybe 70% of the DNA left over. That's the so-called JUNK DNA. Though the word junk is used sort of townies cheek.

The assumption is that even these DNA doesn't make up any of the genes it must serve some other purpose. Anyway, if we examine these ends of these coils of DNA, we will find a sequence of DNA at each end of every human Chromosome, called a telomere. Now a telomere is a highly repetitious and genetically meaningless sequence of DNA, what we were calling JUNK DNA. But it does have any important purpose; it is sort of like the plastic tip on each end of shoelace. It means not help you tie your shoe but that little plastic tip keeps the rest of the shoelace, the shoe string from unraveling into weak and useless threads. Well, the telomere at the end of Chromosomes seems to do about the same thing--- protect the genes the genetically functional parts of the Chromosome from being damaged. Every time the Chromosome divides, every time one cell divides into two. Pieces of the ends of the Chromosome, the telomere, get broken off. So after each division, the telomere gets shorter and one of the things that may happen after a while is that pieces of the genes

themselves get broken off the Chromosomes. So the Chromosome is now losing important genetically information and is no longer functional. But as long as the telomeres are at certain length they keep this from happening. So it seems that, when the, by looking at the length of the telomeres on specific Chromosomes we can actually predict pretty much how long certain cells can successfully go on dividing. Other some cells just seem to keep on dividing regardless which mean not be always a good thing if it gets out of control.

But when we analyze the cells chemically we find something very interesting, a chemical in them, and an enzyme called telomerase. As bits of the telomere break off from the end of Chromosome, this chemical, this telomerase can rebuild it, can help resemble the protected DNA, the telomere that the Chromosome is lost. Someday we may be able to take any cell and keep it alive functioning and reproducing itself essentially forever through the use of telomerase. And in the future we may have virtually immortal nerve cells and immortal skin cells of whatever because of these chemical, telomerase can keep the telomere on the ends of Chromosomes from getting any shorter.

TPO12 Lecture 2 Business

Narrator
Listen to part of a lecture in a Business Class

Professor
Ok, as we've talked about a key aspect of running a successful business is knowing, um, getting a good sense of what the customer actually wants, and how they perceive your product. So with that in mind, I want to describe a very simple method of researching customer preference, and it is becoming increasingly common, it's called----MBWA----which stands for managing by wandering around. Now, MBWA, that's not the most technical sounding name you've ever heard, but it describes the process pretty accurately. Here is how it works.

Basically, Um, the idea is that business owners or business managers just go out and actually talk to their customers, and learn more about how well the business is serving their needs, and try to see what the customer experiences, because that's a great way to discover for yourself, how your product is perceived, what the strengths and weaknesses are, you know, how to you can improved it that sort of thing, you know Dortans, they make soup and can vegetables and such. Well, the head of the company, had Dortans' topped executives walk around supermarkets, um, asking shoppers what they thought of Dortans' soup, and he use the data to make changes to the company's product, I mean, when Dortans of all the companies, embraces something as radical as MBWA, it really show you how popular the theory has become, yes, Lisa?

Student A
But this is dangerous to base decisions on information from a small sample of people? Is it large scale market research safer getting data on a lot of people?

Professor
That's a good question, and well I don't want to pretend that W… MBWA is some sort of, um, replacement for other methods of customer research. Now, the market research data definitely can give you a good idea of, um, of the big picture, but MBWA is really useful kind of filling in the blanks, you know, getting a good underground sense of how you products you use, and how people need respond to them, and Yes, the numbers of opinion you get is small so you

do need to be careful, but, good business managers will tell you that the big fear they have an.. .and one of the most frequent problems they come across is well becoming out of touch with what their customers really want and need, you know surveys and market research stuff like that, they can only tell you so much about what the customers actually want in their day-to-day lives. Managing by wandering around on the other hand, that get you in there give you a good sense about what customers needs so. So when use combination then, MBWA and market research were the powerful tools. Oh, here is another example for you, um, see you executive for a clothing manufacture. It was, um, Lken, Lken jeans you know, they went in work in the store for a few days, selling Lken's cloths. Now that give them a very different idea about their product, they saw how people responded to it; they could go up to customers in the store asked questions about it, yes Mike?

Student B
Well, I would think that a lot of customers will be bothered by, you know, if I'm shopping, I don't know if I want some business representatives coming up to me and asking me questions, it's.. It's like when I got phone call at home from marketing researchers, I just hang up them

Professor
Oh, well, it's certainly true that well no one likes getting calls at home from market researchers or people like that, but I will tell you something. Most customers have exact opposite reaction when they comes to MBWA. Now, don't ask me why, because I really have no idea, but the fact is that customers tend to respond really well to MBWA, which is the key reason for a success.

In fact, the techniques of MBWA works so well, they have actually been extended to all kinds of different contacts like politics for instance, Um, a few years back, the major of Botamore, Um.. I can guess its name is Shapher or something like that. Anyway, he decided that the best way to serve the people of the city, of his city, was actually get out there in it and experience the things that they experienced, so he right around the city in, you know, all parts of it, and he see all the prattles; he see how the trash was sometimes, um, not pick up but off side the street and then they go back to the office and they write these memos, and these memos to stuff about the problems he had seen, and

how they needed to be fixed, you know that sort of thing, but the thing is he got all the information just by going around and seeing the different Botamore neighborhoods and talking to the people in them, and he called it--- small politics, we'd call it MBWA, or just, playing good customer service.

TPO 12 Conversation 2

Narrator
Listen to a conversation between a student and a Department Secretary.

Student
Hi. Miss Andrics.

Secretary
Hi Bret, how are you?

Student
I'm fine; except I have a question about my paycheck.

Secretary
Sure. What' up?

Student
Well it's already been several weeks at the end of the semester my check was supposed to go directly into my bank account but there haven't been any deposits.

Secretary
That's odd.

Student
Yea, I thought graduate teaching a system for automatically put on the payroll at the beginning of the semester.

Secretary
They are. Let's see did you complete all the forms for the payroll?

Student
I filled in whatever they sent me, and I returned like the end of August.

Secretary
Hum, well, you definitely should have been paid by now. At least two pay periods have passed since then

Student
I asked the bank and they didn't know anything. Who should I talk to about this, payroll?

Secretary
I'm going to contact them for you. There was a problem in processing

some of the graduate students' payroll paper work. 'Cause their computer program crashed after all the information was processed. And some people's information couldn't be retrieved.

Student
Hum. But why didn't any one let me know?

Secretary
I don't know how they work over there, 'cause they couldn't even figure out whose information was missing. And this isn't the first time, seems like something like this happens every semester.

Student
So how do I find out if my information was lost?

Secretary
I will contact them tomorrow morning to see if you're in the system. But you're probably not.

Student
What then will let me to do?

Secretary
Sorry but you will need to fill out those forms again and then I will fax them over the payroll office.

Student
And then what… Well, what I really need to know is how long till I get the money, I'm already a month behind my bills and my tuitions due soon.

Secretary
That'll get you into the system the same day they receive your paper works. So if you do that tomorrow, you'll get paid next Friday.

Student
That's a long time from now. Will that pay checking include all the money I am owed?

Secretary
It should. I will double check with the payroll department.

Student
And another thing, Is there any way I could get paid sooner, I have been teaching all these weeks…

Secretary
I know that's not fair but I don't think they can do anything; all the

checks are computed automatically in the system. They can't just write checks.

Student
But there is another one to make mistakes. They've never told me!

Woman
I understand how you feel and if I were you, I'd be upset too. I'll tell you what: when I call them, I will explain the situation and ask them if there is any way you can be paid sooner. But I have to tell you that base on past experiences you shouldn't count on it.

Student
(Sigh) I understand thanks. I know it's' not your fault and that you're doing everything you can.

Secretary
Well, what I CAN do is make sure that your first check for total amount the university owes you.

Student
That'll be great! Thank you. I will be on campus about 10 tomorrow morning and I will come back to see you then.

TPO 12 Lecture 3 Music history

Narrator
Listen to part of a lecture in a music history class. The professor has been discussing Opera.

Professor
The word opera means work, actually it means works. It's the plural of the word opus from the Latin. And in Italian it refers in general to works of art. Opera Lyric or lyric of opera refers to what we think of as opera, the musical drama. Opera was commonplace in Italy for almost thousands of years before it became commercial as a venture. And during those years, several things happened primarily linguistic or thematic and both involving secularization.

Musical drama started in the churches. It was an educational tool. It was used primarily as a vehicle for teaching religion and was generally presented in the Latin, the language of the Christian Church which had considerable influence in Italy at that time. But the language of everyday life was evolving in Europe and at a certain point in the middle ages it was really only merchants, Socratics and clergy who can deal with Latin. The vast majority of the population used

their own regional vernacular in all aspects to their lives. And so in what is now Italy, operas quit being presented in Latin and started being presented in Italian. And once that happened, the themes of the opera presentations also started to change. And musical drama moved from the church to the plaza right outside the church. And the themes again, the themes changed. And opera was no longer about teaching religion as it was about satire and about expressing the ideas of society your government without committing yourself to writing and risking imprisonment or persecution, or what have you.

Opera, as we think of it, is of course a rather restive form. It is the melodious drama of ancient Greek theater, the term 'melodious drama' being shortened eventually to 'melodrama' because operas frequently are melodramatic, not to say unrealistic. And the group that put the first operas together that we have today even, were, they were…well…it was a group of men that included Gallo Leo's father Venchesil, and they met in Florence he and a group of friends of the counts of the party and they formed what is called the Camarola Dayir Bardy. And they took classical theater and reproduced it in the Renaissance's time. This…uh…this produced some of the operas that we have today.

Now what happened in the following centuries is very simple. Opera originated in Italy but was not confined to Italy any more than the Italians were. And so as the Italians migrated across Europe, they carried theater with them and opera specifically because it was an Italian form. What happened is that the major divide in opera that endures today took place. The French said opera auto-reflect the rhythm and Kevin of dramatic literature, bearing in mind that

we are talking about the golden age in French literature. And so the music was secondary, if you will, to the dramatic Kevin of language, to the way the rhythm of language was used to express feeling and used to add drama and of course as a result instead of arias or solos, which would come to dominated Italian opera. The French relied on that what is the Italian called French Word 1 or French Word 2 in English. The lyrics were spoken, frequently to the accomp**nt of a harpsichord.

The French said you really cannot talk about real people who lived in opera and they relied on mythology to give them their characters and their plots, mythology, the past old traditions, the novels of chivalry or the epics of chivalry out of the middle Ages. The Italian said, no this is a great historical tool and what a better way to educate the public about Neo or Attalla or any number of people than to put them into a play they can see and listen to. The English appropriated opera after the French. Opera came late to England because all

theaters, public theaters were closed, of course, during their civil war. And it wasn't until the restoration in 1660 that public theaters again opened and opera took off. The English made a major adjustment to opera and exported what they had done to opera back to Italy. So that you have this circle of musical influences, the Italians invented opera, the French adapted it, the English adopted it, and the Italians took it back.

It came to America late and was considered to elites for the general public. But Broadway musicals fulfilled a similar function for a great long while. George Champon wrote about opera, "If an extraterrestrial being or two appear before us and say, what is your society like, what is this Earth thing all about, you could do worse than take that creature to an opera." Because opera does, after all, begin with a man and a woman and any motion.

TPO12 Lecture 4 Environmental science

Narrator
Listen to part of a lecture in an environmental science class.

Professor
All right folks, let's continue our discussion of alternative energy sources and move on to what's probably the most well-known alternative energy source---solar energy. The sun basically provides earth with virtually unlimited source of energy every day, but the problem has always been how do we tap this source of energy. Can anyone think of why it's so difficult to make use of solar energy?

Student A
Because it is hard to gather it?

Professor
That's exactly it. Solar energy is everywhere, but it's also quite diffused. And the thing is the dream of solar energy is not a new one. Humanity has been trying to use the sun's light as a reliable source of energy for centuries. And around the beginning of the 20th century there were actually some primitive

solar water heaters on the consumer market. But they didn't sell very well. Any of you wanna guess why?

Student A
Well, there were other energy choices like oil and natural gas, right?

Professor
Yeah. And for better or for worse, we chose to go down that path as a society. When you consider economic factors, it's easy to see why. But then in the 1970s, there was an interest in solar energy again. Why do you think that happened?

Student B
Because oil and natural gas were...err...became scarce?

Professor
Well, not exactly. The amount of oil and natural gas in the earth was still plentiful, but there were other reasons. It's a political thing really and I'm gonna get into that now. So what happened in the 1970s was oil and natural gas became very expensive very quickly, and that spurred people to start looking into alternative forms of energy, solar energy probably being the most popular. But then in the 80s, this trend reversed itself when the price of oil and natural gas went down.

Alright let's shift our focus now to some of the technologies that have been

invented to overcome the problem of gathering diffused solar energy. The most basic solution is simply to carefully place windows in a building, so the sun shines into the building and then it's absorbed and converted into heat. Can anyone think of where this is most commonly used?

Student A
Greenhouses.

Professor
Yep, greenhouses where plants are kept warm and provided with sunlight because the walls of the building are made entirely of glass. But we do also have more complex systems that are used for space heating and they fall into two categories, passive and active heating systems.

Passive systems take advantage of the location or design of a house. For

example, solar energy is gathered through large glass panels facing the sun. The heat is then stored in water-filled tanks or concrete. No mechanical devices are used in passive heating systems. They operate with little or no mechanical assistance.

With active systems, on the other hand, you collect the solar energy at one location, and then you use pumps and fans to move heat from the collectors through a plumbing system to a tank, where can be used to heat a home or to just provide hot water.

Student B
Excuse me professor, but I've got to ask, how can solar energy work at night or on cloudy days?

Professor
That's...Well...that is a really good question. As a matter of facts, science is still working on it, trying to find ways of enhancing energy storage techniques so that coming of night or cloudy days really wouldn't matter. That is the biggest drawback to solar energy. The problem of what do you do in cases where the sun's light is weak or virtually non-present. So the storage of solar energy, lots of solar energy, is a really important aspect.

Student A
Does that mean that solar energy can only be used on a small scale, like heating a home?

Professor
Well actually, there have been some attempts to build solar energy power plants. The world's largest solar plant is located in Cremer Junction California. It can generate 194 megawatts of electric power, but that's just a drop in the bucket. Right now the utility companies are interested in increasing the capacity of Cremer Junction Plant, but only time will tell if it will ever develop

into a major source of power for that region, considering the economic and political factors involved.

TPO 13 Conversation 1

Professor:
Good afternoon, Alex, can I help you with something?

Student:
Well, I want to talk with you about the research project you have assigned today. I um…I hope you could clarify a few things for me.

Professor:
I'll certainly try.

Student:
Ok, all we have to do is do two observations and take notes on them, right?

Professor:
Ur, that's the start, but you need to do some research, too. Then you will write a paper that is not so much about the observations, but a synthesis of what you have observed and read.

Student:
Ok….And what about the children I am suppose to observe?

Professor:
Not children, a single child observed twice.

Student:
Oh…Ok, so I should choose a child with a permission of a child's parents of course and then observed that child a couple of times and take good notes, then?

Professor:
Actually after your first observation, you go back and look through your textbook or go to a library and find a few sources concerning the stage of development, the particular child is in. Then, with that knowledge, you will make the second observation of the same child to see if these expected developmental behaviors are exhibited.

Student:
Can you give me an example?

Professor:
Well, en, if you observed a 4 year-old child, for example, my daughter is 4 years old; you might read up on cushy stage of cognitive development we covered those in class.

Student:
Aha…

Professor:
And most likely, what stage would a child of that age be in?

Student:
Um… the pre-operational stage?

Professor:
Exactly, if that's the case, her languages used to be maturing and her memory and imagination would be developed.

Student:
So she might play pretend like she can pretend when driving her toy car across a couch that the couch is actually a bridge or something.

Professor:
That is right. In addition, her thinking would be primarily egocentric.

Student:
So she would be thinking mostly about herself and her own needs, and might not be able to see things from anyone else perspective.

Professor:
En hums…

Student:
But what if she doesn't? I mean, what if she doesn't demonstrate those behaviors?

Professor:
That's fine; you'll note that in your paper. See, your paper should compare what is expected of children at certain stages of development with what you

actually observed.

Student:
Ok, I have one more question now.

Professor:
What's that?

Student:
Where can I find a child to observe?

Professor:
Ur, I suggest you contact the education department secretary. She has a list of

contacts at various schools and with certain families who are somehow connected to the university. Sometimes they are willing to help out students with projects like yours.

Student:
Ok, I'll stop by the educational department office this afternoon.

Professor:
And if you have any trouble or any more questions, feel free to come by during my office hours.

TPO 13 Lecture 1 City planning

Narrator:
Listen to the lecture in the city planning class.

Professor:
In the last 15 years or so, many American cities have had difficulties in maintaining a successful retail environment. Business owners in the city centers or the downtown areas have experienced some financial losses, because of the city movement of the people out of the city and then into suburbs. In general, downtown areas, just don't have that many residential

areas, not that many people live there. So what did city planners decide to do about it? While, one way they've came up with the some ways to attract more people, to shop downtown was by creating pedestrian malls.

Now, what is a pedestrian mall? It's a pretty simple concept really, it is essentially an outdoor shopping area designed just for people on foot. And… well, unlike many of other shopping malls that are built in suburb nowadays, these pedestrian malls are typically located in the downtown areas of the city. And there are features like white sidewalks, comfortable outdoor sitting and maybe even for tens---UN…you know art. There are variations on this model of course, but the common denominators are always an idea of creating a shopping space that will get people to shop in the city without needing their cars. So I am sure you can see how heavy an area that off-limits to automobile traffic would be ideal for heavily populated city where, well, the streets will otherwise be bustling with noise, unpleasant traffic congestion. Now the concept which originated in Europe was adopted by American city planners in the late 1950s. And since then, a number of Unites States' cities have created the pedestrian malls. And many of them have been highly successful. So what does city planner learns about ** these malls succeed?

Well, there are two critical factors to consider when creating the pedestrian malls--- location and design. Both of which are equally important. Now let's start with location. In choosing a specific location for pedestrian mall, there are in fact two considerations. Proximity to potential customers, UN…that's we'll call it customer base and accessibility to public transportation which we will get into just a moment. Now, for a customer base, the most obvious example would be a large office building since the employees could theoretically go shopping after work or during their lunch hour, right? Another really good example is convention center which typically has a hotel and large meeting spaces to draw visitors to the city for major business conferences and events. But ideally, the pedestrian malls will be used by local residents, not just people working in the city or visiting the area. So that's where access to the public transportation comes in, if… if the designer planed to locate the malls in central transportation hub, like bus terminal, a major train, subway station or they work

with city officials to create sufficient parking areas, not too far from the mall, which make sense because people can drive into the mall area or then they need easy access to it.

OK, so that's location, but what about design? Well, design doesn't necessarily include things like sculptures or decorative walkways or… or even eye

catching window displays, you know art. Although I bet the first to admen those things are ascetically appealing, however, visually pleasing sights, while there are not a part of pedestrian malls design that matter than most. The key consideration is a compact and convenient layout. One which allows pedestrians to walk from one end of the mall to the other in just a few minutes, so you can get the major stores, restraints and other central places without having to take more than one or two turns. Now, this takes a careful uncreative planning.

But now what if one ingredient to this planning recipe is missing? There could quite be possibly long lasting effects. And I think a good example is pedestrian mall in the Louisville Kentucky for instance. Now when the Louisville mall was built, it has lots of visual appeal, it was attractively designed, right in the small part of downtown and it pretty much possessed other design elements for success. But now, here is my point about location comes into play. There wasn't a convention center around to help joining visitors and was the only nearby hotel eventually closed down for that same reason. Well, you can imagine how these malls affected local and pedestrian malls business owners. Sort of what was we called it a chain reaction. It wasn't until a convention center and a parking garage was built about decades later that malls started to be successful.

TPO 13 Lecture 2 Ecology

Narrator:
Listen to a part of a lecture in an ecology class.

Professor:
So, continuing our discussion of ecological systems--- whole systems. The main thing to keep in mind here is the interrelationships. The species in the system err…. and even the landscape itself, they are interdependent. Let's take what you've read for this weekend and see if we can apply this interdependence idea. Mike?

Student:

Well, um…, how about beavers--- ecosystems with beavers in waterways.

Professor:
Good, good, go on.

Student:
Like, well, you can see how it's so important, cause if you go back before European settled in north America, like before the 1600s, back when native Americans were the only people living here, well, back then there were a lot of beavers, but later on, after Europeans…

Professor:
OK, wait, I see where you are heading with this, but before we go into how European settlement affected the ecosystem, tell me this--- what kind of environment do beavers live in? Think about what it was like before the Europeans settlers came, we'll come back to where you were headed.

Student:
OK, well, beavers live near streams and rivers and they block up the streams and rivers with like logs and sticks and mud. You know, they build dams that really slow down the flow of the stream. So then the water backs up, and creates like a pond that floods the nearby land.

Professor:
And that creates wetlands. OK, tell me more.

Student:
Well with wetlands, it's like there is more standing water, more Stillwater around, and that water is a lot cleaner than swiftly flowing water, because the dirt and settlement and stuff has the chance to sink to the bottom.

Professor:

More important for our discussion, wetland areas support a lot more variety of life than swiftly flowing water. For example, there are more varieties of fish or insects, lots of frog spices, and then species that rely on those species start to live near the wetlands too.

Student:
Yes, like birds and mammals that eat the fish and insects, and you can get trees and plants that begin to grow near the standing water, that can't grow

near the running water. Oh, and there's something about wetland, and ground water too.

Professor:
OK, good. Wetlands have a big affect on ground water, the amount of water below the surface of the land. Think of wetlands as, Umm, like a giant sponge, the earth soaks up a lot of this water that's continually flooding the surface, which increases the amount of water below. So where is there a wetland, you get a lot of ground water, and ground water happens to be a big source of our own drinking water today.

All right… So, back to the beavers, what if the beavers weren't there?

Student:
You just have a regular running stream, because there is no dam, so the ecosystem would be completely different, there would be fewer wetlands.

Professor:
Exactly, so, now let's go back to where you were headed before, Mike. You mentioned the change that occurred after Europeans came to North America.

Student:
Yeah, well, there used to be beavers all over the place, something like 200 million beavers, just in the continental United States. But when Europeans came, they started hunting the beavers for their fur, because beaver fur is really warm, and it was really popular for ** hats in Europe. So the beavers were hunted a lot, overhunted, they are almost extinct by the 1800s, so… that meant fewer wetlands, less standing water.

Professor:
And what does that mean for the ecosystem? Kate?

Student:
Well if there is less standing water than the ecosystem can support its many species, because a lot of insects and fish and frogs can't live in running water, and then the birds and animals that eat them, lose their foods supply.

Professor:
Precisely, so the beaver in this ecosystem is what we call a keystone species.

The term keystone kind of explains itself. In architecture, a keystone in an

archway or doorway is the stone that holds the whole thing together, and keeps it from collapsing. Well, that's what a keystone species does in an ecosystem. It's the critical species that keeps the system going. Now, beaver populations are on the rise again, but there is something to think about.

Consider humans as part of these ecosystems, you've probably heard about water shortages or restrictions on how much water you can use, especially in the summer time, in recent years. And remember what I said about groundwater; imagine if we still have all those beavers around, all those wetlands. What would our water supply be like then?

TPO 13 Conversation 2

Narrator:
Listen to a conversation between a student and the language lab manager.

Student:
Hi, I'm not sure, but err... is this the Carter language lab?

Manager:
Yes, it is. How can I help you?

Student:
I'm taking the first year Spanish this semester. Our professor says that we need to come here to view a series of videos. I think it is called Spanish Working on Your Accident.

Manager:
Yes, we have that. Err...They are on the wall behind you.

Student:
So, I can just take....err.....Can I take the whole series home? I think there are three of them.

Manager:
I guess you haven't been here before.

Student:
No, no I haven't.

Manager:
Ok, well, you have to watch the videos here. You need to sign in to reserve an open room and sign out the video you need, just start with the first one in the series, each video have an hour long.

Student:
So, it is a video library, basically?

Manager:
Yes, but unlike the library, you can't take any videos out of the lab.

Student:
OK, so how long can I use the video room for?

Manager:
You can sign up for two hours at a time.

Student:
Oh, good, so I can watch more than one video when I come up here. Is the lab pretty busy all the time?

Manager:
Well, rooms are usually full read after dinner time, but you can sign up the day before to reserve the room if you are.

Student:
Err...the day before....But, I can just stop in to see if the any lab is open, right?

Manager:
Sure, stop in any time.

Student:
What about copies of these videos? Is there just one copy of each in the series? I don't want to miss out everyone comes in a once.

Manager:
Oh, no, we have several copies of each tape of Spanish accident series. We usually have multiple copies for everything for each video collection.

Student:
Super. So...how many rooms are there total in the lab?

Manager:
20. They are pretty small. So, we normally get one person or no more than a small group of people in their watching the video together. Actually, someone else for your class just came in and took the first Spanish video into watch. You could probably run in a watch with them. Of course, you are welcome to have own room. But, sometimes students like to watch with classmate, so they can review the material with each other afterwards. For example, it was with some content they didn't really understand.
Student:
I guess I prefer my own room. I concentrate better about myself and I don't want to miss anything, you know, and it is probably already started watching it...

Manager:
No problem, we've got a lot of rooms open right now. When you come in, you sign your name on the list and I signed the room number or if you call that event that it attended tell you your room number, if you forget, just come in and take a look at the list. The videos are over there.

Student:
Great, thanks.

TPO 13 Lecture 3 Poetry

Narrator:
Listen to part of the lecture in poetry class, the professor is discussing medieval poetry.

Professor:
OK, so the two poems we are looking at today fall into the category of medieval times, which was how long ago?

Student:
Almost a thousand years ago, right?

Professor:
Yes, that's right.

Student:
But, professor, are you sure these are poems? I mean I thought poems were shorter; these were more like long stories. I mean one of them must all about love, but the other one the Chan…Chan…whatever it called, the other one; it's all about fighting and battles. I mean can both of them be considered to be poems?

Professor:
Well, think back to the very beginning of this course.

Student:
Aha

Professor:
Remember how we, we define poetry? In the very broadest sense, we said it's written to evoke, to make you, the audience, have some kind of the emotional experience through the use of imagery, en, some kinds of predictable rhythm. And usually, but not always, there's more than one meaning implied with the words that are used.

Let's start with the Chanson poetry first. That's Chanson. Chanson poem became popular in Europe, particularly in France, and the term is actually

short for a longer French phrase that translates to a…huh… songs of deeds. Now they were called songs of deeds because strangely enough, they were written to describe the heroic deeds or actions of warriors, the knights during conflicts. We don't know a lot about the authors, it still contests somewhat. But we are pretty sure about who the Chanson poems were written for. That is---they were written for the knights and the lords---the nobility that they served. The poems were song performed by a minsstrola, a singer who

travelled from castle to castle, singing to its local lord and its knights. Ah… well, would someone summarize the main features of the Chanson poems you read?

Student:
Well, there's a hero, and a knight, who goes to battle, and he is inspired for his courage, bravery and loyalty, loyalty to the royalty serves, his country and his fellow warriors in the field. He's a, he has a, he's a skilled fighter, willing to face the most extreme dangers, sacrificial, willing that sacrifice anything and everything to protect his king and country.

Professor:
Ok, now be given that the intended audiences for these poems were knights and lords. What can we say about the purpose of Chanson poetry? What kinds of feelings were it meant to provoke?

Student:
I guess they must been really appealing to those knights and lords who were listening to them. Hearing the songs probably made them feel more patriotic, made them feel like a good noble thing to serve their countries, and whatever way they could.

Professor:
Good, we've got a pretty good picture of what the Chanson hero was like. Now let's compare that to the hero in the other poem. The other poem is an example what's called Romance Poetry. And the hero in the romance poems was also in knight. But what made the knight in Romance Poetry different from the knight in Chanson poetry. Well, first the purpose of the hero's actions was different. The hero in the Romance Poetry is independent, purely solitary in a way, not like the Chanson poet who was always surrounded by his fighting companions. He doesn't engage in the conflict to protect his lords or country. He does it for the sake of adventure, to improve himself, to show his worthy of respect and love for his lady. He's very conscious of the particular

rules of social behavior he has to live up to somehow. And all of those actions are for the purpose of proving that he is an upright moral, well-mannered, well behaved individual. You may have noticed that in Chanson's poetry there isn't much about the hero's feelings. The focus is on the actions, the deeds. But the Romance Poetry describes a lot of the inner feelings, the motivations, psychology you could say, of the knight trying to improve himself, to better himself, so he's worthy the love of a woman.

What it explains this difference? Well, a digging into the historical context tells us a lot. Romance Poetry emerged few generations after Chanson, and its roots were in geographical regions of France that were comer, where conflict wasn't central to people's lives. More peaceful times meant there was more time for education, travel, more time for reflection. Another name for Romance Poetry that's often synonym with it is troubadour poetry.

Troubadours were the authors of the new romance poems. And we know a lot more about the troubadours than we do about the Chanson authors, because they often had small biographical sketches added to their poems that gives more specific information about their social status, geographical location and small outlines of their career. These information wasn't particularly reliable because they were sometimes based on fictitious stories, great adventure or the scrape together from parts of the different poems. But there is enough to squeeze or infer some facts about their social class. The political climates have settle down enough so that troubadours had the luxury being able to spend most if not all of their time, creating, crafting or composing their love songs for their audiences. And yes these poems were also songs; many troubadours were able to make a living being full time poets which should tell you something about the value of that profession during the medieval times.

TPO 13 Lecture 4 Astronomy

Narrator:
Listen to part of a lecture in an astronomy class.

Professor:
OK, I wanna go over the different types of meteoroids, and what we've learned from them about the formation of earth, and solar system. Uh… the thing is what's especially interesting about meteoroids is that they come from interplanetary space, but they consist of the same chemical elements that are in matter originated on earth, just in different proportions. But that makes it easier to identify something as a meteoroid, as it opposed to…to just a terrestrial rock. So to talk about where meteoroids come from, we need to talk about comets and asteroids, which basically...they're basically made up of debris left over from the origin of the solar system 4.6 billion years ago.

Now I'm going a bit out of a boarder here…umm…I'm not going to go into any depth on the comets and asteroids now, but we'll come back later and do that. From now, I'll just cover some basic info about them.

OK, comets and asteroids. It might help if you think of...remember we talked about the two classes of planets in our solar system? And how they differ in composition? The terrestrial planets--like Mars and Earth--composed largely of rocks and metals, and the large gas giants, like Jupiter. Well, the solar system also has two analogous classes of objects, smaller than planets--namely, asteroids and comets. Relatively near the sun and inner solar system, between Jupiter and Mars to be precise, we've got the asteroid belt, which contains about 90 percents of all asteroids orbiting the sun. These asteroids are…uh…like the terrestrial planets, and they're composed mostly of rocky materials and metals.

Far from the sun, in the outer solar system, beyond Jupiter's orbit, temperatures are low enough to permit ices to form out of water and…and out of gases like methane and carbon dioxide. Loose collections of these ices and small rocky particles form into comets. So comets are similar in composition to the gas giants. Both comets and asteroids are...typically are smaller than planets.

And even smaller type of interplanetary debris is the meteoroid. And it's from meteoroids that we get meteors and meteorites. "Roids" are, for the most part anyway, they are just smaller bits of asteroids and comets. When these bits enter earth's atmosphere, well, that makes them so special that they get a special name. They're called meteors. Most of them are very small, and they burn up soon after entering earth's atmosphere. The larger ones that make it through the atmosphere and hit the ground are called meteorites. So

meteorites are the ones that actually make it through.

Now we've been finding meteorites on earth for thousands of years, and we've analyzed enough of them to learn a lot about their composition, most come from asteroids, though a few may have come from comets. So essentially they are rocks, and like rocks, they're mixtures of minerals. They are generally classified into three broad categories--stones, stony irons and irons.

Stone meteoroids, which we refer to simply as, uh, stones, are almost entirely rock material. They actually account for almost all of the meteorite material that falls to earth. But even so, it's rare to ever find one. I mean, it's easier to find an iron meteorite or stony iron. Anyone guess why? Look at their names. What do you think iron meteorites consist of?

Student:
Mostly iron?

Professor:
Yeah… iron and some nickel, both of which are metals. And, if you're trying to find metal?

Student:
Oh! Metal detectors!

Professor:
Right, thank you. At least that's part of it. Stone meteoroids, if they lie around exposed to the weather for a few years, well, they're made of rock, so they end up looking almost indistinguishable from common terrestrial rocks--once that originated on earth. So it's hard to spot them by eye. But we can use metal detectors to help us find the others, and they're easier to spot by eye. So most of the meteorites in collections, uh, in museums, they'll be...they're iron meteorites, or the stony iron kind, even though they only make up about 5 percents of the meteorite material on the ground.

TPO 14 Conversation 1

Narrator:
Listen to a conversation between a student and the librarian employee.

Student:
Hi, I am looking for this book---the American judicial system. And I can't seem to find it anywhere. I need to read a chapter for my political science class.

Librarian:
Let me check in the computer. Um… doesn't seem to be checked out and it's not on reserve. You've checked the shelves I assume.

Student:
Yeah, I even checked other shelves and tables next to where the book should be.

Librarian:

Well, it's still here in the library. So people must be using it. You know this seems to be a very popular book tonight. We show six copies. None are checked out. And, yet you didn't even find one copy on the shelves. Is it a big class?

Student:
Maybe about Seventy Five?

Librarian:
Well, you should ask your professor to put some of the copies on reserve. You know about the 'Reserve system', right?

Student:
I know that you have to read reserve books in the library and that you have time limits. But I didn't know that I could ask a professor to put a book on the reserve. I mean I thought the professors make that kind of decisions at the beginning of the semester.

Librarian:
Oh… they can put books on reserve at anytime during the semester.

Student:
You know reserving book seems a bit unfair. What if someone who is not in the class wants to use the book?

Librarian:
That's why I said some copies.

Student:

Ah, well, I'll certainly talk to my professor about it tomorrow. But what I am gonna do tonight?

Librarian:
I guess you could walk around the Poli-Sci ----- 'Political Science' section and look at the books waiting to be re-shelved.

Student:
There are do seem to be more than normal.

Librarian:
We are a little short of staff right now. Someone quit recently, so things aren't getting re-shelved as quickly as usual. I don't think they've hired replacement yet, so, yeah, the un-shelved books can get a bit out of hand.

Student:
This may sound a bit weird. But I've been thinking about getting a job. Um… I've never worked at the library before, But…..

Librarian:
That's not a requirement. The job might still be open. At the beginning of the semester we were swamped with applications, but I guess everyone who wants the job has one by now.

Student:
What can you tell me about the job?

Librarian:
Well, we work between six and ten hours a week, so it's a reasonable amount. Usually we can pick the hours we want to work. But since you'd be starting so late in the semester, I'm not sure how that would work for you. And… Oh… we get paid the normal university rates for student employees.

Student:
So who do I talk to?

Librarian:
I guess you talk to Dr. Jenkins, the head librarian. She does the hiring.

TPO 14 Lecture 1 Psychology

Narrator:
Listen to part of a lecture in a psychology class

Professor:
We've said that the term "Cognition" refers to mental states like: knowing and believing, and to mental processes that we use to arrive at those states. So for example, reasoning is a cognitive process, so it's perception. We use information that we perceive through our senses to help us make decisions to arrive at beliefs and so on. And then there are memory and imagination which relate to the knowledge of things that happen in the past and may happen in the future. So perceiving, remembering, imagining are all internal mental processes that lead to knowing or believing. Yet, each of these processes has limitations, and can lead us to hold mistaken believes or make false predictions. Take memory for example, maybe you have heard of studies in which people hear a list of related words. Ah…, let`s say a list of different kinds of fruit. After hearing this list, they are presented with several additional words. In this case, we`ll say the additional words were "blanket" and "cheery". Neither of these words was on the original list, and, well, people will claim correctly that "blanket" was not on the original list, they'll also claim incorrectly that the word "cheery" was on the list. Most people are convinced they heard the word "cheery" on the original list. Why do they make such a simple mistake? Well, we think because the words on the list were so closely related, the brain stored only the gist of what they heard. For example, that all the items on the list were types of the fruit. When we tap our memory, our brains often fill in details and quite often these details are actually false. We also see this "fill-in" phenomenon with perception. Perception is the faculty that allows us to process information in the present as we take it via our senses. Again, studies have shown that people will fill in information that they thought they perceived even when they didn`t. For example, experiments have been done where a person hears a sentence, but it is missing the word, that logically completes it. They'll claim to hear that word even though it was never said. So if I were to say…er…the sunrise is in the…and then fill to complete the sentence, people will often claim to have heard the word "east".
In cognitive psychology, we have a phrase for this kind of inaccurate "filling in of details"--- it's called: A Blind Spot. The term originally refers to the place in our eyes where the optic nerve connects the back of the eye to the brain. There are no photo receptors in the area where the nerve connects to the eye. So that particular area of the eye is incapable of detecting images. It produces "A Blind Spot" in our field vision. We are unaware of it, because the brain fills in what it thinks belongs in its image, so the picture always appears complete to us. But the term "blind spot" has also taken on a more general meaning--- it refers to people being unaware of a bias that may affect their judgment about the subject. And the same "blind-spot phenomenon" that affects memory and perception also affects imagination. Imagination is a faculty that some people use to anticipate future events in their lives. But the ease with which we imagine details can lead to unrealistic expectations and can bias our decisions.

So…er…Peter, suppose I ask you to image a lunch salad, no problem, right? But I bet you imagine specific ingredients. Did yours have tomatoes, Onion, Lettuce? mine did? Our brains fill in all sorts of details that might not be part of other people's image of a salad, which could lead to disappointment for us. If the next time we order a salad in a restaurant, we have our imagined salad in mind, that's not necessarily what we'll get on our plate. The problem is not that we imagine things, but that we assume what we've imagined is accurate. We should be aware that our imagination has this built-in feature, the blind spot, which makes our predictions fall short of reality.

TPO 14 Lecture 2 Biology

Narrator:

Listen to part of a lecture in a biology class.

Professor:

Almost all animals have some way of regulating their body temperature; otherwise they wouldn't survive extreme hot or cold conditions---sweating, panting, swimming to cooler or warmer water; ducking into somewhere cool like a burrow or a hole under a rock; these are just a few. And that's body is colder or warmer than the surrounding environment, because it's a microclimate.
A microclimate is a group of climate conditions that affect the localized area, weather features like temperature, wind, moisture and so on. And when I say localized, I mean really localized, because microclimates can be, as the name suggests, pretty small, even less than a square meter. And microclimates are affected by huge number of other variables. Obviously weather conditions in the surrounding areas are a factor. But other aspects of the location like, um… the elevation of the land, the plant life nearby, and so on, have a substantial effect on microclimates. And of course the human development in the area, eh, a road will affect a nearby microclimate. It's also interesting to know that microclimates thither or near each other can have very different conditions. In the forest for example, there can be a number of very different microclimates close to each other, because of all the variables I just mentioned.

Student:

So how does a hole in the ground, a burrow, stay cool in a hot climate?

Professor:

Well, since cold air sinks, and these spots are shaded, they are usually much cooler than the surrounding area. And these spots are so important because many animals rely on microclimates to regulate their body temperature. Hmm, for instance, there is a species of squirrel, in the Western part of the United States that can get really hot when they were out foraging for food. So they need a way to cool down. So what'd they do? They go back to their own burrow. Once they get there, their body temperatures decrease very, very quickly. The trip to the burrow prevents the squirrel from getting too hot.

Student:

But squirrels are mammals, right? I thought mammals regulate their temperature internally.

Professor:

Mammals do have the ability to regulate their body temperature, but not all can do it to the same degree, or even the same way. Like when you walk outside on a hot day, you perspire, and your body cools itself down, a classic example of how mammal regulates its own body temperature. But one challenge that squirrels face, well many small mammals do, is that because of their size, sweating would make them lose too much moisture. They dehydrate. But on the other hand, their small size allows them to fit into very tiny spaces. So for small mammals, microclimates can make a big difference. They rely on microclimates for survival.

Student:

So cold blood animals, like reptiles, they can't control their own body temperature, so I can image the effect of microclimate would have on them.

Professor:

Yes, many reptile insects rely on microclimates to control their body temperature. A lot of reptiles use burrows or stay under rocks to cool down. Of course with reptiles, it's a balancing act. Staying in the heat for too long can lead to problems, but staying in the cold can do the same. So reptiles have to be really precise about where they spend their time, even how they position their bodies. And when I say they're precise, I mean it--- some snakes will search out a place under rocks of a specific thickness, because too thin a rock doesn't keep them cool enough, and too thick a rock will cause them to get too cold. That level of precision is critical to the snake for maintaining its body temperature. And even microscopic organisms rely on microclimates for survival.
Think about this, decomposing leaves create heat that warms the soil; the warm soil in turn affects the growth, the conditions of organisms there. And those organisms then affect the rate of decomposition of the leaves. So a microclimate can be something so small and so easily to disturbed that even a tiny change can have a big impact. If someone on a hike knocks a couple of rocks over, they could be unwittingly destroying a microclimate that an animal or organism relies on.

TPO 14 Conversation 2

Narrator:

Listen to a conversation between a student and his faculty adviser

Advisor:
Hi ， Steven I schedule this appointment, cause it has been a while since we touch this.

Student:

I know I have been really busy--- a friend of my works on a school a paper. He asks me if I would like to try to reporting so I did and I really love it.

Advisor:

Hey…that's sounds great!

Student:

Yeah… the first article I wrote it was profile of the chemistry professor---the one whose name teacher the year. My article ran on the front page. When I saw my name, I mean my byline in print, I was hooked. Now I know this is what I want to do--- be a reporter.

Advisor:

Isn't it great to discover something that you really enjoy? And I read that the article too? It was very good.

Student:

To be honest, the articles got a lot of editing. In fact I barely recognized a couple of paragraphs. But the editor explained why the changes were made. I learned a lot and my second article didn't meet nearly many changes.

Advisor:

Sound like you got a real neck for this.

Student:

Yeah… anyway, I am glad you schedule this meeting because I want to change my major to journalism now.

Advisor:
Um，the university doesn't offer major in journalism.

Student:

Oh no…

Advisor:

But….

Student:

I… I mean… should I transfer to another school, or major in English?

Advisor:
Er… wait a minute. Let me explain why the major isn’t offered. Editors at the newspaper… editors… um… I mean when you apply for a reporting job, editors look at the two things--- they want to see clips, you know, some of your published articles, though also want to try out, though give you an assignment like… covering a price of conferences some other event, then see if you can craft the story about it, accurately, on dead line.

Student:

So they don't even to look at my major?

Advisor:

It is not that they don't look at it… it is… well, having a degree in something other than journalism should actually work to your advantage.

Student:
How?

Advisor:

Most journalism specialized these days. They only write about science or business or technology for example. Is there a type of reporting you think you may like to specialize then?

Student:

Well… I think it can be really cool to cover the Supreme Court. I mean… their decision affects so many people.

Advisor:

That is really a goal worth striving for. So, why not continue major in political science? And as elective, you could take some Pre-Law classes like Constitution Law, and as for you work on the student newspaper paper, maybe they let you cover some local court cases--- once that the student and professor here would want to read about.

Student:
Do you know of any?

Advisor:
I do. Actually, there is case involving this computer software program that one of our professors wrote. The district courts decide in if the university entitle to any of our professors' profits?

Student:
Wah…. I will definitely follow upon that!

TPO 14 Lecture 3 Astronomy

Narrator:

Listen to part of a lecture in an astronomy class.

Professor:

OK, last time we talked about ancient agricultural civilizations that observed the stars and then used those observations to keep track of the seasons. But today I want to talk about the importance of stars for early seafarers, about how the fixed patterns of stars were used as navigational aids.
OK, you've all heard about the Vikings and their impressive navigation skills, but the seafaring people of the pacific islands, the Polynesians and the Micronesians, were quite possibly the world's greatest navigators. Long before the development of, uh, advanced navigational tools in Europe, pacific islanders were travelling from New Zealand to Hawaii and back again, using nothing but the stars as their navigational instruments.
Um, the key to the pacific islanders' success was probably their location near the equator. What that meant was that the sky could be partitioned, divided up, much more symmetrically than it could farther away from the equator. Unlike the Vikings, early observers of the stars in Polynesia or really anywhere along the equator would feel that they were at the very center of things, with the skies to the north and the skies to the south behaving identically, they could see stars going straight up in the east and straight down in the west. So it was easier to discern the order in the sky than farther north or farther south, where everything would seem more chaotic.
Take the case of the Gilbert Islands, they are part of Polynesia, and lie very close to the equator. And the people there were able to divide the sky into symmetrical boxes, according to the main directions, north, east, south and west. And they could precisely describe the location of a star by indicating its position in one of those imaginary boxes. And they realized that you had to know the stars in order to navigate. In fact there was only one word for both in the Gilbert Islands, when you wanted to the star expert, you ask for a navigator.
Um, islanders from all over the pacific learned to use the stars for navigation, and they passed this knowledge down from generation to generation. Some of them utilized stone structures called stone canoes, ah, and these canoes were on land, of course, and you can still see them on some islands today. They were positioned as if they were heading in the direction of the points on the sea horizon where certain stars would appear and disappear during the night, and, um, young would-be navigators set by the stones at night and turned in different directions to memorize the constellations they saw, so they could recognize them and navigate… by them later on when they went out to sea.
One important way the Polynesians had for orienting themselves was by using zenith stars. A zenith star was a really bright star that would pass directly overhead at particular latitude…at a particular distance from the equator, often at a latitude associate with some particular pacific island. So the Polynesians could estimate their

latitude just by looking straight up, by observing whether a certain zenith star passed directly overhead at night, they'd know if they have rates the same latitude as a particular island they were trying to get to. Um, another technique used by the Polynesians was to look for a star pair, that's two stars that rise at the same time, or set at the same time, and navigators could use these pairs of stars as reference points, because they rise or set together only at specific latitudes. So navigators might see one star pair setting together. And, uh…would know how far north or south of the equator they were. And if they kept on going, and the next night they saw the pairs of stars setting separately, then they would know that they were at a different degree of latitude. So looking at rising and setting star pairs is a good technique. Um… actually it makes more sense with setting stars; they can be watched instead of trying to guess when they'll rise.

Uh, OK, I think all this shows that navigating doesn't really require fancy navigational instruments; the peoples of the pacific islands had such expert knowledge of astronomy as well as navigation that they were able to navigate over vast stretches of Open Ocean. Uh, it's even possible that Polynesian navigators had already sailed to the Americas, centuries before Columbus.

TPO 14 Lecture 4 Archeology

Narrator:

Listen to part of the lecture in the archaeology class

Professor:
When we think of large monumental structures built by early societies and Egyptian pyramid probably comes to mind. But there are some even earlier structures in the British Isles also worth discussing, and besides the well-known circle of massive stones of Stonehenge which don't get me wrong is remarkable enough, well, other impressive Neolithic structures are found there too. Oh, yes, we are talking about the Neolithic period here, also called new Stone Age, which was the time before stone tools began to be replaced by tools made by bronze and other metals.
It was about 5000 years ago, even before the first Egyptian pyramid that some of amazing Neolithic monuments---tombs, were racketed at the very size around ironed Great Britain and costal islands nearby.
I am referring particular to structures that in some cases, look like ordinary natural hills. But we definitely build by humans, well-organized communities of human's to enclose a chamber or room within stone walls and sometimes with a high, cleverly designed sealing of overlapping stones. These structures are called Passage Graves, because in the chamber, sometime several chambers in fact, could only be entered from the outside through a narrow passage way.

Michael:
Excuse me, professor, but you said Passage Graves. Was this just monument to honor the dead buried there or were they designed to be used somehow by the living?

Professor:
Ah, yes! Good question, Michael. Besides being built as tombs, some of these Passage Graves were definitely what we might call Astronomical Calendars, with chambers they flooded with some light on the certain special days of the year, witch must see miraculous and inspired good dealer of they really just wonder. But research indicates that not just light but also the physics of sound help to enhance this religious experience.

Michael:
How so?

Professor:
Well, first the echoes. When religious leaders started chanting with echoes bounced off the stonewalls over and over again, it must seem like a whole chorus of other voices, spirits of God maybe join in. But even more intriguing is what physicists called Standing Waves. Basically, the phenomenon of Standing Waves occurs when sound waves of the same frequency reflect off the walls and meet from opposite directions. So, the volume seems to alternate between very loud and very soft. You can stand

quite near a man singing in loud voice and hardly hear him. Yet step little further away and voice is almost defining. As you move around chamber, the volume of the sound goes way up and way down, depending on where you are and these standing waves. And often the acoustic makes it hard to identify where sounds are coming from. It is powerful voices that are speaking to you or chanting from inside your own head. This had to engender powerful sense of all Neolithic worshipers.

And another bit of physics I played here is something called Resonance. I know physics, but well I imagine you have all below near of top empty bottles and heard sounds it makes. And you probably notice that depending on its size--- each empty bottle plays one particular music note. Or it is the physics might put it, each bottle resonates at a particular frequency. Well, that's true of these chambers too. If you make a constant noise inside the chamber, maybe by steadily beating drum at certain rate, a particular frequency of sound will resonate. We will ring out intensely, depending on the size of chamber. In some of large chambers though, these intensified sound may be too deep for us to hear, we can feel it. We are mysteriously agitated by a….but it is not a sound our ears can hear. The psychological effects of all these extraordinary sounds can be profound, especially when they seem so disconnected from human doing drumming or chanting. And there can be observable physical effects on people too. In fact, the sounds can cause headaches, feelings of dizziness, increase heartache, that sort of thing, you see.

Anyway, what is we experience inside one of these Passage Graves clearly could be far more intense than everyday reality outside which made them very special places. But back to your question, Michael, as to whether these Graves were designed to be used by the living. Well, certainly, we have got to ask economical or calendar function. That seems pretty obvious, and I wanna go into more detail on that now.

TPO 15 Conversation 1

Narrator:
Listen to a conversation between a student and the faculty advisor of the campus newspaper .
Student
Hi! I talked to someone on the phone a couple of weeks ago, Anna , I think it was?
Advisor
I'm Anna, the faculty advisor
Student
Oh, great! I'm Peter Murphy. You probably don't r e member me, but …
Advisor
No! No! I remember you . You're interested in working for the paper.
Student
Yeah, as a reporter .
Advisor
That's right. You're taking a jo urnalism class and you ’ ve done some reporting before in high school, right?
Student
Wow, you have a good memory.
Advisor
Well we haven ’ t had many students applying lately so … so anyway, you still want to do some reporting for us?
Student
Yeah, if you have room for me on the staff .
Advisor
Well we always need more reporters, but you know, we don't pay anything, right?
Student
Yeah, I know, but I huh.. . I'd like the experience. It would look good on my resume .
Advisor
Absolutely! Let's see . I think I told you that we ask prospective reporters to turn in some outlines for possible articles .
Student
Yeah, I sent them in about a week ago, but I haven't heard anything back yet, so, so I thought I'd stop by and see, but I guess you haven't looked at them yet .
Advisor
Oh, Max, the news editor. He looks a t all the submissions
Student
Oh , so he hasn't made any decision about me yet?
Advisor
Well I just got here a few minutes ago... haven't been in for a couple of days. Just give me a second to check my e-mail. Uh … here is a message

from Max. Let ’ s see. Well it seems you ’ ve really impressed him. He says it would be wonderful if you could join our staff.
Student
Oh, great! When can I start?
Advisor
WeII, you turned in an outline on something to do with the physics department?
Student
Yeah, they're trying to come up with ways to get more students to take their introductory courses.
Advisor
Right, well , apparently, nobody else is covering that story , so he wants you to follow up on it.
Student
OK. Uh … wha t the other outline I sent in, about the proposed increase in tuition fees?
Advisor
Oh, it lo oks like we've got that covered
Student
So I am starting with an article about the physics department. I guess I'd better get to work. Do you have any advice on how I should cover the story?
Advisor
Well, Max will want to talk to you but I am sure he will tell you to find out things like why the physics department's worried about enrollment. Has the number of students been getting smaller in recent years? By how much? What kinds of plans are they considering to address this problem?
Student
Right, some of those issues are already in what I proposed .
Advisor
And you'll want to do some interviews, you know, what do the professors think of the plans , what do the students think you get the idea but …
Student
But w ai t till I talk to Max before proceeding .
Advisor
Right, he'll cover everything you need to know to be a report e r for us . Can you come back this afternoon? He will be here until 5 o'clock .

TPO 15 Lecture 1 Psychology

Narrator:
Listen to part of a lecture in a psychology class
Professor
For decades, psychologists have been looking at our ability to perform tasks while other things are going on, how we are able to keep from being distracted and what the conditi ons for good concentration are. As long ago as 1982, researchers came up with something call ed the CFQ - the Cognitive Failures Questionnaire. This questionnaire asks people to rate themselves according to how often they get distracted in different situations, like h um … .. forgetti ng to save a computer file because they had something else on their mind or missing a speed limit sign on the road. John?
John
I've lost my share of computer files, but not because I ’ m easily distracted. I just forget to save them.
Professor
And that's part of the problem with th e CFQ. It doesn ’ t take other factors into account enough, like forgetfulness. Plus you really can ’ t say you are getting objective scientific results from a subjective questionnaire where people report on themselves. S o it ’ s no surprise that someone attempted to design an objective way to measure distraction. I t ’ s a simple computer game designed by a psychologist named, Nilli Lavie. In Lavie ’ s game, people watch as the letters N and X appear and disappear in a certain area on the computer screen. Every time they see an N, they press one key, and every time they see an X they press another, except other letters also start appearing in the surrounding area of the screen with increasing frequency which creates a distraction and makes the task more difficult. Lavie observed that people ’ s reaction time slowed as these distractions increased.
Student 2
Well that ’ s not too surprising, isn ’ t it?
Professor
No, it's not. It's the next part of the experiment that was surprising. When the difficulty really increased, when the screen filled up with letters, people got better al spotting the Xs and Ns . What do you think that happened?
John
Well, maybe when we are really concentrating, we just don't perceive irrelevant information . Maybe we just don't take it in, you know?
Professor
Yes, and that's one of the hypotheses that was proposed, that the brain simply doesn't admit the unimportant information. The second h ypothesis is that, yes, we do perceive everything, but the brain categorizes the information, and whatever is not relevant to what we are

concentrating on gets treated as low priority. So Lavie did another experiment, designed to look at the ability to concentrate better in the face of increased difficulty. This time she used brain scanning equipment to monitor activity in a certain part of the brain, the area called V5, which is part of the visual cortex, the part of our brains that processes visual stimuli .

V5 is the area of the visual cortex that's responsible for the sensation of movement. Once again, Lavie gave people a computer-based task to do. They have to distinguish between words in upper and lower-case letters or even harder, they had to count the number of syllables in different words. This time the distraction was a moving star f i el d in the background, you know, where H looks like you are moving through space, passing stars. Normally area of V5 would be stimulated as those moving stars are perceived and sure enough, Lavie found that during the task area of V5 was active, so people were aware of the moving star field. That means people were not blocking out the distraction.

Student

So doesn't that mean that the first hypothesis y ou mentioned w as wr o ng, the one that says we don't even perceive irrelevant information when we are concentrating?

Professor

Yes that's right, up to a point, bu t that ’ s not all. Lavie also discovered that as she made the task more difficult , V5 became less a ctive, so that means that now people weren ’ t really noticing the star field at all. That was quite a surprise and it approved that the second hypothesis – that we do perceive eve rything all the time but the brain categorizes distractions differently, well, that wasn't true eith er. Lavie thinks the solution lies in the brain ’ s ability to accept or ignore visual information. She thinks its capacity is limited. I t ’ s like a highway. W hen there are too many cars, traffic is sto pp e d. No one can get on. S o when the brain is loaded to capacity, no new distractions can be perceived . Now that may be the correct conclusion for visual distractions, but more research is needed to tell us how the brain deals with, say, the distractions of solving a math problem when we are hungry or when someone is singing in the next room.

TPO 15 Lecture 2 Geology

Narrator:
Listen to part of a lecture in a geology class .
Professor
As geologists , we examine layers of sediment on the Earth' s surface to approximate the dates of past geologic time periods. Ah sediment as you know i s material like sand , gravel, fossil fragments that is transported by natural processes like win d , water flow or the movement of glaciers .
So sediment is transported and then deposited and it forms layers on the Earth ' s surface over time. We examine these layers to learn about different ge ologic time periods including when they began and ended.
For example, from about 1.8 million years ago to around 11 thousand years ago was the Pleistocene epic. The Pleistocene epic was an ice age. During this epic, sediment was made by the kind of erosion and we athering that happens when the climate is colder, and part of those sediments are fossils of plants and animals that lived at that time.
The Holocene epic followed the Pleistoce ne epic when the Earth ' s climate warmed up around 11 thousand years ago. The Holocene e pic is characterized by different sediments, ones that form when the climate is warme r. Because the climate changed, the types of plants and animals changed also. Holocene sediments contain remnants of more recent plants and animals, so it's pretty easy to diffe rentiate geologically between these two epics.
Now there is growing evidence that the presence of humans has altered the earth so much that a new epic of geologic history has began – the Anthropocene epic, a new human-influe nced epic. T his idea that we ' ve entered a new Anthro-pocene epic was first proposed in 2002. T he idea is that around the year 1800 CE the human population became large enough, around a billion people, that its activities started altering the environment. T his was also the time of the industrial revolution, which brought a tremendous increase in the use of fossil fuels such coal. The exploitation of fossil fuels has brought planet wide developments: industrialization, construction, uh, mass transport. And these developments have caused major changes like additional erosion of the Earth ' s surface and deforestation. Also, things like the damming of rivers , has caused increased sediment production, not to mention the addition of more carbon dioxide and methane in the atmosphere .
Naturally all these changes show up in recent sediments. And these sediments are quite different from pre year 1800 sediment layers.
Interestingly there's some speculation that h umans started having a major impact on Earth much earlier, about 8000 years ago. That's when agriculture was becoming widespread. Early farmers started clearing forests and livestock produced a lot of extra methane. But I want to stress this is just a hypothesis. The idea that early humans could have had such a major effect, well I'm just not sure we can compare it with

the industrial age. Geologists in the far future will be able t o examine the sediment being laid down today, whereas right now we can say that yes, human impact on the Earth is clear: It'll be future researchers who have a better perspective and will be able to really draw a line between the Holocene and the Anthropocene epics

TPO 15 Conversation 2

Narrator
Listen to part of a conversation between a student and her biology .
Professor
Hi Samantha, how did your track meet go?
Samantha
Great! I placed first in one race and third in another.
Professor
Congratulations ! You must practice a lot.
Samantha
Three times a week pre-season, but now that we ’ re competing every weekend, we practice 6 days a week from 3:30 till 5:00.
Professor
Athletics place a heavy demand on your time, don ’ t they?
Samantha
Yeah, but I really love competing, so …
Professor
You know I played soccer in college and my biggest challenge, and I didn ’ t always succeed, was getting my studying in during soccer season. Are you having a similar …
Samantha
No, I … I really do make time to study. A nd I actually study more for this class than I do for all my other classes. B ut I didn ’ t see the grade I expected on my mid-term exam, which is why I came by.
Professor
Well, you "didn't do badly on the exam, but I agree it did not reflect your potential. I say this because your work on the lab project was exemplary. I was so impressed with the way you handle the microscope and the samples of onion cells, and with how carefully you observed and diagramed and interpreted each stage of cell division. And I don't think you could have done that if you hadn't read and understood the chapter. I mean it seemed like you really had a good understanding of it.
Samantha
I thought so too, but I missed some questions about cell division on the exam
Professor
So what happened?
Samantha
I just sort of blanked out, I guess. I had a hard time remembering details. It was so frustrating.
Professor
Alright, let's back up. You say you studied, where, at home?
Samantha
At my kitchen table actually .
Professor

And that's supposed to be a quiet environment?
Samantha
Not exactly. My brother and parents try to keep it down when I am studying, but the phone pretty much rings off the hook, so …
Professor
So you might try a place with fewer distractions, like the library …
Samantha
But the library closes at mid-night, and I like to study all night before a test, you know, so everything is fresh in my mind. I studied six straight hours the night before the mid-term exam . T hat ’ s why I expected to do so much better.
Professor
Oh ok. Y ou know that studying six consecutive hours is not equivalent to studying one hour a day for six days.
Samantha
It isn ’ t?
Professor
No. There is research that shows that after about an hour of intense focus, your brain needs a break. It needs to, you know, shift gears a little. Your brain's ability to absorb information starts to decline after about the first hour. So if you are dealing with a lot of new concepts and vocabulary, anyway, if you just reviewed your notes, even 20 minutes a day, it'd be much better than waiting until the night before an exam to try and absorb all those details .
Samantha
Oh, I didn't realize .
Professor
Think of your brain as: a muscle. If you didn't practice regularly with your track team, and then tried to squeeze in three weeks worth of running practice just the day before a track meet, how well do you think you'd perform in your races?

TPO 15 Lecture 3 Art History

Narrator:
Listen to part of a lecture in an art history class .
Professor:
Now in Europe in the Middle Ages before the invention of printing and the p r inting pres s, all books, all manual scripts were hand-made. And the material typically used for the pages was parchment, which is animal skin that stretched and dried under tension, so it bec o me s really fat and can be written on . During the 1400s, when printing was being developed, paper became the predominant material for books in Europe, but prior to t hat, it was parchment . Parchment is durable, much more so than paper, and it could be reus ed which came in handy since it was a costly material and in short supply. So it wasn ’ t uncommon for the scribes or monks who produce the manual scripts . Ah, remember before printing books were made mainly in monasteries . Well, the scribes often recycled the parchment that ’ d been used for earlier manual scripts. They simply erased the ink off the parchment and wrote something new in its place
A manual script page that was written on, erased and then used again is called a palimpsest . Palimpsests were created, well, w e kn ow about two methods that were used for removing ink from parchment. In the late Middle Ages, it was customary to scrape away the surface of the parchment with an abrasive, which completely wiped out any writing that was there. But earlier in the Middle Ages, the original ink was usually removed by washing the used parchment with milk. That removed the ink. But with the passing of time, the original writing might reappear. In fact , it might rea pp ear to the extent that scholars could make out an even deci p her , the original text. Perhaps, the most famous example is the Archimedes' palimpsest.
Archimedes li v e d in G re ece around 200 BCE, and as you probably know, he's considered one of the greatest Mathematicians who ever lived, even though , many of his writings had been lost , includi ng what many now think to be his most important work called The Method . But in 1998, a book of prayers from the Middle Ages sold in an art auction for a lot of money, more money than anyone would pay for a damaged book from the 12th century. Beautiful or not, why? It had been discovered that the book was a palimpsest, and beneath the surface writing on the manual script laid, guess what? Mathematical theorems and diagrams from Archimedes
Archimedes' writings were originally done on papyrus scrolls. Then in the 10 th century, a scribe made a copy on parchment of some of his texts and diagrams including, as it turns out, The Method . This was extremely fortunate, since later on, the original papyrus scrolls disappeared. About 200 years later in the 12 th century, this parchment manual script became a palimpsest when a scribe used the parchment to make a prayer book. So the pages, the pieces of parchment themselves, had been preserved.

But the Archimedes' text was erased and written over, and no one knew it existed. It wasn't until 1906 that a scholar came across the prayer book in a library and realized it was a palimpsest, and that the underlying layer of texts could only have come from Archimedes. That was when his work The Method was discovered for the first time .
Um... the palimpsest then went through some more tough times, but eventually it ended up in an art auction where was bought and then donated to an art museum in Baltimore, for conservation and study. To avoid further damage to the manual script, the research team at the art museum has had to be extremely selective in their techniques they used to see the original writing. They've used ultraviolet light and some other techniques, and if you're interested in that sort of thing, you can learn more about it in an art conservation class. But act ually, it was a physicist who came up with a method that was a breakthrough. He realized that the iron in the ancient ink would display if exposed to a certain X-ray imaging method, and except for small portions of the text that couldn't be deciphered, this technique's been very helpful in seeing Archimedes' texts and drawings through the medieval over w riting .

TPO 15 Lecture 4 Biology

Narrator:
Listen to part of a lecture in a biology class.
Professor:
OK. We've been talking till now about the two basic needs of a biological community – an energy source to produce organic materials, you know ah, food for the organism , and the waste recycling or breakdown of materials back into inorganic molecules, and abo ut how all this requires photosynthesis when green plants or microbes convert sunlight into energy and also requires microorganisms, bacteria, to secrete chemicals that break down or r ecycle the organic material to complete the cycle
So, now we are done with this chapter of the textbook, we can just review for the weekly quiz and move on to the next chapter, right? Well, not so fas t. First, I ‘d like to talk about some discoveries that have challenged one of these fundamental assumptions about what you need in order to have a biological community.
And, well, there actually were quite a few surpris es. I t all began in 1977 with the exploration of hydrothermal vents on the ocean floor. Hydrothermal vents are cracks in the Earth ’ s surface that occur, well, the ones we are taiking about here are found deep at the bottom of the ocean. And these vents on the ocean floo r, they release this incredibly hot water, 3-4 times the temperature that you boil water at be cause this water has been heated deep within the Earth. Well about 30 years ago, researche rs sent a deep-sea vessel to explore the ocean ’ s depth, about 3 kilometers down, way deep to ocean floor, No one had ever explored that far down before. Nobody exp ected there to be any life down there because of the conditions. First of all, sunlight doesn't rea ch that far down so it ’ s totally dark. There couldn ’ t be any plant or animal life since there's no sunlight, no source of energy to make food. If there was any life at all, it ’ d just be some bacter ia breaking down any dead materials that might have fallen to the bottom of the ocean . And?
Student 1
And what about the water pressure? D idn ’ t we talk before about how the deeper down into the ocean you go, the greater the pressure?
Professor
Excellent point! And not only the extreme pressure, but also the extreme temperature of the water around these vents. If the lack of sunlight didn't rule out the existence of a biological community down there then these factors certainly would, or so they thought.
Student 2
So you are telling us they did find organisms that could live under those conditions?
Professor:
They did indeed, something like 300 different species
Student 1 But... but how could that be? I mean without sunlight, no energy, no no …

Protessor:
What they discovered was that microorganisms, bacteria, had taken over both functions of the biological community - the recycling of waste materials and the production of energy. They were the energy source.
You see, it turns out that certain microorganisms are chemosynthetic - they don't need sunlight because they take their energy from chemical reactions
So, as I said, unlike green plants which are photosynthetic and their energy from sunlight, these bacteria that they found at the ocean floor, these are chemosynthetic, which means that they get their energy from chemical reactions. How does this work?
As we said, these hydrothermal vents are releasing into the ocean depth this intensely hot water and here is the thing, this hot water co ntains a chemical called hydrogen sulfide, and also a gas , carbon dioxide. Now these bacteria actually combine the hydrogen sulfide with the carbon dioxide and this chemical reaction is what produces organic material which is the food for larger organisms. The researchers had n ever seen anything like it before.
Student 2 : : : :
Wow! So just add a chemical to a gas, and bingo, you ’ ve got a food supply?
Professor
Not just t h at! W hat was even more surprising were all the large organisms that lived down there. The most distinctive of these was something called the tube worm. H ere, let me show you a picture .
The tube of the tube worm is really, really long. They can be up to one and half meters long , and these tubes are attached to the ocean floor, pretty weird looking, huh?
And another thing, the tube worm has no. mouth, or digestive organs. So you are asking how does it eat? Well, they have these special organs that collect the hydrogen sulfide and carbon dioxide and then transfer it to another organ, where billions of bacteria live. These bacteria that live inside the tube worms, the tube worms provide them with hydrogen sulfide and carbon dioxide. And the bacteria, well the bacteria kind of feed the tube worms through chemosynthesis, remember, that chemical reaction I described earlier.

TPO 16 Script Conversation1

Narrator:
Listen to a conversation between a Student and a facilities Manager at the university.

Student:
Hi. I'm Melanie, the one who's been calling.

Manager:
From the singing group, right?

Student:
From the choir.

Manager:
Right, the choir. It's nice to finally meet you in person. So, you are having problems with...

Student:
Noise. Like I explained on the phone we've always had our rehearsals in the Lincoln Auditorium every day at 3 o'clock and it's always worked just great. But the past few weeks with the noise, it's been a total nightmare since constructions started next door on the science hall.

Manager:
Oh, that's right. They're building that addition for new laboratories.

Student:
Exactly. Anyway, ever since they started working on it, it's been so noisy we can barely hear ourselves sing.

Manager:
Let alone sing.

Student:
Forget about singing. I mean, we keep the windows down and everything, but once those bulldozers get going, I mean those machines are loud. We've already had to cut short two rehearsals and we've got a concert in 6 weeks.

Manager:
Well, that's not good. I'm assuming you've tried to reschedule your rehearsals. They don't do construction work at night.

Student:
I ran that by the group, but there were just too many. I mean evenings are really hard. It seems like everyone in the choir already has plans and some even have classes at night.

Manager:
And what about the music building?

Student:
You know, originally we were booked in one of the rehearsal rooms in the music building, but then we switched with the jazz ensemble. They're a much smaller group and they said the acoustics, the sound in that room, was better for them. So having us moved to a bigger space like the Lincoln Auditorium seemed like a reasonable idea.

Manager:
But now...

Student:
All that noise. I don't know. I just wonder if the jazz ensemble knew what was going to happen.

Manager:
Well, that wouldn't be very nice.

Student:
No. But it really was quite a coincidence. Anyway, now the music building's fully booked, mornings, afternoons, everything, we just need a quiet space. And it has to have a piano.

Manager:
A piano. Of course some of the other auditoriums have pianos, but that's not going to be easy.

Student:
You think they're pretty booked up?

Manager:
Probably. But it can't hurt to check. What about Bradford Hall? I remember a piano in the old Student center there.

Student:
At this point, we'd be grateful for any quiet place.
Manager:
Can you... How flexible can you be on times? You said no evenings, but what ill(if) can't find something open at 3 o'clock? Can you move earlier or later?

Student:
I wish I could say another time would be okay, but you know how it is, everybody's already got commitments for the whole semester 2:30 or 3:30 would probably be okay, but I don't think we could go much outside that

Manager:
Well, check with me tomorrow morning. I should've found something by then. It might not be ideal...

Student:
As long as it’s got a piano and nobody’s putting up a building next door, we’ll be happy.

TPO 16 Script Lecture 1

Narrator:
Listen to a part of lecturer in a geology class.

Professor:
Now there are some pretty interesting caves in parts of the western United States, especially in national parks. There is one part that has over a hundred caves, including some of the largest ones in the world. One of the more interesting ones is called Lechuguilla Cave. Lechuguilla has been explored a lot in recent decades. It’s a pretty exciting place I think. It was mentioned only briefly in your books. So can anyone remember what it said? Ellen?

Male Student:
It’s the deepest limestone cave in the U.S.?

Professor:
That’s right. It’s one of the longest and deepest limestone caves not just in the country but in the world. Now, what else?

Male Student:
Well, it was formed because of sulfuric acid, righht?

Professor:
That’s it. Yeah, what happens is you have deep underground oil deposits and there are bacteria. Here let me draw a diagram.
Part of the limestone rock layer is permeated by water from below. Those curly lines are supposed to be cracks in the rock. Below the water table and rock is oil. Bacteria feed on this oil and release hydrogen sulfide gas. This gas is hydrogen sulfide, rises up and mixes with oxygen in the underground water that sits in the cracks and fissures in the limestone. And when hydrogen sulfide reacts with the oxygen in the water, the result of that is sulfuric acid, Ok? Sulfuric acid eats away at limestone very aggressively. So you get bigger cracks and then passageway is being formed along the openings in the rock and it’s all underground. Ah yes, Paul?

Male Student:
So that water... It’s not flowing, right? It’s still?

Professor:
Yes, so there are two kinds of limestone caves. In about 90 percent of them, you have

water from the surface, streams, waterfall or whatever - moving water that flows through cracks found in limestone. It's the moving water itself that wears away at the rock and makes passageways. Also, in surface water, there is a weak acid, carbonic acid, not sulfuric acid but carbonic acid that helps dissolve the rock. With a little help from this carbonic acid, moving water forms most of the world's limestone caves. When I was researching this for a study a few years ago, I visited a couple of these typical limestone caves, and they were all very wet, you know, from streams and rivers. This flowing water carved out the caves and the structures inside them.

Male Student:
But not Lechuguilla?

Professor:
Dry as a bone. Well, that might be a bit of an exaggeration. But it's safe to say that it's sulfuric acid and not moving water that formed Lechuguilla cave and those few other ones like it. In fact, there is no evidence that flowing water has even gone in or out of the cave. So, it's like a maze. You have passageways all around. There are wide passages, narrow ones at all different depths, like underground tunnels in the limestone. And, since they were created underground and not from flowing surface water, not all these passageways have an opening to the outside world. And.. .and there is other evidence that flowing water wasn't involved in Lechuguilla. We've said that sulfuric acid dissolves limestone, right, and forms the passageways? What else does sulfuric acid do? Paul?

Male Student:
Ah, leaves a chemical residue and...

FeMale Student:
Gypsum, right?

Professor:
Yep, you'll find lots of gypsum deposited at Lechuguilla. And, as we know, gypsum is soluble in water. So if there were flowing water in the cave, it would dissolve the gypsum. This is part of what led us to the realization that Lechuguilla is in that small group of waterless caves. And Lechuguilla is pretty much dormant now. It's not really forming any more. But, there is other ones like it, for example, in Mexico, that are forming. And when cave researchers go to explore them, they see and smell, the sulfuric acid and gases of...er...phew...now, something else, think of rotten eggs. And, it's not just the smell. Explorers even need to wear special masks to protect themselves from the gases in these caves. OK? Paul.

Male Student:
Yeah, how about what these caves look like on the inside?

Professor:
Well, the formations.. .there is really something. There's such variety there like nothing anywhere else in the world, some of them are elaborate looking, like decorations. And a lot of them are made of gypsum and could be up to 20 feet long. It's pretty impressive.

TPO 16 Script Lecture 2

Narrator:
Listen to part of a lecture in a music history class.

Professor:
Up until now in our discussions and readings about the broken early classical periods, we've been talking about the development of musical styles and genres within the relatively narrow social context of its patronage by the upper classes. Composers, after all, had to earn a living and those who were employed in the services of a specific patron, well, I don't have to spell it out for you, the likes and dislikes of that patron, this would've had an effect on what was being composed and performed. Now, of course, there were many other influences on composers, um, such as the technical advances we've seen in the development of some of the instruments, uh, you remember the transverse flute, the clarinet and so on.
But I think if I were asked to identify a single crucial development in European music of this time, it would be the invention of the piano, which, interestingly enough also had a significant effect on European society of that time. And I'll get to that in a minute. Now, as we know, keyboard instruments existed long before the piano - the organ, which dates back to the Middle Ages, as do other keyboard instruments, such as the harpsichord which is still popular today with some musicians. But none of these has had as profound an impact as the piano.
Um, the piano was invented in Italy in 1709. The word piano is short for pianoforte, a combination of the Italian words for soft and loud. Now, unlike the harpsichord which came before it, the piano is a percussion instrument. You see, the harpsichord is actually classified as a string instrument, since pressing a key of a harpsichord causes a tiny quill that's connected to the key to pluck the strings that are inside the instrument, much the same as a guitar pick plucks the strings of a guitar But pressing the keys of a piano causes tiny felt-covered hammers to strike the strings inside the instrument, like drumsticks striking the head of a drum. This striking action is why the piano is a percussion instrument instead of a string instrument.
Okay, so why is this so important? Well, the percussive effect of those little hammers means that the pianist, unlike the harpsichordist, can control the dynamics of the sound - how softly or loudly each note is struck, hence the name, pianoforte, soft and loud. Now artistically for both composers and performers this was a major turning point. This brand new instrument, capable of producing loud and soft tones, greatly expanded the possibilities for conveying emotion. This capacity for increased expressiveness, in fact, was essential to the Romantic style that dominated 19th century music. But I'm getting ahead of myself
Um, before we get back to the musical impact of this development, I wanna take a look at the social impact that I mentioned earlier. Now, in the late 1 7005 and the earlier 1 800s, the development of the piano coincided with the growth of the middle class in Western Europe. Of course folk music, traditional songs and dances had always been part of everyday life. But as mass production techniques were refined in the 19th century, the

price of pianos dropped to the point that a larger proportion of the population could afford to own them. As pianos became more available, they brought classical music, the music which previously had been composed only for the upper classes, into the lives of the middle class people as well.
One way in particular that we can see the social impact of this instrument is its role in the lives of women of the time. Previously, it was quite rare for a woman to perform on anything, but maybe a harp or maybe she sang. But suddenly in the 19th century it became quite acceptable, even, to some extent, almost expected for a middle-class European woman to be able to play the piano, partly because among upper-middle class women it was a sign of refinement. But it was also an excellent way for some women to earn money by giving piano lessons. And some women, those few who had exceptional talent and the opportunity to develop it, their lives were dramatically affected.
Later we'll be listening to works by a composer named Robert Schumann. But let's now talk about his wife Clara Schumann. Clara Schumann was born in Germany in 1819. She grew up surrounded by pianos. Her father sold pianos and both her parents were respected piano teachers. She learned to play the instrument when she was a small child and gave her first public recital at age 9. Clara grew up to become a well-known and respected piano virtuoso, a performer of extraordinary skill who not only gave concerts across Europe, but also was one of the first important feMale composers for the instrument.

Section 2

TPO 16 Script Conversation 2

Narrator:
Listen to a conversation between a Professor and a Student .

Professor
Jeff, I'm glad you drop by. I've been meaning to congratulate you on the class leadership award.

Student
Thanks Professor Bronson, I was really happy to get it and a little surprised. I mean, there were so many other people nominated.

Professor
Well, I know the award was well deserved. Now, what can I do for you today?

Student
I needed to talk to you about the medieval history test you know, the one scheduled for Friday afternoon.

Professor
Yes?

Student
Well, there is this trip that my French class is taking. We are going to Montreal for the weekend.

Professor
Montreal? That's my favorite city. What'll you be seeing there?

Student
I'm not sure yet. Well, the reason, the main reason I wanted to go is that we'll be rooming with French speaking Students there, you know, so we can get a chance to use our French to actually talk with real French speakers.

Professor
It sounds like a good opportunity. But then, there is that test.

Student
Yeah... but.. well, the thing is the bus leaves right in the middle of when our history class meets this Friday. So, well, I was thinking maybe I could take the test on a different day like Monday morning during your office hours?

Professor
Eh...Monday morning...um...that would not be...oh wait, let me just see one thing. Aha, okay. That's what I thought. So, for your class, I was planning a take-home exam so you could just take the test along with you. Let's see, I guess you could come to class Friday just to pick up the test. That way you'd still make your bus, and then find some quiet time during your trip to complete it and you can bring it to class Wednesday when I'll be collecting everyone else's.

Student
Hmm.. . um...during the trip, well, I guess I could. So I should plan to take my books and stuff with me.

Professor
You'll definitely need your class notes. I'm giving you several short essay questions to make you think critically about the points we've discussed in class, to state.. .uh state and defend your opinion, analyze the issues, speculate about how things might have turned out differently. So, you see, I don't care if you look updates and that kind of thing. What I want is for you to synthesize information to reflect back on what we've read and discussed and to form your own ideas, not just repeat points from the textbook. Does that make sense?

Student
Yeah, I think so. You are looking for my point of view.

Professor
That's right. The mid-term exam showed me that you know all the details of who, where and when. For this test, I want to see how you can put it all together to show some original thinking.

Student
That's sounds pretty challenging, especially trying to work it into this trip. But, yeah, I think I can do it.

Professor
I'm sure you can.

Student
Thank you, Professor Bronson.

Professor
Have a great time in Montreal.

TPO 16 Script Lecture 3

Narrator:
Listen to a part of a lecture in a biology class.

Professor
OK. Let's continue our discussion about animal behavior by talking about decisions that animals face, complex ones. Animals, even insects, carry out what look like very complex decision making processes. The question is how. I mean no one really thinks that, say a bee goes through weighing the pros and cons of pollinating this flower or that flower. But then how do animals solve complex questions, questions that seem to require decision making. The answer we'll propose of course is that their behavior is largely a matter of natural selection. As an example, let's look at foraging behavior among beavers.
Beavers eat plants, mostly trees. And they also use trees and tree branches to construct their homes in streams and lakes. So when they do forage for food and for shelter materials, they have to leave their homes and go up on land where their main predators are. So there are a number of choices that have to be made about foraging. So for example, um... they need to decide what kind of tree they should cut down. Some trees have higher nutritional value than others, and some are better for building material, and some are good for both... um...aspen trees. Beavers peel off the bark to eat and they also use the branches for building their shelters. So aspens do double duty. But ash trees, beavers use ash trees only for construction. Another decision is when to forage for food. Should they go out during the daytime when it's hotter outside and they have to expend more energy, or at night when the weather is cooler but predators are more active?
Ok, but there are two more important issues, really the most central, the most important, OK? First, let's say a beaver could get the same amount of wood from a single large tree when it has lots of branches as it could get from three small trees. Which should it choose? If it chooses one large tree, it' have to carry that large piece of wood back home, and lugging a big piece of wood 40 or 50 yards is hard work, takes a lot of energy. Of course it'll have to make only one trip to get the wood back to the water On the other hand, if it

goes for three small trees instead, it will take less energy per tree to get the wood back home but it'll have to make three trips back and forth for the three trees. And presumably, the more often it wanders from home, the more it's likely to be exposed to predators. So which is better, a single large tree or three small trees?
Another critical issue and it's related to the first, to the size issue, is how far from the water should it go to get trees. Should it be willing to travel a greater distance for a large tree, since it'll get so much wood from it? Beavers certainly go farther from the water to get an aspen tree than for an ash tree. That reflects their relative values. But what about size? Will it travel farther
For a larger tree than It will for a smaller tree? Now I would have thought the bigger the tree, the farther the beaver would be willing to travel for it. That would make sense, right? If you're going to travel far, make the trip worth it buy bringing back most wood possible. But actually, the opposite is true. Beavers will cut down only large trees that are close to the water. They will travel far only to cut down certain small trees that they can cut down quickly and drag back home quickly. Generally, the farther they go from the water, the smaller the tree they will cut down. They're willing to make more trips to haul back less wood, which carries a greater risk of being exposed to predators. So it looks as though beavers are less interested in minimizing their exposure to predators and more interested in saving energy when foraging for wood, which may also explain why beavers forage primarily during the evenings.
OK, so why does their behavior indicate more of a concern with how much energy they expend than with being exposed to predators? No one believes a beaver consciously weighs the pros and cons of each of these elements. The answer that some give is that their behavior has evolved over time. It's been shaped by constraints over vast stretches of time, all of which comes down to the fact that the best foraging strategy for beavers isn't the one that yields the most food or wood. It's the one that results in the most descendants, the most offspring. So let's discuss how this idea works.

TPO 16 Script Lecture 4

Narrator:
Listen to part of a lecture in an art history class.

Professor
OK, now urn, a sort of paradigmatic art form of the Middle Ages was stained glass art. Stained glass of course is simply glass that has been colored and cut into pieces and re-assembled to form a picture or a decorative design. To truly experience the beauty of this decorative glass you should see it with light passing through it, especially sunlight, which is why stained glass is usually used for windows. But of course it has other uses, especially nowadays. Urn, anyway the art of making stained glass windows developed in Europe, urn, during the Middle Ages and was closely related to church building. In the early 1100s a church building method was developed that reduced the stress on the walls so more space could be used for window openings allowing for large and quite elaborate window designs. Back then, the artists made their own glass, but first they came up with

the design. Paper was scarce and expensive, so typically they drew the design onto a white tabletop. They'd draw the principal outline but also outline the shape of each piece of glass to be used and indicate its color. Now in the window itself the pieces of glass would be held together by strips of lead. So in the drawing the artists would also indicate the location of the lead strips. Then you could put a big piece of glass on the tabletop and see the design right through it and use it to guide the cutting of the glass into smaller pieces.

Student
And the lead that was just to hold the pieces of glass together?

Professor
Well, lead is strong and flexible so it's ideal for joining pieces of glasses cut in different shapes and sizes. But up to the 15th century the lead strips also helped create the design. They were worked into the window as part of the composition. They were used to outline figures to show boundaries just like you might use solid lines in a pencil drawing.

Student
How did they get the color'? I mean how did they color the glass?

Professor
Well up until the 16th century stained glass was colored during the glass making process itself. You got specific colors by adding metallic compounds to the other glass making ingredients.
So if you wanted red you added copper if you wanted green you added iron. You just added these compounds to the other ingredients that the glass was made of.

Student
So each piece of glass is just one color?

Professor
Yes, at least up until the 16th century. Then they started... urn.. .you started to get painted glass. Painted glass windows are still referred to as stained glass but the colors were actually painted directly onto clear glass after the glass was made. So um with this kind of stained glass you could paint a piece of glass with more than one color.

Student
And with painted glass they still used the lead strips?

Professor
Yes, with really large windows it took more than one piece of glass, so you still needed lead strips to hold the pieces together. But the painters actually tried to hide them. So it was different from before when the lead strips were part of the design. And it is different, because with painted glass the idea of light corning through to create the magical effect wasn't the focus any more. The paintwork was. And painted glass windows became very popular In the 19th century, people started using them in private houses and public buildings. Unfortunately, many of the original stained glass windows were thought to be old fashioned and they were actually destroyed, replaced by painted glass.

Student
They actually broke them? That showed good judgment, real foresight, didn't it?

Professor
Yes, if only they had known. Uh, and it's not just that old stained glass is really valuable today, we lost possibly great artwork. But luckily there was a revival of the early techniques in the mid-I 800s and artists went back to creating colored glass and using the lead strips in their designs. The effects are much more beautiful. In the 19th century Louis Tiffany came up with methods to create beautiful effects without having to paint the glass. He layered pieces of glass and used thin copper strips instead of lead, which let him make these really intricate flowery designs for stained glass, which are used in lamp shades You've heard of Tiffany lamp shades right? These of course took advantage of the new innovation of electric lighting. Electric light bulbs don't give quite the same effect as sunlight streaming through stained glass but it's close. So layered glass, Tiffany glass, became very popular and still is today. So let's look at some examples of different types of stained glass from each era.

TPO 17 Conversation 1

Narrator
Listen to a conversation between a student and a professor.

Professor
OK, let' s see. Right, Modern Stagings of a Shakespearian Classic. Well, like I told you last week, I think that's a great topic for you paper. So the title would be something like ... uh ...

Student
I am not really sure, probably something like 20th
century stagings of A Midsummer
Night's Dream.

Professor
Yes, I like that. Straightforward and to the point. So how is the research going?

Student
Well, that's what I came to talk to you about. I was wondering if you happen to have a copy of the Peter Brook production of A Midsummer Night's Dream in your video collection. I've been looking for it everywhere and I am having a really hard time tracking it down.

Professor
That's because it doesn't exist.

Student

You mean in your collection ? Or at all?

Professor
I mean at all. That particular production was never filmed or recorded.

Student
Oh no. I had no idea. From what I read, that production, like, it influenced every other production of the play that came after it. So I just assumed it had been filmed or videotaped.

Professor
Oh, It definitely was a landmark production. And it's not like it ran for just a week, but either it was never filmed or if it was the film's been lost. And it' s ironic because there's even a film about the making of the production, but none of the production itself.

Student
So now what do I do? If there is no video.

Professor
Well, think about it. This is the most important 20th
century staging of A Midsummer
Night's Dream, right?

Student
But how can I write about Brook's interpretation of the play if I can't see his production.

Professor
Just because there's no recording doesn't mean you can't figure out how it influenced other productions.

Student
Yeah, I guess there's enough material around, but it will be a challenge.

Professor
True. But think about it, you are writing about dramatic arts, the theater, and that 's the nature of theater, isn't it?

Student
You mean because it is live, when the performance is finished ...

Professor
That's it. Unless it' s filmed, it's gone. But that doesn't mean we can't study it. And of course some students in this class are writing about productions in the 19th
century,
there are no videos of those. You know, one of the challenges for people who study theater is to find way of talking about something that 's really so transient, about

something that, in a sense, doesn’t exist.

TPO 17 Lecture 1 Art History(Prehistoric Art Dating)

Narrator
Listen to part of a lecture in an art history class.

Professor
Good morning, ready to continue our review of prehistoric art? Today, we will be covering the Upper Paleolithic Period, which I am roughly defining as the period from 35,000 to 8,000 BC. A lot of those cave drawings you have all seen come from this period. But we are also be talking about portable works of art, things that could be carried around from place to place. Here is one example.
This sculpture is called the Lady with the Hood1
, and it was carved from ivory,
probably a mammoth's tusk. Its age is a bit of a mystery. According to one source, it dates from 22,000 BC. But other sources claimed it has been dated closer to 30,000 BC. Amy?

Amy
Why don't we know the exact date when this head was made?

Professor
That's a fair question. We are talking about prehistory here. So obviously the artists didn't put a signature or a date on anything they did. So how do we know when this figure was carved?

Tom
Last semester I took an archaeology class and we spent a lot time on, studying ways to date things. One technique I remember was using the location of an object to date it, like how deep it was buried.

Professor
That would be Stratigraphy. Stratigraphy is used for dating portable art. When archaeologists are digging at a site, they make very careful notes about which stratum(strata), which layer of earth they find things in. And, you know, the general rule is that the oldest layers are at the lowest level. But this only works if the site

hasn't been touched, and the layers are intact. A problem with this dating method is that an object could have been carried around, used for several generations before it was discarded. So it might be much older than the layer or even the site where it was found. The stratification technique gives us the minimum age of an object, which isn't necessarilly its true age. Tom, in your archaeology class, did you talk about radiocarbon dating?

Tom
Yeah, we did. That had to do with chemical analysis, something to do with measuring the amount of radiocarbon that's left in organic stuff. Because we know how fast

radiocarbon decays, we can figure out the age of the organic material.

Professor
The key word there is organic. Is art made of organic material?

Tom
Well, you said the lady with the hood was carved out of ivory. That 's organic.

Professor
Absolutely. Any other examples?

Amy
Well, when they did those cave drawings. Didn't they use, like chacoal or maybe colors, dyes made from plants?

Professor
Fortunately, they did, at least some of the time. So it turns out that radiocarbon dating works for a lot of prehistoric art. But again there's a problem. This technique destroys what it analyzes, so you have to chip off bits of the object for testing. Obviously we are reluctant to do that in some cases. And apart from that, there's another problems. The date tells you the age of the material, say, a bone or a tree, the object is made from, but not the date when the artist actually created it. So, with radiocarbon dating, we get the maximum possible age for the object, but it could be younger.
Ok, let' s say our scientific analysis has produced an age range. Can we narrow it

down?

Amy
Could we look for similar styles or motives? You know, try to find things common to one time period.

Professor
We do that all the time. And when we see similiarities in pieces of art, we assume some connection in time or place. But is it possible that we could be imposing our own values on that analysis?

Tom
I am sorry. I don't get your point.

Professor
Well, we have all kinds of pre-conceived ideas about how artistic styles develop. For example, a lot of people think the presence of details demonstrates that the work was done by a more sophisticated artist. While a lack of detail suggests a primitive style. But trends in art in the last century or so certainly challenge that idea. Don't get me wrong though, analyzing the styles of prehistoric art can help dating them. But we need to be careful with the idea that artistic development occurs in a straight

line, from simple to complex representations.

Amy
What you are saying is, I mean, I get the feeling that this is like a legal process, like building a legal case, the more pieces of evidence we have, the closer we get to the truth.

Professor
Great analogy. And now you can see why we don't have an exact date for our sculpture, the lady with the hood.

TPO 17 Lecture 2 Environmental Science(Milankovitch Hypothesis)

Narrator
Listen to part of a lecture in an environmental science class.

Professor
Ok, so we have been talking about theories that deal with the effects of human activity on the climate. But today I'd like to talk a little bit about other theories that can explain variations in climate. And one of the best-known is called the Milankovitch Hypothesis.

Now what the Milankovitch Hypothesis is about? It says that variations in earth's movements, specifically in its orbit around the sun, these variations lead to differences in the amount of solar energy that reaches the earth. And it is these differences in the amount of energy that's reaching earth from the sun, it is what causes variations in earth's climate.

Ok, a lot of people think of earth's orbit around the sun as being perfectly circular, as smooth and as regular as, say, the way that hands move on a well -made watch, but it just doesn't work that way. You are probably aware that the earth's orbit around the sun, it is not shaped like a perfect circle. It is more of an oval, it is elliptical. But the shape of this orbit isn't consistent, it varies over time, over a period of about a thousand years. Sometimes it is a little more circular, sometimes it is more elliptical. And when earth's orbit is more elliptical, earth is actually closer to the sun during part of the year. Which makes earth, and in particular, the northern hemisphere, warmer. And why is that important? well, because most of the planet's glaciers are in the northern hemisphere, and if it gets too warm, then glaciers will stop forming. And we've already talked about how that affects earth's overall temperature.

The second movement involved in the hypothesis has to do with axial tilt. The tilt of earth's axis, that imaginery pole that runs through the center of the earth. And depending on the angle it tilts at, the seasons can be more or less severe. It makes winters cooler and summers warmer, or what some might say it is doing now, it makes summers less hot, and more importantly, the winters less cold. Which just like what I mentioned before, can also stop, prevent glaciers from forming, or cause them to melt.

There is a third movement the hypothesis covers called precession. Precession, basically is the change in the direction of earth's axis of rotation. It will take me a million years to explain even just the basics of this movement as precession is quite complex. And all these details are way beyond our scope. What's important for you to understand is that these three movements, well, they are cyclical, and they work together to form, to produce complex but regular variations in earth's climate, and lead to the growth or decline of glaciers.

Now, when Milankovitch first proposed this theory in the 1920s, many of his

colleagues were skeptical. Milankovitch didn't have any proof. Actually there wouldn't be any evidence to support his hypothesis until the 1970s, when oceanographers were able to drill deep into the seafloor and collect samples, samples which were then analyzed by geologists. And from these samples they were able to put together a history of ocean temperatures going back hundreds of thousands of years, and this showed that earth's climate had changed pretty much the way Milankovitch's hypothesis suggested it would. So this evidence was pretty strong support for the Milankovitch Hypothesis. And by the 1980s, most people accepted this theory.

However, in the late 1980s, some scientists were exploring Devil' s Hole, which is basically an extensive water-filled cave, far from the ocean, in Nevada2
, in the
western United States. Over millions of years, groundwater left deposits of a mineral called calcite3
, on the rock within Devil's Hole. And by studying these clacite deposits, we can determine the climate conditions, the temperatures over the last half million years. Well, the Devil' s Hole findings contradicted the ones obtained during the 1970s, so basically the question was, were the ages of one or both the samples were wrong, or were scientists misunderstanding the significance of the evidence.

Well, in the 1990s, a new study was done on the two samples. And the ocean floor samples were found to be correct, as were the samples from Devil's Hole. And now it is generally believed that the sample from Devil's Hole correspond to variations in local climate, in the western United States, rather than global climate changes.

TPO 17 Conversation 2

Narrator
Listen to a conversation between a student and a food service manager.

Student
Excuse me, Mrs. Hanson. My name is John, John Grant. I work as a waiter in the campus dining hall, in the faculty dining room.

Manager
What can I do for you, John?

Student
Well, I work week nights, except for Friday. I was wondering if I could switch from working the dinner service to working at lunch.

Manager
That's going to be a problem. I am afraid we don't have any openings at lunch time. A lot of students want to work then, so it is really rare for us to have an open spot at that time of day.

Student
Oh, you see, I have joined this group, the University Jazz Band, and the band's practice time is right around dinner time. You know, it is so hard to get into this group, I must have auditioned like ten times since I have been at the school, so I am ... Anyway, so I was really hoping to have the dinner hour free so I can go to practice.

Manager
Well, we do have other open times, like breakfast.

Student
Eh, that won't work, I am sorry. I mean that, I can't work that early. I have this very important music class I got to take, and it is like, first thing in the morning.

Manager
Well, if you don't mind working in the kitchen, we've got some pretty flexible hours for students doing food-prep work, anything from early morning to late afternoon.

Student
What's prep work?

Manager
You prepare food for the cooks. You know, like cutting up vegetables for soup, or cleaning greens for salads.

Student
Oh, that doesn't sound, I mean... Being a waiter, I get to see a lot of the professors, like in a different light, we joke around a little you know. In the classroom, they always have to be pretty formal, but ...

Manager
Well, the money is no different since we pay students the same amount for any of the jobs here in food service, so it's up to you.

Student
Oh, man. I always thought that sacrificing for my art, that'd mean working long hours as a musician for, like, no money. I didn't think it'd mean, peeling carrots.

Manager
Let me see, I am offering you something that has the hours you want, it is right here on campus, and you make as much money as you did being a waiter, quite a sacrifice.

Student
I am sorry, I know you are just trying to help. I guess I should look into the food-prep job.

Manager
Ok, then, I'll tell the kitchen manager that you will stop by tomorrow to talk about the job and schedule your hours. And I will let the dining hall manager know that he needs to find a new waiter for the evening.

Student
Oh, ok, I guess that' s it. Thanks, Mrs. Hanson.

TPO 17 Lecture 3 History(Ancient Egyptian Calendar)

Narrator
Listen to part of a lecture in a history class. The professor has been discussing ancient Egypt.

Professor
Ok, so one of the challenges that faced ancient civilizations like Egypt was timekeeping, calendars. When you have to grow food for whole cities of people, it is important to plant your crops at the right time. And when you start having financial obligations, rents, taxes, you have to keep track of how often you pay.

So today we will look at how the Egyptians adressed these problems. In fact, they ended up using two calendars, one to keep track of the natural world, or their agriculture concerns, and another one, that was used to keep track of the business functions of the Kingdom. So let's take a look at the hows and whys of one ancient Egyptian calendar system, starting with the Nile River.

Why the Nile? Well, there's no other way to put it. Egyptian life basically revolved around the mysterious rise and fall of the river. The success of their agriculture system depended upon them knowing when the river would change. So, naturally, their first calendar was divided up into three seasons, each based on the river 's changes: inundation, subsidence and harvest.

The first season was the flooding, or inundation, when the Nile valley was essentially submerged in water for a few months or so. And afterwards during the season of subsidence, the water would subside, or recede, revealing a new layer of fertile black silt and allowing for the planting of various crops. And finally the time of the year would arrive when the valley would produce crops, such as wheat, barley, fruit, all ready to harvest. Ok, so it was important to the ancient Egyptians to know when their Nile based seasons would occur, their way of life depended upon it.

Now, the way they used to count time was based on the phases of the moon, which, regularly and predictably, goes through a cycle, starting with a new moon, then to a full moon, and back again to the new moon. Now this cycle wes then used to determine the length of their month. So, um, one lunar cycle was one Egyptian month, and about four of the months would constitute a season. Now, 12 of these months was an approximately 354-day year. So they had a 354-day agricultural calendar that was designed to help them determine when the Nile would inunadate

the land.

Well, of course it had to be more complicated than that. The average amount of time between floodings wasn't actually 354 days. I mean, although it varies, the average was clearly longer than 354 days. So how did they keep this short calendar in step with the actual flooding of the Nile?

Well, their astronomers had discovered that at a certain time of year the brightest star, Sirius, would disappear. Actually, it'd be hidden in the glare of the Sun. And then, a couple of months later, one morning in the eartern sky just before dawn, Sirius would reappear. And it happened regularly, about every 365 days. Even more significantly, the reappearance of Sirius would occur around the same time as the Nile's flooding. And this annual event is called a heliacal rising4
.

The heliacal rising was a fair indicator of when the Nile would flood. The next new moon, after the heliacal rising of Sirius, which happened in the last month of the calendar year, marked the New Year. And because the ancient Egyptians were using the lunar cycle in combination with this heliacal rising, some years ended up having 12 lunar months, while others had 13 lunar calender months, if Sirius didn't rise in the 12th
month.

Even though the length of the agricultural calendar still fluctuated, with some years having 12 months and others having 13, it ended up being much more reliable than it was before. They continually adjusted it to the heliacal rising of Sirius, ensuring that they never got too far off in their seasons. This new calendar was ideal, because, well, it worked well for agricultural purposes as well as for knowing when to have traditional religious festivals. So, that was their first calendar.

But was it any way to run a government? They didn't think so. For administrative purposes, it was very inconvenient to have years of different lengths. So another calendar was introduced, an administrative one. Probably soon after 3,000 BC, they declared a 365-day year, with 12 months per year, with exactly 30 days each month, with an extra 5 days at the end of each year. This administrative calendar existed alongside the earlier agricultural and religious calendar that depended on the heliacal rising of Sirius. This administrative calendar was much easier to use for things like scheduling taxes and other things that had to be paid on time. Over time, the calendar got out of step with seasons and the flooding of the Nile, but for bureaucratic purposes, they didn't mind.

TPO 17 Lecture 4 Biology(Octopus)

Narrator
Listen to part of a lecture in a biology class.

Professor
Ok, now I want to talk about an animal that has a fascinating set of defense mechanisms. And that's the octopus, one of the unusual creatures that live in the sea. The octopus is prey to many species, including humans, so how does it escape its predators?
Well, let me back up here a second. Anyone ever heard of Proteous? Proteus was a God in Greek mythology who could change form. He could make himself look like a lion or a stone or a tree, anything you wanted, and he could go through a whole series of changes very quickly.
Well, the octopus is the real world version of Proteus. Just like Proteus, the octopus can go through all kinds of incredible transformations. And it does this in three ways: by changing color, by changing its texture, and by changing its size and shape.
For me, the most fascinating transformation is when it changes its color. It's a normal skin color, the one it generally presents, is either red or brown or even grey, and it 's speckled with dark spots. But when it wants to blend in with its environment to hide from its enemies, it can take on the color of its immediate surroundings: the ocean floor, a rock, a piece of coral, whatever. Charles?

Student
Do we know how that works, I mean, how they change colors?

Professor
Well, we know that the reaction that takes place is not chemical in nature. The color changes are executed by two different kinds of cells in the octopus ' skin, mainly by color cells on the skin's surface call chromatophores
5
.
Chromatophores consist of tiny sacks filled with color dye. There might be a couple hundred of these color sacks per square millimeter of the octopus ' skin, and depending on the species, they can come in as many as five different colors. Each one of these sacks is controlled by muscles. If the muscles are relaxed, the sack shrinks, and all you see is a little white point. But if the muscle's contract, then the sack expands, and you can see the colors. And by expanding different combinations

Student
And just with various combinations of those five colors, they can recreate any color in their environment?

Professor
Well, they can no doubt create a lot with just those five colors, but you are right, maybe they can't mimic every color around them, so that's where the second kind of

cell comes in.
Just below the chromatophores is a layer of cells that reflect light from the environment, and these cells help the octopus create a precise match with the colors that surround them. The colors from the color sacks are supplemented with colors that are reflected from the environment, and that 's how they are able to mimic colors with such precision. So, that's how octopus mimic colors.
But they don't just mimic the colors in their environment; they can alos mimic the texture of objects in their environment. They have these little projections on their skin that allow them to resemble various textures. The projections are called papillae6
. If the octopus wants to have a rough texture, it raises the papillae. If it wants to have a smooth texture, it flattens out the papillae, so it can acquire a smooth texture to blend in with the sandy bottom of the sea.
So the octopus has the ability to mimic both the color and the texture of its environment. And it's truly amazing how well it can blend in with its surroundings. You can easily swim within a few feet of an octopus and never see it.

Student
I read that they often hide from predators by squirting out a cloud of ink, or something like that.

Professor
Yes. The octopus can release a cloud of ink if it feels threatened. But it doesn't hide behind it, as is generally believed. Um, the ink cloud is ... it serves to distract a predator while the octopus makes its escape.
Um, now there's a third way that octopus can transform themselves to blend in with or mimic their environment, and that's by changing their shape and size, well, at least their apparent size.
The muscular system of the octopus enables it to be very flexible to assume all sorts of shapes and postures. So it can contract into the shape of a little round stone, and sit perfectly still on the seafloor. Or it can nestle up7
in the middle of a plant and take
the shape of one of the leaves. Even Proteus would be impressed, I think.

TPO-18 Conversation 1

A: Hi ! I hope you can help me . I just transferred from Northeastern State University near Chicago.

B: Well welcome to Central University .But Chicago is such a great city. Why did you leave?

A: Everyone asks that. It's my hometown. And it was sure convenient to go to a school nearby. But Northeastern is still fairly small. And it doesn't have the program I'm interested in. I want to major in international studies. And the only program int the State is here.

A: We do have a great program. Well how did you get interested in international studies?

B: My family hosted a few foreign exchange students while I was growing up. Then I took part in an international summer program after I graduated from high school. I thought I really I like meeting people from all over, getting to know them.

A: OH! Ok! And that led you to our program. Right now though I think you are looking for a job.

B: Yeah, a part time job on campus. I thought I'd save money ,being away from the big city. But it doesn't seem to be working that way .Anyway I'm not having much luck.

A: I'm not surprised. Most of our campus jobs are taken in the first week or two of the semester. What work experience have you had?

B: Well, I worked in the university library last year. But I already checked at the library here. They said their remaining positions were for work-study students getting financial aid. I've never run into that before.

A: Well, I guess each school has its own policies. Uh, we really don't have much right now. You might be better. If you really want something, how are your computer skills?

B: About average I'd say. I helped teach some of the basic computer classes. Northeastern offers for new users, if that helps any.

A: OK, The technology support department needs people to work its helpdesk. It's basically a customer service job, answering questions, helping people solve their computer proplems,give you a chance to develop your people skills.

B: Something every diplomat needs. But is there some problem? I mean why is the job still open?

A: Well, they have extended hours, from 6am to 2am every day. So they need a large staff. But right now they only need people early mornings, late nights, and weekends. You'd probably end up with a bit of everything rather than a regular spot. On the bright side you'll probably be able to get some studying done between calls. At least it could be a start and then you can try for better hours next semester .

B: Um, I see why the hours might be a problem. But I guess I can't afford to be too picky if I want a job. Still maybe we can work something out..

TPO 18 Lecture 1 Astronomy

We are going to start a study of **sunspots** today, and I think you'll find it rather interesting. Now I'm going to assume that you know that sunspots, in the most basic terms, are dark spots on the Sun's surface. That will do for now. The ancient Chinese were the first to record observations of sunspots as early as the year 165. When later European astronomers wrote

about sunspots, they didn't believe that the spots were actually on the Sun. That's because of their belief at the time that the heavenly bodies, the Sun, Moon, Stars, and Planets, were perfect, without any flaws or blemishes. So the opinion was the spots were actually something else, like shadows of planets crossing the Sun's face. And this was the thinking of European astronomers until the introduction of the telescope, which brings us to our old friend, Galileo. In the early 1600s, based on his observations of sunspots. Galileo proposed a new hypothesis. He pointed out that the shape of sunspots, well, the sunspots weren't circular. If they were shadows of the planets, they would be circular, right? So that was a problem for the prevailing view. And he also noticed that the shape of the sunspots changed as they seemed to move across the Sun's surface. Maybe a particular sunspot was sort of square, then later it would become more lopsided, then later something else. So there is another problem with the shadow hypothesis, because the shape of a planet doesn't change. What Galileo proposed was that sunspots were indeed a feature of the Sun, but he didn't know what kind of feature. He proposed that they might be clouds in the atmosphere, the solar atmosphere, especially because they seemed to change shape and there was no predicting the changes, at least nothing Galileo could figure out. That random shape changing would be consistent with the spots being clouds. Over the next couple hundred years, a lot of hypotheses were tossed around. The spots were mountains or holes in the solar atmosphere through which the dark surface of the Sun could be seen. Then in 1843, astronomer named Heinrich Schwa be made an interesting claim, Trobe had been watching the Sun every day that it was visible for 17 years, looking for evidence of a new planet. And he started keeping tracks of sunspots, mapping them, so he wouldn't confuse them, so he wouldn't confuse them with any potential new planet. In the end, there was no planet, but there was evidence that the number of sunspots increased and decreased in a pattern, a pattern that began repeating after 10 years, and that was a huge breakthrough. Another astronomer named Wolf kept track of the Sun for an even longer period, 40 years actually. So Wolf did 40 years of research, and Trobe did 17 years of research. I think there is a lesson there. Anyway, Wolf went though all records from various observatories in Europe and put together a history of sunspot observations going back about 100 years. From this information, he was able to confirm the existence of a pattern, a repeating cycle but Wolf detected an 11-year cycles? Dose that sound familiar to anyone? No? Well, geomagnetic activity, the natural variations in Earth's magnetic field, it fluctuates in 11-year cycles. Well, we'll cover this later in this semester, but for now, well, scientists in the late 19th century were aware of geomagnetic cycles, so when they heard that the sunspots' cycle was also 11 years, well, they just had to find out what was going on. Suddenly, everyone was doing studies of the possible relationship between the Sun and the Earth. Did the sunspots cause the geomagnetic fields or did the geomagnetic fields cause the sunspots? Or is there some other thing that caused both? And astronomers did eventually figure out what sunspots had to do with magnetic fields. And the fact that sunspots are magnetic fields accounts for their dark appearance. That's because magnetic fields reduce the pressure exerted on the gases inside of them, making the spots cooler than the rest of the Sun's surface. And since they are cooler, they are darker.

TPO 18 Lecture 2 Art History

A: Today we'll continue our examination of ancient Roman sculpture. We've already looked at portrait sculpture which are busts created to commemorate people who had died, and we've looked at relief sculpture, or sculpting on walls. And today we'll look at yet another category of sculpture-made copies of famous Greek sculptures.

B: Why did they do that?

A: Well no one knows for sure. You see, in the late 4th century B.C., the Romans began a campaign to expand the Roman Empire, and in 300 years they had conquered most of the Mediterranean area and parts of Europe. You know the saying, copies. Roman sculptors often "To the victor belong the spoils"? Well, the Roman army returned to Rome with many works of Greek art. It's probably fair to say that the Romans were impressed be Greek art and culture and they began making copies of the Greek statues. Now the dominant view in traditional art his that Roman artists lacked creativity and skill especially compared to the Greek artists who came before them. Essentially, the traditional view, a view that's been prevalent for over 250 years, is that the Romans copied Greek sculptures because they couldn't create sculpture of their own. But finally some contemporary art historians have challenged this view. One is Elaine Gazda . Gazda says that there might be other reasons that Romans made copies. She wasn't convinced that it was because of a lack of creativity. Can anyone think of another possible reason? Well maybe they just admired these sculptures. You know, they liked the way they looked. Yes. That's one of Gazda's points. Another is that while nowadays reproduction is easy, it was not so easy in Roman times. Copying statues required a lot of skill, time and effort. So Gazda hypothesizes that copying didn't indicate a lack of artistic imagination or skill on the part of Roman artists, but rather the Romans made copies because they admired Greek sculpture. Classical Greek statues represented an idealization of the human body and were considered quite beautiful at the time. Gazda also believes that it's been a mistake to dismiss the Roman copies as, well, copies for copy's sake and not to consider the Roman function and meaning of the statues.

B: What do you mean the Roman function? Weren't they just for decoration?

A: Well, not necessarily. Under the Emperor Augustus at the height of the Roman Empire, portrait statues were sent throughout the empire. They were supposed to communicate specific ideas about the emperor and the imperial family and to help inhabitants of the conquered areas become familiar with the Roman coins were also distributed throughout the empire. Anybody care to guess what was on them?

The emperor's face? That's right! The coins were easy to distribute and they allowed people to see the emperor or at least his likes and served as an additional reminder to let them know, well, who was in charge. And the images helped people become familiar with the emperor. Statues of him in different roles were sent all over the empire. Now, actually some Roman sculptures were original but others were exact copies of Greek statues and some Roman sculptures were combinations of some sort. Some combined more than one Greek statue and others combined a Greek god or an athlete with a Roman's head. At the time of Julius Caesar, I wasn't uncommon to create statues that had the body of a god and the head of an emperor. And the Romans were clever. What they did was they made plaster casts from molds of the sculptures. Then they shipped these plaster casts to workshops all over the empire, where they were replicated in marble or bronze. And on some statues the heads were removable. They could put an emperor's head on different bodies, showing him doing different things. And then later when then time came they could even use the head of the next

emperor on the same body.

TPO 18 Conversation 2

A: Well, I'm glad you redid your outline. I fed a few comments, but nothing you have to act on. It's in good enough shape for you to start writing you paper.

B: Thanks! At first I was afraid all that prep work would be a waste of time.

A: Well, especially with a challenging topic like yours: factors leading to the emergence of sociology as an academic discipline. There's just so much history to consider; you could get lost without a solid outline. So did you have a question?

B: Yeah, it's about…you mentioned needing volunteers for a research study?

A: Yep, it's not my study. It's my colleague's in the marketing department. She needs people to watch various new TV programs that haven't been broadcast yet, then indicate on a survey whether they liked it, why, if they'd watch another episode. It'd be kind of fun plus participants get a $50 gift certificate.

B: Wow, well I like the sound of that. But…so they are trying to predict if the shows are gonna succeed or fail, right, based on students' opinions? Why would they care what we think?

A: Hey, don't sell yourself short. People your age are a very attractive market for advertisers who promote their products on television. The study is sponsored by a TV network. If enough students don't like the show, the network may actually reconsider putting it on the air.

B: OK, well, how do I sign up?

A: You just add your name and phone number to this list and check a time slot, although it looks like the only times left are next Monday morning and Thursday evening.

B: Oh, well, I have marketing and economics Monday mornings and Thursday.

A: OH, you are taking the marketing class? Who's teaching it?

B: It's Professor Largin - Intro to Marketing. Hr hasn't mentioned the study though.

A: Oh, well, the marketing department's pretty big. I happen to be friends with a woman who is doing the TV study. Ok, well, we don't want you missing class. How's Thursday?

B: Oh, I work from 5 till 9 that night. Hmm, no flexibility with your schedule? Where do you work?

A: Oh, I like Fox's. I eat there every week. Maybe you could switch shifts with someone.

B: I'm still in training. And the only night my trainer works is Thursday. Look!

A: I know the owners there really well. Why don't you let me give them a call and explain the situation?

B: OK! It'd be cool to be part of a real research study. And the gift certificate wouldn't hurt either.

TPO 18 Lecture 3 European History

In order to really study the social history of the Middle Ages, you have to understand the role of spices. Now, this might sound a little spurring, even a little strange. But what seem like little things now were back then actually rather big

things. So first let's define what a spice is. Technically speaking, a spice is part of an aromatic plant that is not a leaf or herb. Spices can come from tree bark like cinnamon, plant roots like ginger, flower buds like cloves. And in the Middle Ages. Europeans were familiar with lots of different spices, most important being pepper, cloves, ginger, cinnamon, maize and nutmeg. These spices literarily dominated the way Europeans lived for centuries, how they traded and even how they used their imaginations. So why this medieval fascination with spices? We can boil it down to there general ideas briefly. One was cost and rarity. Uh two was exotic taste and fragrance. And third, mysterious origins and kinds of mythical status. Now for cost and rarity, spices aren't native to Europe and they had to be imported. Spices only grew in the East Indies and of course transportation costs were incredibly valuable even from the very beginning. Here is an example. In 408 AD, the Gothic General who captured Rome demanded payment. He wanted 5000 pounds of gold among other things but he also wanted 3000 pounds of pepper. Maybe that would give you an idea of exactly where pepper stood at the time. By the Middle Ages, spices were regarded as so important and expensive they were used in diplomacy, as gifts by heads of state and ambassadors. Now for the taste. The diet then was relatively bland, compared to today's. There wasn't much variety. Especially the aristocracy who tended to eat a lot of meat, they were always looking for new ways to prepare it, new sources, new tastes and this is where spices came in. Now, this is a good point to mention one of the biggest myths about spices. It's commonly said that medieval Europeans wanted spices to cover up the taste of spoiled meat. But this isn't really true. Anyone who had to worry about spoiled meat couldn't afford spices in the first place. If you could afford spices, you could definitely afford fresh meat. We also have evidence that various medieval markets employed a kind of police to make sure that people did not sell spoiled food, and if you were caught doing it, you were subject to various fines, humiliating public punishments. So what actually was true was this: In order to have meat for the winter, people would preserve it in salt, not a spice. Spices actually aren't very effective as preservatives. And throughout winter, they would eat salted meat, but the taste of the stuff could grow really boring and depressing after a while. So the cook started looking for new ways to improve the taste and spices were the answer, which brings us to mysterious origins and mythical status. Now the ancient Romans had a thriving spice trade and they sent their ships to the east and back. But when Rome collapsed in the fifth century and the Middle Ages began, direct trade stopped, and so did that kind of hands-on knowledge of travel and geography. Spices now came by way of the trade routes with lots of intermediaries between the producer and the consumer. So these spices took on an air of mystery. Their origins were shrouded in exotic travels. They had the allure of the unknown, of wild places. Myths grew up of fantasy lands, magical faraway places made entirely of food and spices. And to that, spices themselves had always been considered special or magical not just for eating and this was already true in the ancient world where legends about spices were abundant. Spices inspired the medieval imagination. They were used as medicines to ward off diseases, and mixed into perfumes, incent. They were used in religious rituals for thousands of years. They took on a life of their own and they inspired the medieval imagination, spurred on the age of discovery in the 145th and 16th centuries. When famous explorers like Columbus and da Gama and Magellan left Europe in their ships, they weren't looking for a new world.; they were looking for spices. And we know what important historical repercussions some of those voyages had.

TPO 18 Lecture 4 Biology

A：Well, it's finally looking like spring is arriving. The last of the winter snow would be melting away in a few days. So before we close today, I thought I'd mention a biological event that's a part of the transition from winter to spring, something you can go outside and watch if you have some patience. There is a small creature that lives in this area; you've probably seen it. It's the North American wood frog. Now the wood frog's not that easy tosspot since it stays pretty to close to the ground, under leaves and things and it blends in really well with its background as you can see. But they are worth the effort because they do something very unusual, something you might not have even thought possible. OK North American wood frogs live over a very broad territory or range. They're found all over the northeastern United States and all through Canada and Alaska, even inside the Arctic Circle. No other frog is able to live that far and north. But wherever they live, once the weather starts to turn cold and the temperature starts to drop below freezing, as soon as the frog even touches an ice crystal or a bit of frozen ground, well, it begins to freeze. Yeah...yes to me. You look a little bit taken aback.

B: Wait, you mean it's still alive but it freezes, solid?

A: Well, almost. Ice forms in all the spaces outside the cells but never within a cell.

B: But… then how does its heart beat?

A: It doesn't.

B: But…then how could it…….

A: You are gonna do such a thing? Well, that first touch of ice apparently triggers a biological response inside the frog. That first of all starts drawing water away from the center of its body, so the middle part of the frog, its internal organs, its heart, lungs, liver, these start getting drier and drier while the water that's being pulled away is forming a puddle around the organs just underneath the skin. And then that puddle of water starts to freeze. OK, up to known, the frog's heart is still beating, right? Slower and slower but…and in those last few hours before it freezes, it distributes glucose, a blood sugar throughout its body, its circulatory system, sort of acts like an an antifreeze.

B: A solution of antifreeze like you put in your car in the winter?

A: Well, you tell me. In frogs, the extra glucose makes it harder for the winter inside the cells to freeze. So the cells stay just slightly wet, enough so that they can survive the winter. Then after that, the heart stops beating altogether. So is that the same?

B: I don't really know, but how long dose it stay that way?

A: Well, it could be days or months, all winter in fact but umm, see the heart really doesn't need to do any pumping now because the blood is frozen too.

B: I just, I guess I just don't see how it isn't, you know, clinically dead.

A: Well, that's the amazing thing and how it revives is pretty amazing too. After months without a heartbeat, spring time came around again, the earth starts to warm up and suddenly one day, ping, a pulse, followed by another one, then another until maybe ten, twelve hours later, the animal is fully recovered.

B: And does the thawing process have some kind of trigger as well?

A: Well, we are not sure actually, the clearer thing is even though the sun is warning the frog up on the outside, its inside

thaw out first, the heart and brain and everything. But somehow it all just happens that way every spring.

B: But after they thaw does it affect them like their lifespan?

A: Well, hmm, we really don't know a lot about how long a wood frog normally lives, probably just a few years but there is no evidence its longevity. It does have some other impacts though. In studies, we found that when it comes to reproduction, freezing diminishes the mating performance of males. After they've been frozen and thawed of course, they don't seem quite as vocal. They move slower and they seem to have a harder time recognizing a potential mate. So if the male frog could manage not to go through this freezing cycle, he'd probably have more success in mating.

TPO 19 Conversation 1

Listen to a conversation between a student and the professor.

Student
Hi, professor Handerson. That was a really interesting lecture in class today.

Professor
Thanks, Tom. Yeah, animals' use of deception, ways they play tricks on other animals, that's a fascinating area. One we are really just starting to understand.

Student
Yeah, you know, selective adaptations over time are one thing. Oh, like, non-poisonous butterflies, that have come to look like poisonous ones. But the idea that animals of the same species intentionally deceive each other, I have never heard that before.

Professor
Right, like, there are male frogs who lower their voices and end up sounding bigger than they really are.

Student
So they do that to keep other frogs from invading their territory ?

Professor
Right, bigger frogs have deeper voices, so if a smaller frog can imitate that deep voice. Well ...

Student
Yeah, I can see how that might do the trick. But, anyway, what I wanted to ask was, when you started talking about game theory. Well, I know a little bit about it, but I am not clear about its use in biology.

Professor
3
Yeah, it is fairly new to biology. Basically, it uses math to predict what an individual would do under certain circumstances. But for example, a buisness sells, oh computer, say, and they want to sell their computers to a big university. But there is another company bidding too. So, what should they do?

Student
Well, try to offer the lowest price so they can compete, but still make money.

Professor
Right, they are competing, like a game, like the frogs. There are risks with pricing too high, the other company might get the sale, there is also the number and types of computers to consider. Each company has to find a balance between the cost and benefits. Well, game theory creates mathematical models that analyze different conditions like this to predict outcomes.

Student
Ok, I get that. But how does it apply to animals ?

Professor
Well, you know, if you are interested in this topic, it would be perfect for your term paper.

Student
The literature review ?

Professor
Yeah, find three journal articles about this or another topic that interests you and discuss them. If there is a confict in the conclusions or something, that would be important to discuss.

Student
Well, from what I have looked at dealing with game theory, I can't say I understand much of the statistics end.

Professor
Well, I can point you to some that presents fairly basic studies, that don't assume much background knowledge.
You'll just need to answer a few specific questions: What was the researchers' hypothesis? What did they want to find out? And how did they conduct their research? An then the conclusions they came to. Learning to interpret these statistics will come later.

TPO 19 Lecture 1 Linguistics(Proto-Indo-European)

Narrator
Listen to part of a lecture in a linguistics class.

Professor
All right, so far we have been looking at some of the core areas of linguistics, like syntax, phonology, semantics, and these are things that we can study by looking at one language at a time, how sounds, and words, and sentences work in a given language. But the branch of historical linguistics, involves the comparison of several different languages, or the comparison of different stages of a single language.

Now, if you are comparing different languages, and you notice that they have a lot in common. Maybe they have similar sounds and words that correspond to one another that have the same meaning and that sound similar.

Let's use a real-world example. In the 18th century, scholars who have studied the ancient languages, Sanskrit, Latin and Greek, noticed that these three languages had many similarities. And there might be several reasons why languages such as these had so much in common. Maybe it happened by chance, maybe one language was heavily influenced by borrowed words from the other. Or maybe, maybe the languages developed from the same source language long ago, that is, maybe they are genetically related, that was what happened with Sanskrit, Latin and Greek. These languages had so many similarities that it was concluded that they must have all come from the same source. And talk about important discoveries in linguistics, this was certainly one of them.

The scholars referred to that source language as Proto-Indo-European, Proto-Indo-European is a reconstructed language. Meaning, it is what linguists concluded a parent language of Sanskrit, Latin and Greek would have to be like. And Proto-Indo-European branched out into other languages, which evolved into others, so in the end, many languages spoken all over the world today can trace their ancestry back to one language, Proto-Indo-European, which was spoken several thousand years ago.

Now, one way of representing the evolution of languages, showing the way languages are related to each other, is with the family tree model. Like a family tree that you might use to trace back through generations of ancestors, only it's showing a family of geneticall related languages instead of people. A tree model for a language family starts with one language, which we call a mother language, for example, Proto-Indo-European. The mother language, is the line on the top of this diagram, over time, it branches off into new daughter languages, which branch into daughter languages of their own, and languages that have the same source, the same mother, are called sisters, they share a lot of characteristics, and this went on until we are looking at a big upside down tree languages like this. It is incomplete of course, just to give you an idea. So that's the family tree model, basically.

Now, the tree model is a convenient way of representing the development of a language family and of showing how closely related two of more languages are. But it is obviously very simplified, having a whole language represented by just one branch on a tree doesn't really do justice to all the variations within that language. You know, Spanish that spoken in Spain isn't exactly the same as Spanish that is spoken in Mexico, for example.

Another issue is that languages evolve very gradually, but the tree model makes it look like they evolve over night,like there was a distinct moment in time when a mother language clearly broke off into daughter languages. But it seems to me it probably wasn't quite like that.

TPO 19 Lecture 2 Astronomy(Radio Astronomy & Optical Astronomy)

Narrator
Listen to part of a lecture in an astronomy class.

Professor
So how many of you have seen the Milky Way, the Milky Galaxy in the sky? You, you have?

Student
Yeah, I was camping, and there was no moon that night, it was super dark.

Professor
Anybody else? Not too many. Isn't that strange that the Milky Way is the galaxy that the planet earth is in, and most of us have never seen it? Now, what's the problem here?

Student
Light pollution, right? From street lights and stuff ...

Professor
Yes, Especially unshielded street light, you know, ones that aren't pointed downward. Now, here's an irony, the buiding we are in now, the astronomy building not far from our observatory, has unshielded lights.

Student
So the problem is pretty widespread.

Professor
It is basically beyond control, as far as expecting to view the night sky anywhere near city, I mean. I have lived around here my whole life. And I have never seen the Milky Way within city limits, and I probably never will. There is a price for progress, eh? But let's think beyond light pullution, that's only one kind of a technological advance that has interfered with astronomical research.

Can anyone think of another? No? Ok, let's look at it this way, we don't only gain information by looking at the stars, for the past 70 years or so, we have also used radio astronomy1 , which lets us study radio waves from the sky.

Student
How can you observe radio waves? I mean, tell anything about the stars from that.

Professor
Well, in optical astronomy, using a telescope and observing the stars that way, we rely on visible light waves. What we are seeing from earth is actually electromagnetic radiation that's coming from stars. And just one part of it is visible light. But there are problems with that. When photons2 and light waves hit objects in our atmosphere, water droplets, oxygen and nitrogen molecules, dust particles and so on. These objects are illuminated, they are lit up, and those things are also being lit by all our street lights, by the moon, all these ambient light. And on top of that, when that visible radiation bounces off those molecules, it scatters in all directions. And well, light from stars, even nearby in our own galaxy, doesn't stand a chance against that. Basically the light bouncing off all these objects close to earth is brighter than what's coming from the stars.

Now, radiowaves are electromagnetic radiation that we can't see. Nearly all astronomical objects in space emit radio waves, whether nearby stars, objects in far away galaxies, they all give off radio waves. And unlike visible light waves, these radio waves can get through the various gases and dusts in space, and through our own earth's atmosphere comparatively easily.

Student
Ok, then we might as well give up on optical astronomy and go with radio astronomy.

Professor
Well, the thing is, with the radio astronomy, you can't just set up a telescope in you backyard and observe stars. One problem is that radio waves from these far away objects, even though they can get through, are extremely faint. So we need to use radio telescopes, specially designed to receive these waves and then, well, we can use computers to create pictures based on the information we receive.

Student
That sounds cool. So, how do they do that?

Professor
Well, it is kind of like the same way a satellite dish3 receives its signal, if you are familiar with that. But radio telescopes are sometimes grouped together, is the same effect as having one big telescope to increase radio wave gathering power. And they use electronics, quite sophisticated. Yeah, it is neat how they do it, but for now why don't we just stick with what we can learn from it. Some very important discoveries have been made by this technology, especially you consider that some objects in space give off radio waves but don't emit any light. We have trouble discovering those sorts of bodies, much less studying them using just optical telescopes.

Student
Well, If the radio waves are so good at getting throught the universe, what's the problem?

Professor
Well, answer this. How come people have to turn off their cell phones and all our electronic devices when an airplane is about to take off?

Student
The phones interfere with the radio communication at the airport, right?

Student
Oh, so our radio waves here on earth interfere with the waves from space?

Professor
Yes, signal from radios, cell phones, TV stations, remote controls, you name it. All these things cause interference. We don't think about that as often as we think about light pollution. But all those electrical gauges pollute the skies, just in a differen way.

TPO 19 Conversation 2

Narrator
Listen to a conversation between a student and the director of the student cafeteria.

Student
Hi, I... I am sorry to interrupt, could I ask you a few questions?

Director
Sure, but if it is about you meal plan, you'll need to go to Room 45, just down the hall.

Student
Eh, no, I am OK with my meal plan. I am actually here about the food in the student cafeteria.

Director
Oh, we do feed a lot of students, so we can't always honor individual requests. I am sure you understand.

Student
Of course. It is just that I am a little concerned, I mean, a lot of us are, that a lot of the food you serve isn't really that healthy. Like there are so many deep-fried foods.

Director
As a matter of fact, we recently changed the type of oil we use in our fryer . It is the healthiest available. And would you believe that at least ten students have already complaint that their french fries and fried chicken don't taste as good since we switched?

Student
Oh, I try not to eat too many fried foods anyway. I am just aware that, eh...You see, I used to work in a natural food store. They had all these literature4 advising people to eat fresh organic growing food. Working there really open my eyes.

Director
Did you come to the organic food festival we had to celebrate Earth Day?

Student
Oh, sorry, I must have missed that.

Director
We served only certified organic food, most of which was from local farms. It is not something we can afford to do on a daily basis, and there aren't too many organic farms around here. But sometime the produce we offer is organically grown. It depends on the season and the prices of course.

Student
That's good to know. I like the fact that organic farms don't use chemical pesticides or anything that can pollute the soil or the water.

Director

I do too. But let me ask you this. Is it better to buy locally grown produce that is not certified as organic or is it better to get organically grown fruits and vegetables that must be trucked in from California, three thousand mile away. What about fossile fuels burned by the trucks' engine. Plus the expense of shipping food across long distances. And nutritionally speaking, an apple is an apple however it is grown.

Student

I see your point. It is not so clear-cut.

Director

Why don't you visit our cafeteria's website? We list all our food suppliers. You know, where we buy the food that we serve. And the site also suggests ways to make your overall diet a healthy one. You can also find some charts listing fat and calorie content for different types of seafood, meat and the other major food groups.

Student

I didn't realize you thought about all these things so carefully, I just noticed the high-calorie food in the cafeteria.

Director

Well, we have to give choices so everyone is satisfied. But if you wish to pursue this further, I suggest that you talk to my boss.

Student

That's OK, seems like you are doing what you can.

TPO 19 Lecture 3 Marine Biology(Plant Life in Salt Marshes)

Narrator
Listen to part of a lecture in a marine biology class.

Professor
Ok, today we are going to continue our discussion of plant life in coastal salt marshes
5 of North America. Salt marshes are among the least inviting environments for plants. The water is salty, there is little shade and the ocean tide comes in and out, constantly flooding the marsh, so the variety of plants found in salt marshes is limited, but there is a plant genus that thrives there, the Spartina. In fact, the Spartina genus is the dominant plant found in salt marshes. You can find one type of the Spartina, Saltmarsh Cordgrass, growing in low marsh areas. In higher marsh areas, you are likely to find a Spartina commonly called Salt-meadow Hay. So how is the Spartina able to survive in an envrionment that would kill most plants? well, it is because salt marsh grasses have found ways to adapt to the conditions there.

First of all, they are able to withstand highly saline conditions. One really interesting adaptation is the ability to reverse the process of osmosis6

. Typically, the process of osmosis works... Well, when water moves through the wall of a plant cell, it will move from the side containing water with the lowest amount of salt into the side containing the highest amount of salt. so imagine what would happen if a typical plant suddenly found itself in salt water, the water contained in the plant cells, that is water with very little salt would be drawn out toward the seawater, water with a lot of salt. So you can see the fresh water contained in the plant will be removed and the plant will quickly lose all its water and dehydrate. But what about the Spartinas, well, they allow a certain amount of salt to enter their cells, bringing the salt content of the water within the plant, to a slightly higher concentration than that of the surrounding seawater. So instead of fresh water moving out of the plant cells, salt from the seawater enters, reverse osmosis, and this actually strengthens the cells.

Another adaptation to the salty environment is the ability to excrete excess salt back to the environment. That's why you might see a Spartina shimmering in the sunlight. What's reflecting the light is not salt from seawater that has evaporated, although that's a good guess. But it is actually the salt that came from within the plant. Pretty cool, eh? You can really impress your friends and family with that little ? the next time you are in a salt marsh.

But coping with salt is not the only challenge for plants in the salt marsh. Soil there is dense and very low in oxygen, so Spartinas have air tubes, air enters through tiny openings on the leaves, the tubes provide direct pipe line for oxygen, carrying it down the leaves through the stems and into the roots, where it is needed. If you pull up a Spartina, you might even notice some reddish mud on some of the roots, this is caused by oxygen reacting with iron sulfide in the soil, and it produces iron oxide or rust.

Now, although the Spartinas have adapted several chemical and physical mechanisms that allow them to thrive in salt water and to feed oxygen to their roots. There is yet another aspect of the harsh environment that they have to adapt to, the force of tides and occasional violent storms. Wind and water are constantly crashing into these plants. So as you might have guessed, they have developed a means of solidly anchoring themselves into the soil. How? They have tough sort of underground stems called rhizome, rhizomes from one plant grow through the muddy soil and interlock with those of other nearby plants, the plants form a kind of colony, a community that will thrive and perish together. Because alone as single plants, they cannot survive. \

Of course the plants in these colonies also need tough resilient stems above the soil, stems that can bent a lot but not break as water constantly crashes into them. So in addtion to the interlocking underground rhizomes, they have yet another adaptation, and it is ... well, we are back to reverse osmosis again, by adjusting the osmotic pressure so that the cells are always fully inflated, the plant is able to withstand great pressure befor snapping, so Spartinas may look like simple marsh grass, but they are really a wonder of chemistry, physics and structural engineering that allows them to survive and even thrive in an evironment in which most plants will wilt7 and die within hours.

Recommended Reading:
Salt Marsh Life
Life in New Hampshire Salt Marshes
Dynamics of the Salt Marsh

TPO 19 Lecture 4 Art History(Cecilia Beaux)

Narrator: Listen to part of a discussion in an art history class.

Professor: All right, let's continue our discussion of portrait artists(portraitist) and portraiture. Who remembers any of the important points we made last time? Sandra?

Student: Well, artists have done portraits of people for centuries, of famous people and regular people, and most portraits convey the artists' personal vision, like their feelings and insights about a person.

Professor: Great, that's a crucial point, and I'd like to explore that a little today. A great example of that, that vision in portraiture, is Cecilia Beaux. Cecilia Beaux was born in 1854, and after learning to paint and studying with several important artists of the time, Beaux became known as one of the best portrait painters in the United States. She was very successful. She even had portraits of the wife and children of Theodore Roosevelt, while he was president. Some did not get much more prestige than that. Now, those portraits also reflect the kind of subjects that Beaux tended to use, which were mostly women and children. For example, in her first major work, her subjects were ..., the painting featured her sister and her nephew. Yes, Mark?

Student

Yeah, it just seems interesting. I was wondering if that was unusual to have a portrait artist who is a woman become so well-known and successful in the 19th century.

Professor

Great question. Yeah, she really stood out back in the 1800s. And today, she is still considered one of the greatest portrait painters of her time, male or female. In fact, she was the first full-time female instructor at the Pennsylvania Academy of the Fine Arts, and she was a full member of the National Academy of Design. These are pretty important institutions, so, yeah, she definitely made headway for women artists. Ok, so let's look at one of her portraits now, this painting is called The Dreamer. It is one of my favorites. And I think it is especially characteristic of Beaux's work. So what you see here is a portrait of a close friend of Cecilia Beaux. So tell me what's the first thing that draws you to this painting? What catches your eye first.

Student

Well, for me, it is her face and hands, I think they are really expressive, and also, they make the woman seem very comtemplative, seems like she is thinking pretty seriously about something.

Student

Yeah, her eyes kind of draw you in. But what strikes me is the contrasting colors, the white dress and the dark background. It kind of reminds me of that painting we discussed a few weeks ago, by ...eh... John Singer Sargent. I think it was called MadameX?

Professor

I agree, good point. Yes, Beaux had high regard for Sargent's work. And this is something, a technique you will find in both of their work. Ok, but the painting is called The Dreamer. What do you see is dreamlike about it?

Student

Well, the background behind the woman is pretty vague. Like, maybe there is no real context, like no definite

surroundings, expecially compared to the woman herself, since she is so clear and well-defined.

Professor

Yes, the unclear background definitely contributes to that dreaminess. It is meant to show a sense of isolation I think. With the woman is deep in a daydream and not really aware of anything eale. This painting shows how insightful Cecilia Beaux was as a portrait artist. Besides her excellent technical skills, like her use of brush strokes and color to make an impression, both respectives come through. Her portraits reveal her own interpretation of her subject's state of mind. This is what it is all about, not just likenesses

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Now, the undefined background also shows how Cecilia Beaux was influenced by the French Impressionists, who believed, like Beaux, in a personal rather than conventional approach to their subject matter. Beaux used some impressionist techniques and share much of their phylosophy, but her style, it was all her own.

TPO20 Section1 Conversation1-Student&Librarian

Narrator

Listen to a conversation between a student and a library employee.

Student

Excuse me, I received a letter that I am supposed to return a book that I checked out back in September , it's called Modern Social Problems. But I am writing my senior thesis, so I thought I was allowed to keep the book for the whole academic year .

Librarian

So you signed up for extended borrowing privileges?

Student

Yeah.

Librarian

And we are still asking you to bring the book back?

Student

Uh-huh. Do I really have to?

Librarian

Well, let me check the computer . The title was ... Modern Social Problems?

Student

Yeah.

Librarian

Eh... Ok, yeah. It’s been recalled. You can keep it all year as long as no one else requests it, but someone else has, it looks like one of the professors in the sociology department. So you have to bring it back. You can check it out again when it is returned in a couple of weeks.

What if the person renews it? And I really need it right now.
Librarian
All of it? Or is there a certain section or chapter you are working with?

Student

Well, there’s one chapter in particular I am working with, but why?
Librarian
Well, we normally don’t do this, but because of the circumstances we can photocopy up to one chapter for you. Why don’t you do that for the one you are working with right now? And by the time you need the rest of the book, maybe it’ll have been returned.

Student

Oh, that would be great.
Librarian
Do you have it with you?
Student
Eh... no, it’s in my dorm room. These are books I want to check out today. Is it OK if I bring that one by in a couple of days?
Librarian
Actually, the due day is tomorrow. After that, there’ll be a two dollar per day fine. But you need to return it today if you want to check out any books today. That’s our policy.

Student
Oh, I see.
Librarian
Yeah, not a lot of people realize that. In fact, every semester we get a few students who would have their borrowing privileges suspended completely because they haven’t returned books. They are allowed to use books only in the library. They are not allowed to check anything out because of unreturned books.

That’s not good. I guess I should head back to the dorm right now.
Librarian
But before you go, what you should do is fill out a form requesting the book back in two weeks. Then the person who requested it won’t be able to renew it. You’ll get it back quickly.
Student
I’ll do that right now.

TPO20 Lecture1-Linguistics(Gricean Maxims)

Narrator

Listen to part of a lecture in a linguistics class.

Professor

Ok, the conventions or assumptions that govern conversation, these may vary from one culture to another , but basically, for people to communicate, there is a ... they have to follow certain rules. Like if I am talking with you and I start saying things that are not true, if you can't tell when I am lying and when I am telling the truth, well, we are not going to have a very satisfactory conversation, are we? Why? Because it violates one of the Gricean Maxims, that's a set of rules or maxims a philosopher name H.P .Grice came up with in 1970s. One of these Gricean Maxims is... well, I've already given you a hint.

Student

Oh, you just can't go around telling lies.

Professor

Right, or as Grice put it, "Do not say what you believe to be false." That's one of Grice's Maxims of Quality as he called it. So that's pretty obvious. But there are others just as important. Like, eh... suppose you would ask me what time it was and I replied 'my sister just got married' , what would you think?

Student

You are not really answering my question.

Professor

No, I am not, am I? There is no connection at all, which feels wrong because you generally expect to find one. So one important maxim is simply: be relevant. And using the so-called Maxim of Relevance we can infer things as well, or rather the speaker can imply things and the listener can make inferences. For instance, suppose you say you would really love to have a cup of coffee right now, and I say 'there's a shop around the corner' . Now, what can you infer from what I said?

Student

Well, the shop sells coffee for one thing. 7

Professor

Right, and that I believe it is open now. Because if I won't implying those things, my response would not be relevant. It'd have no connection with what you said before. But according to the maxim, my response should be relevant to your statement, meaning, we should assume some connection between the statement and the response. And this maxim of relevance is quite efficient to use. Even if I don't spell out all the details, you can still make some useful logical inferences, namely, the shop is open and it sells coffee. If we actually have to explain all these

details, conversations would move along pretty slowly, wouldn't they?

OK, then there's the maxims of manner, including things like be clear , and avoid ambiguity.

And another more interesting maxims is one of the so-called maxims of quantity, quantities of information, that is. It says, to give as much as is required in the situation. So suppose you asked me what I did yesterday and I say 'I went to the Art Museum.' You would likely infer that I saw some works of art. Suppose, though, that I did not go inside the museum, I just walked up to it then left. Then I violated the quantity maxim by not giving enough information. So you can see how important implications are to our ability to carry on a conversation.

But there are times when people will violate these maxims on purpose. Let's say a boss is asked to write a letter of recommendation for a former employee seeking an engineering job. The letter he writes is quite brief. Something like, uh, Mr . X is polite and always dresses quite neatly. So what does this really mean?

Student

Oh, I see. By not mentioning any important qualities related to the job, the boss is ... like, implying that this is best that can be said about Mr . X that he is really not qualified.

Professor

Exactly. It's a written letter not a conversation, but the principle is the same. The boss is conveying a negative impression of Mr . X without actually saying negative about him. So, by violating the maxims, we ...eh... but ... it can be a way to be subtle or polite, or to convey humor through sarcasm or irony.

Sometimes though people will violate maxims for another purpose: to deceive. Now, can you imagine who might do such a thing?

Student

Some politicians.
Student
Or advertisers.

Professor

Right. Anyone who may see an advantage in implying certain things that are untrue without explicitly saying something untrue. They think, hey, don't blame us if our audience happens to draw inferences that are simply not true. So next time you see an advertisement saying some product could be up to 20% more effective, think of these maxims of quantity and relevance, and ask yourself what inferences you are being led to draw. Think, more effective than what exactly?

And why do they use those little phrases ‘could be’ and ‘up to’? These claims give us a lot less information than they seem to.

TPO20 Lecture2-Environmental Science(Interglacial Periods)

Narrator

Listen to part of a lecture in an environmental science class.

Professor

I’d like to take you back about 11 thousand years ago when Earth entered the latest interglacial period. Interglacial periods are, typically periods of time between Ice Ages, when the climate warms, and the glacial ice retreats for a time, before things cool off again and another Ice Age begins. And for over the past several million years, Earth’s sort of default climate has actually been Ice Age, but we have experienced periodic regular thaws, and the last one, the one we are in now, started about 11 thousand years ago.

Now, the typical pattern for an interglacial period, and we have studied several, is that the concentration of carbon dioxide and methane gas actually reaches it... its peak, that is, there is the most carbon dioxide and methane gas, uh, greenhouse gases in the atmosphere just after the beginning of the interglacial period. And then, for reasons which are not entirely clear , the concentration of greenhouse gases gradually goes down. Now, the climate continues to warm for a while because there is a lag effect. But uh, gradually as the concentration of greenhouse gases goes down, Earth starts to cool again, and eventually you slip back into an Ice Age.

Um, however , for the latest interglacial period, the one we are in now, this pattern did not hold, that is, the concentration of carbon dioxide and methane dipped1
a little bit after, uh, uh, after
peaking at the beginning, near the beginning of the interglacial period, but then it began to rise again. Um ... What was different about this interglacial period than the other ones?

Well, one of the big differences is human activity. People began to raise crops and animals for food instead of hunting for them. This is the agricultural revolution. And it began to happen in the earliest stages about 11 thousand years ago.

Now, scientists have tended to regard ... the ... uh ... agricultural revolution as a beneficiary of the ... uh ... fortuitous
2
shift in climate. However , some new theories of climate, new theorists of
climate have proposed that perhaps humanity was having an effect on the climate as far back as the beginnings of the agricultural revolution. When you grow crops and uh, pasture your animals , one of the things you do is you cut down the forests. If you cut down the forests, when you burn the trees for fuel and don’t replace them with other trees, or when you just leave them to rot and don’t allow other trees to grow, you end up with a lot more carbon in the form of carbon dioxide getting into the atmosphere.

Um ... another gas associated with the spread of agriculture is methane. Methane forms in large concentration above wetlands, and as it turns out, the cultivation of certain grains creates vast areas of artificial wetlands, and probably drastically increases the amount of methane getting into the atmosphere, over and above what would be there.

So, um... agriculture, the ... the spread of agriculture, you know we are talking over thousands of years, um... but this could very well had a profound effect on the composition of Earth's atmosphere. It's kind of ironic to think that absent that effect, it maybe that we would be heading into an Ice Age again. In fact, back in the 1970s, a lot of theorists were predicting that, you know, the climate would start to cool and we'd slowly enter into the new Ice Age. And then they were puzzled as to why it didn't seem to be happening.

Umm... now, what are the implications for the future? Well, um... it is a little tricky. I mean, you could say, well, here is an example of ... um ... human activity, the agricultural revolution which actually was beneficial, we altered the climate for the better , perhaps, by preventing an Ice Age. But then industrialization, of course, has drastically increased the amount of carbon dioxide that humans are putting into the atmosphere, the burning of fossil fuels tends to put a lot of CO2 into the atmosphere. Um... so we are entering into uncharted3
territory now, in terms of the amount
of carbon dioxide, the concentrations of carbon dioxide that are now being put into the atmosphere as a result of industrialization and the use of fossil fuels.

TPO20 Section2 Conversation2-Student&Professor

Narrator

Listen to a conversation between a student and a professor .

Student

Professor Jennings, I hope I am not interrupting, but you wanted to see me?
Professor
Oh, hello, Suzane. Yes, yes, come right in. How are you doing?
Student
All right.

Professor

Well, good. The reason I wanted to talk to you was that while you were presenting you linguistics project in class the other day, well, you know, I was thinking you are a perfect candidate for the dean's undergraduate research fund.

Student

Um ... Professor , I am really sure what the... um ... dean ....
Professor
Undergraduate research fund is ... It is a mouthful I suppose. OK. Here's the thing. Every year the school has a pool of money to fund a number of research projects of undergraduate students. Because as you can imagine, indepth research often requires monetary support.

Student

I would like to expand on my research.
Professor
Good. First a panel of professors reviews the applications for the grant. And then they decide

which project should be funded. The alloted money could be used for travel expenses, to attend a conference for example, or things like supplies, research equipment, resources that are necessary to conduct the research.

Student I
see.
Professor
Right. And I think you should apply for this grant. Your project is definitely eligible
4
. And you can
expand it if you have the necessary resources. So, does it sound like something you would be interested in?

Student

Oh, yeah, sounds great. I thought the topic I work on was very interesting, and it is certainly relevant to my linguistics major . I assume it will also look good when I try to get into graduate school. But how do I apply for the grant?

Professor

It is pretty straightforward. A brief description of your proposed project, and an estimated budget. How much you need to spend and what you intend to spend it on. Also a glowing letter of recommendation from a linguistics professor wouldn't hurt, which I'd be more than happy to write up for you.

Student

OK. Cool. I am pretty clear on how to carry out my project, but I am not sure where I can find more information on the subject.

Professor

Well, I have already thought of that. There's this private library at a university in Boston. By the way, because I graduated from that school, I can get you access to it, no problem. You see, the library houses lots of unpublished documents that are relevant to your topic.

Student

So I can put that on the application for the grant, that I plan on using material from that library for my research and figure a trip to Boston into my budget?

Professor

Exactly. I really think judging from your work in class, and the relevance and clarity of this project, you really have a good chance of getting the funding.

Student

OK. I'll definitely apply then.
Professor
The sooner the better . It is due in a few weeks. Gook Luck! And I'll get that letter written up right away.

TPO20 Lecture3-Literature(Folktales)

Narrator

Listen to part of a lecture in a literature class.

Professor

All right, so now we've talked about folk legends and seen that their ... one of their key features is there's usually some real history behind them. They are often about real people, so you can identify with the characters, and that's what engages us in them. The particular stories might not be true and some of the characters or events might be made up. But there's still a sense that the story could have been true since it is about a real person. That's distinct contrast from the other main branch of popular storytelling, which is folk tales.

Folk tales are imaginative stories that ... um ... like folk legends, they have been passed down orally, from storyteller to storyteller for ... since ancient times. But with folk tales you don't ever really get the sense that the story might have been true. They are purely imaginative and so quite revealing, I think anyway, about the culture and the connection between folk tales and culture, which we'll talk about.

But first let's go over the various types of folk tale and focus specifically on Norwegian folk tales

since they illustrate the variety pretty well. There are in general three main types of Norwegian folk tales.

One is animal stories, where animals are the main characters. They can be wild animals or domestic, and a lot of times they can talk and behave like humans, but at the same time, they retain their animal characteristics too. They tend to involve animals like bears, wolves and foxes. The point of these stories, their, their internal objectives, so the speak, is usually to explain some feature of the animal, how it arose. So there's one about a fox who fools a bear into going ice fishing with his tail. When the bear puts his tail into the water through a hole in the ice, to try and catch a fish, the ice freezes around it, and he ends up pulling his tail off. So that's why bears to this day have such short tails.

The second category of Norwegian folk tale is the supernatural. Eh ... stories about giants and dragons and trolls, and humans with supernatural powers or gifts, like invisibility cloaks. Or where people are turned into animals and back again into a person, those are called transformation stories.

There's a well-known Norwegian supernatural folk tale, a transformation story called East of the Sun and West of the Moon, which we'll read. It involves a prince who is a white bear by night and a human by day. And he lives in the castle that's east of the Sun and west of the Moon, which the heroine in the story has to try to find. Besides being a good example of a transformation story, this one also has a lot of the common things that tend to show up in folk tales. You will find the standard opening, 'once upon a time ... ' . And it has stock
5
characters like a prince, and a poor but
beautiful peasant girl, she is the heroine I mentioned. And ... um ... it has a very conventional form. So no more than two characters are involved in any one scene. And it has a happy ending. And it's ... the story is presented as though ... well, even though a lot of the actions that occurred are pretty fantastic, so you'd never think of it as realistic. The characters still act like ... they resemble real people. They are not real or even based on historical figures. But you might have a supernatural story involving a king, and he'd act like you'd expect a Norwegian king to act.

OK. The third main kind of folk tale is the comical story. We'll say more later about these, but for now, just be aware of the category and that they can contain supernatural aspects, but they are usually more playful and amusing overall than supernatural stories.

Now, as I said, traditionally, folk tales were just passed down orally. Each generation of storytellers had their own style of telling a story. But ... um ... in Norway, before the 19th century,
folk tales were just for kids. They weren't seen as worthy of analysis or academic attention. But this changed when the romantic movement spread throughout Europe in the mid-19th century. Romantics looked at folk tales as sort of a reflection of the soul of the people. So there was something distinctly Norwegian in folk tales from Norway. And there was renewed pride in the literature and art forms of individual countries. As a result, the first collection of Norwegian folk tales is published in 1852. And there have been many new editions published since then. For the people of Norway, these stories are now an important part of what it means to be Norwegian.

TPO20 Lecture4-Biology(Snowshoe Hare)

Narrator

Listen to part of a lecture in a biology class.

Professor

Now, James, you said you had been to the State of Maine, right?
Student
Yeah, actually I lived in western Maine until I was about sixteen.

Professor

Great. So why don't you tell everybody what is like there in the winter?
Student
The winter? Well, it's cold. And there's lots of snow, you wouldn't believe how much snow we used to get.

Professor

Actually I would. I did field research up there a couple of winters. And it really is an incredible environment. And to survive in that sort of environment, animals have to adapt, to evolve in response to their surroundings. As you recall, an adaptation is any feature, um... physical or behavioral feature of a species that helps it survive and reproduce. And in adapting to extreme climates, like Maine in the winter time, animals can evolve in pretty interesting ways. Take, for example, the snowshoe hare.

Ok, the snowshoe hare, and of course, that's H-A-R-E, like a rabbit. Although I probably should mention that technically a hare is not exactly the same as a rabbit, even though it is very similar . The primary difference is that a rabbit's young are born blind and without fur , while a hare's babies are born with a full coat and able to see.

Now, the snowshoe hare, tell me, what sort of adaptations do you think it has developed that help it survive the Maine winters? I'll give you a hint. Food isn't an issue. The hare actually has abundant food in the small twigs it finds.

Student
Well, I don't know. I mean, I know we used to try to look for these rabbits, eh... hares, when we went hiking in the winter , but it was often hard to find them in the snow.

Professor

Yes. That's exactly right. The major concern of the snowshoe hare in the winter is predators. And now that includes humans. So one of its adaptations is basically camouflage. In other words, its coat, its fur , turns from brown in the summer to white in the winter , which makes it harder for the hare's predators to see it against the white snow.

Student

Yeah, but I could swear I remembered seeing rabbits in the snow a couple of times, I means hares, that were brown.

Professor

Well, you may very well have. Timing is really important, but the snowshoe hare doesn't always get it exactly right. Its chances for survival are best if it turns white about the time of the first snowfall. And it's the amount of daylight that triggers the changing of the hare's coat. As the days get shorter , that is, as the Sun is up for a shorter and shorter time each day, the snowshoe hare starts growing white fur and shedding its brown fur . The hare does a pretty good job with its timing, but sometimes when there's a really early or late snow, it stands out. Plus, it takes about a month for the snowshoe hare's coat to completely change color . So if there's a particularly early snowfall, it's very likely that the hare's fur would not yet be totally white. And that would make this a particularly dangerous time for the hare.

OK. What else? Other adaptations? Susan?
Student
Well, it's called the snowshoe hare, so are its feet somehow protect it from the cold?

Professor

Well, this animal's name does have to do with an adaptation of its feet. Uh... though, not like it has warm furry boots or something to keep its feet from getting cold. You've probably never needed to wear snowshoes. But, well, snowshoes are not like thick furry shoes designed to keep the feet warm, they are actually quite thin, but very wide. What they do is spread out the weight of the foot coming down on the snow. See, the problem with walking on snow is that you sink in with every step. But with snowshoes, you don't sink in, you walk on top of the snow. It makes walking through the Maine countryside in the winter much easier .

Anyway, the snowshoe hare has an adaptation that plays on the same idea. It has hind feet that act like snowshoes. I mean, it's paws are wide and they allow the hare to hop and run just at the surface of deep snow. And this is a huge advantage for the snowshoe hare since by contrast, the feet of its predators usually sink right down into the snow.

Now, another advantage related to this is that unlike many animals in winter, snowshoe hares can stay lean6
and light weight. They accumulate essentially no body fat. Can anyone guess why this is so?

Student

They don't eat very much?
Professor
Well, yes. But not because there isn't enough food around. It's because, like I said, food is almost

always within reach, and they don’t have to store up a lot of food energy for the harsh winters.

TPO-21 Conversation1

Narrator
Listen to a conversation between a student and a professor.

Professor Excuse me, can I help you? You look a little lost.

Student Yeah, I am. This is my first day on campus, and I don't know where anything is.

Professor Can't find your orientation session?

Student Uh-huh. What a way to begin! Lost going to orientation

Professor Well, my guess is in the auditorium, that's where they usually are.

Student You're right, the general ones. I went to one of those sessions ealier today. But now I need the one for my major, engineering. My schedule says the meeting room is in ... Johnson Hall? In the engineering department, which should be right here in front of us, according to the map. But this building is called the Morgan Hall.

Professor Well, your map reading skills are fine actually. This used to be Johnson Hall, all right. Trouble is they changed the name to Morgan Hall last spring. So they sent you a map with an old name? I am surprised.

Student Well, this was actually mailed out month and month ago. I got a second pack in the mail more recently with another one of these maps in it. I guess they must have the updated name. I left that one in my dorm room.

Professor Well, things change fast around here. This building was renamed after one of our professors. She retired a few months ago. She is very well-known in the world of physics. Too bad for Johnson, I guess.

Student Who is Johnson anyway?

Professor Oh, one of the early professors here. Unfortunately, I thinks his ideas are going out of style. Science kept marching forward.

Student I'll say it does. That's why I transferred to this university. I was really impressed with all the research equipment you guys have at the laboratories. You are really on the forefront.

Professor Um... so do you know what kind of engineering you want to specialize in?

Student Yeah, aerospace engineering.

Professor Well, the aerospace engineering department here is excellent! Eh... do you know that this university was the first one in the country to offer a program in aerospace engineering?

Student Yeah, I know. And a couple of students who graduated from here became astronauts and orbited the Earth.

Professor Right. The department has many prominent alumni. Well, you might end up taking some of your advanced math course with me. I get a lot of students from the engineering department because I teach the required applied

mathematics courses.

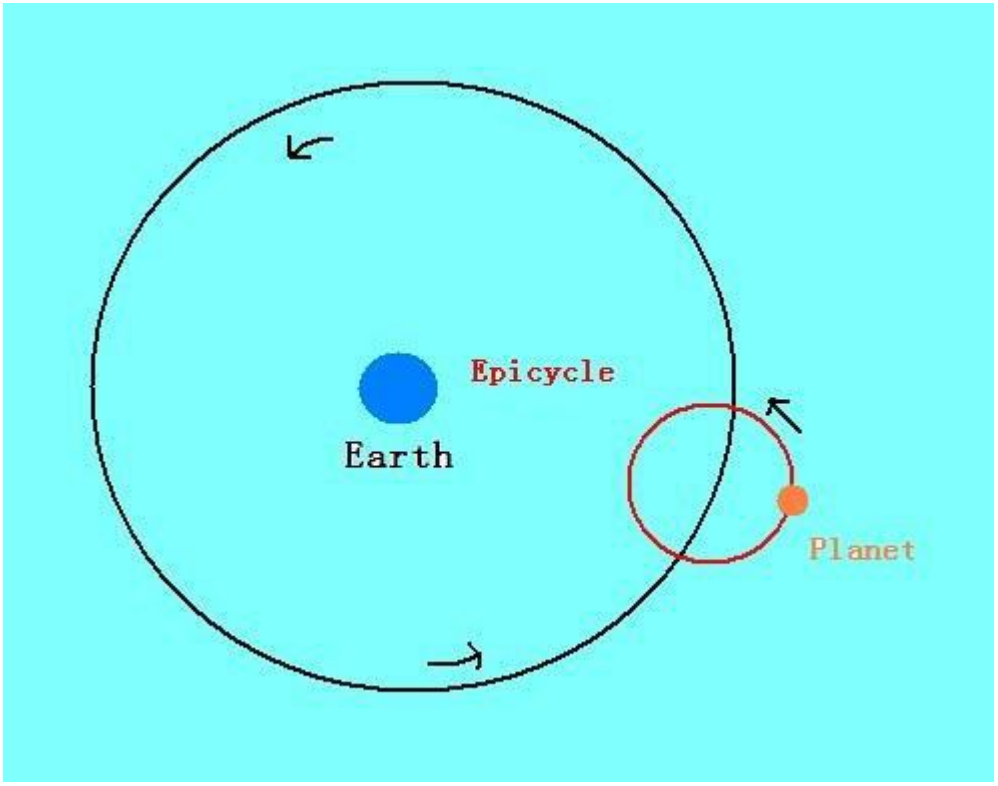
Student Oh, cool. Actually, I want to get a minor in math.

Professor Excellent. Hmm... A major in aerospace engineering with a minor in math, you'll go far with that degree. More of our students should do that. There are so many more opportunities available in the field when you have a strong math background.

Student I'm glad to hear you say that.

TPO 21 Lecture 1 Astronomy(Geocentric&Heliocentric theory)

Narrator Listen to part of a lecture in a history of science class. Aristarchus-Heliocentric Theory



Professor Ok, we have been talking about how throughout history, it was often difficult for people to give up ideas which have long been taken for granted as scientific truth, even if those ideas were false. In Astronomy, for example, the distinction between the solar system and the universe wasn't clear until modern times. The ancient Greeks believed that what we called the solar system was in fact the entire universe, and that the universe was geocentric. Geocentric means Earth-centered, so the geocentric view holds that the Sun, the planets, and the stars, all revolve around the Earth, which is stationary. Of course, we now know that the planets, including Earth, revolve around the Sun, and that the solar system is only a tiny part of the universe.

So, why did the ancient Greeks believe that the Earth was the center of the universe? Well, it made sense to them. Observations of the sky make it appear as if the Sun, the moon, and the stars all revolve around the Earth everyday, while the Earth itself stayed in one place. And this view is also supported by their philosophical and religious beliefs about the origin and structure of the universe. It was presented in the works of well-known Greek philosophers as early as the fourth century B.C.E., and the geocentric theory continue to prevail in Western thought for almost 2,000 years, until the 17th century.

Now, what's especially interesting is that when astronomical observations were made that seemed to be inconsistent with the geocentric view, the ancient Greeks did not really consider alternative theories. It was so intuitive, so sensible that the Earth was the center of the universe that astronomers found ways to explain those seemingly inconsistent phenomena within the geocentric view.

For example, Greek astronomers made excellent, very accurate observations of the movements of the planets, but the observations revealed a bit of a problem. The geocentric theory said, that the planets would move around the Earth in one direction. However, astronomers noticed that at times, several planets seem to stop moving in one direction and start moving backward in their orbits around the Earth, and they came up with a theory that these planets themselves moved in

smaller circles called *epicycles* as they travelled around the Earth. Here's a picture of what they imagined. You see how this *epicycle* theory could account for the seemingly backward motion of the planet. Of course, today we know that this appearance of backward motion is caused by the fact that Earth, as well as other planets, all move in their own orbits around the Sun, and the relative movements of the planets with respect to each other can get quite complex.

However, there were a few astronomers in Greece and other places who didn't agree with the geocentric view, for example, a Greek astronomer who lived in the third century B.C.E. He proposed the theory that our planetary system might be heliocentric, his name was Aristarchus. Heliocentric means Sun-centered, that the Earth revolves around the Sun. Aristarchus recognized from his calculations that the Sun was much larger than the Earth and other planets. It was probably this discovery that led him to conclude that the universe is heliocentric. I mean, isn't it more sensible to think that a smaller heavenly body would orbit a larger one, rather than the opposite?

However, his proposition was rejected largely based on other scientific beliefs held at the time, which all made sense in a way even if they were incorrect. Let me mention two objections Greeks made to Aristarchus's theory. First, they believe that everything that moves creates its own wind, so to speak, everyone has this experience when you are running, right? So, they thought that if the Earth itself was moving, there would have to be a constant wind blowing, sweeping them off their feet, and of course there wasn't. And second, the idea of an Earth that moved didn't fit in with the ancient Greeks' understanding of gravity. They thought that gravity was basically a natural tendency of all things to move towards the center of the universe, which was the Earth, or the center of the Earth, so that explains why apples and other falling objects were falling straight down. If the Sun was at the center of the universe, things would fall toward the Sun and away from the Earth, which of course they didn't. So these were some of the reasons they rejected the heliocentric theory.

TPO21 Lecture 2 Computer Science(Software Development)

Narrator Listen to part of a lecture in a Computer Science class. The professor is discussing software engineering.

Professor We've been talking about the software development cycle, and today I'd like to move on to the next stage of that cycle-testing, and why finding bugs during testing is actually a great thing. Eh...eh... the quality of the software product often relies heavily on how well it's been tested. Liz?

Student Um... just a quick thing. Bugs is the word for problems in the program code, right?

Professor
Yeah, in code or in a computer itself. There is a bit of a story behind that term. Um... back in the 1940s, when the computer industry was just starting, a group of computer scientists was working late one night, and there was a problem in one of the computers' circuits1. When they examined it, they found a five-centimeter long moth caught in there. Once they debugged the computer, it worked just fine. And ever since then, all kinds of computer problems have been known as bugs.

Anyway, you want to find bugs while the software is still in the development and testing phases. Finding them when the software product has already been put on the market can be quite embarrassing. Generally speaking, every software development project has a group of testers and a group of developers. Jack?

Student And they are different people?

Professor They are generally completely different group of people. My personal opinion is that they have to be different groups of people because developers often have a bias for their own work, and it blinds them to certain problems that might be obvious to somebody else. So it is always good to have a different set of eyes to go in there and make sure that everything is tested properly.

Ok, now, here's the key. Developers and testers have different mentalities. The mentality of the software developer is construtive, creative, they are spending long hours working together to create and build something new. A software tester, on the other hand, their entire goal is to look at this product and find problems with it, to improve it. Now, this difference between the testers and the developers can lead to an environment where there is a bit of friction. And that friction sometimes makes it difficult for the two teams to work together.

There are two projects that I worked on a couple of years ago. One, which I'll call *Project Split*, well, the testing and development teams did not work well together. And the other, I'll call *Project Unity*, during which both teams worked very well together. Now, during *Project Split*, we had defect meetings where the developers and the testers met together, eh... eh... to discuss various problems and how they should be fixed. And you could sense the conflict just by walking into the room. Literally, the testers and the developers sat on opposite sides on the table. Um... and ... and the developers were very defensive about the feedback.

Student Well, if bugs are being pointed out they wouldn't be too happy since its their work.

Professor Exactly. Now, 'cause the two teams weren't working well together, the fixes were coming very very slowly. And you know, a lot of times when you fix bugs you introduce new bugs, or you discover bugs and other areas that only come to light because something has been changed, so fixing all those new additional bugs was also being delayed. Um... the test process went on much longer than expected and we ended up having to put the product on the market with known bugs in it, which was obviously not ideal.

Student Ok, and what about *Project Unity*? How was it different?

Professor

Um... this was different because two teams worked closely together during the defect meetings, instead of put up walls. Um... we didn't even talked about, you know, who should fix this, who is at fault2. We all acknowledge what needed to be fixed. So if we had ten bugs, we said, 'Hey, you know what? Let's do this one first 'cause this would expose another whole bunch of defects that we haven't even seen yet.' So we were being proactive3 and effective. And because we were so much more effective with our time, we were actually able to do more than just fix the bugs, we even put in some improvements that we hadn't planned.

TPO21 Conversation 2

Narrator Listen to a conversation between a student and her public relations professor.

Student Hi, professor Gordin. I really learned a lot from your lecture, the one about analyzing all those different segments of the population. Oh, the official term is audience, right? I never imagine that one company could have over thirty audiences to communicate with.

Professor Yeah, a lot of students are taken aback by this, and some public relations consultants don't figure it out until they've worked in the field a while.

Student Everyone thinks, public relations, eh, PR is easy, but there's a lot to it. You really got to know what you are doing.

Professor Absolutely. So, Stacy, your email implied that you needed my advice about graduate school?

Student No, since my undergraduate degree will be in public relations, I've already decided to get a master's degree in marketing. Sorry, I wasn't clear. My issue is, I have got two require courses and two electives. I am trying to figure out which elective course is to take. My advisor suggested economics and accounting, but I am not really sure.

Professor About?

Student Well, I endured accounting and economics in high school and barely stayed awake, they were so ...

Professor Ok, Ok. I hear you. Eh... you say you wanted a master's in marketing, you have got one more semester till graduation. Have you taken any marketing courses yet?

Student No, I figured I've got the marketing basis already since I have take every PR in communication courses offered here.

Professor Well, there's some overlap between PR and marketing, but there are important differences too. Marketing focuses on selling your product or service, eh, you know, attracting customers through advertising, and also buiding relationships with customers. That's what a marketing department does. PR is all about, it involves relationships too, that's why I am saying the two fields overlap. But in PR, you are developing relationships with a wider range of audience.

Student Right. Like employees, suppliers, the media. I do understand this in theory, but aren't you still selling your product, just in a different way?

Professor Not necessarily. Ok, do you remember that PR strategy I alluded to the other day? The one our university uses, a strategy that doesn't overlap its marketing strategy?

Student You mean how the university invites local residents to attend certain lectures and classes for free?

Professor Yeah, this cultivates a sense of good will and helps the university avoid becoming isolated from the larger community. Bringing neighbours into our classrooms is good PR, but it is not marketing since our neighbours aren't our customers, for the most part.

Student That’s why I want to focus on marketing in graduate school. Wouldn’t having expertise in PR and marketing giving me more career options?

Professor Yeah, but you’ll also want to enjoy your work. So for you electives, why don’t you take advertising principles and intro to marketing, which I teach. This way, you’ll find out if marketing is something you really want to pursue. Graduate School tuition is expensive, and these courses will give you a good overview of the field before committing yourself.

Student I wish my advisor had suggested those courses.

Professor Well, I am someone who has worked in both marketing and PR, so I can offer a different perspective than someone who only teaches ...

TPO21 Lecture3 Biology(Snake Evolution)

Narrator Listen to part of a lecture in a biology class.

Professor Probably back in some previous biology course you learned that snakes evolved from lizards, and that the first snakes weren't venomous and then along came more advanced snakes, the venomous snakes. Ok, venomous snakes are the ones that secrete poisonous substances or venom, like the snakes of the viper family or cobras. Then there is non-venomous snakes like constrictors and pythons. Another family of snakes, the colubrids, don't really fit neatly into either category though. Colubrids, and you probably learned this too, although they are often classified as venomous snakes, they are actually generally non-venomous. They are classified as venomous snakes because they resemble them, their advanced features more than the other non-venomous snakes.

Now, what if I told you that there is a good chance that most everything I just said is wrong? Well, everything except the part about snakes evolving from lizards. See, the basic theory about snake evolution has been challenged by a recent study that revealed a whole new understanding of evolutionary relationship for reptiles, you know, which reptiles descended from which ancestors. The researchers study the proteins in the venom genes of various species of colubrids. Emm... snake venom is a mixture of proteins, some toxic, poisonous, and some not. By analyzing the DNA, the genetic material of the proteins, the researchers could focus on the toxic genes and use them to trace the evolution of snake venom, and from this, the evolution of snakes.

Traditionally, to understanding evolutionary relationships, we looked at various easily observed physical characteristics of animals, their skeleton, the size of their brain, and... and then classify them based on similarities and differences. The problem with this method is that characteristics that appear similar may actually have developed in quite different ways. For example, some venoms are chemical-based, and others are bacteria-based, so they clearly had to have developed along different routes and may not be as closely related as we thought.

Now, and not everyone will agree about this. The classification based on DNA seems to be much more reliable. Ok, back to the research. The researchers found that venom evolved before snakes even existed, about a hundred million years before. Now, a couple of venomous lizards were included in this study. And the researchers found some of the same DNA in their venom as in the snakes' venom. This suggested that the common ancestor of all snakes was actually venomous lizard, which means that actually, according to this research, anyway, in terms of the snakes' ancestry, there is no such thing as a non-venomous snake, not even colubrids. What separates colubrids from other snakes we have been classifying is venomous, is not the lack of venom, but the lack of an effective way to deliver the venom into its prey. In most venomous snakes, like vipers and cobras, the venom is used to catch and inmoblize the prey; but in colubrids, venom drips onto the prey only after the prey is in the snake's mouth. So for colubrids, the venom must serve some other purpose, maybe linked to digesting prey. As the different families of venomous snakes evolved, the teeth moved forward, becoming larger, and the venom becoming stronger, so the evolution of the obvious venomous snakes, like cobras and vipers, is about the evolution of an efficient delivery system, not so much the evolution of the venom itself.

So, if there are no truly non-venomous snakes, were the so-called non-venomous snakes, like constrictors and pythons, were they venomous at some point in their evolution? Well, that's not clear at this point. Constrictors have evolved to kill their prey by crushing, but perhaps they once were venomous, and then at some point their venom-producing apparatus4 wasn't needed anymore, so it gradually disappeared. There's one species of snake, the brown tree snake, that uses both constriction and venom, depending on its prey. So, well, it is possible.

So, we have these new concepts of snakes' evolution and a new DNA database, all these information on the genetic makeup of snake venom. And what we have learned from this has led researchers to believe that venom proteins may have

some exciting applications in the field of medical research. You see, venom alters biological functions in the same way certain drugs do, and the big benefit of drugs made from snakes venom would be that they target only certain cells, so maybe that’ll create fewer side effects. Now, it sounds far-fetched5, venom is the basis for human drugs. So far, only one protein has been targeted for study as a potential drug, but who knows, maybe someday.

TPO21 Lecture 4 Art History(Alice Neel)

Narrator Listen to part of a lecture in an Art History class.

Professor
All right, so today we are moving on to Alice Neel, N-E-E-L. Um... Alice Neel painted portraits, she was born in Pennsylvania, and she lived from 1900 to 1984. And I guess you might say, she experienced difficulties as an artist. She was in her 70s, before she had her first major solo exhibition. Um, and this is due at least in part to eh... or... because of photography. After photography became regarded as an art form, portrait painting became less prestigious6, less respected as an art form. And, well, art photography kind of took its place, so you can imagine that a portrait artist, would have had a hard time finding acceptance.

Eh, but the real reason I want to look at Neel, is that I really find her style ... eh, she had interesting ways of portraying people. She combined some elements of realism. What's realism, Alison?

Student It's like painting something exactly how it is, so an artist would try to make it as accurate, um... and objective as possible. Painting stuff just how it appears on the surface.

Professor Ok, good. So Neel combined realism with, well, actually, with expressionism. And that is? We, we just covered this.

Student Um... It's into emotion, like artists are trying to, well, express themselves through the painting, right?

Professor
Yep. The artist is depicting subjective emotions, showing the inner reality as interpreted by the artist rather than the outward form. So the image itself might be distorted or exaggerated in some way. The expression overrides7 objective representation. Ok, so, Alice Neel combined these two styles ... Yes?

Student Em... How is that even possible? How can your portray something exactly as it is and at the same time distort it with emotions? I don't get it.

Professor
All right, good question. It is actually a good lead-in8 to some of the techniques that Neel used, that she employed to bridge that contradiction. In a minute, I'll show you some of her portraits, and I'll want you to notice a few things about them.

First, Neel's use of bold color. All right? You'll see she uses color to convey emtion and feeling, like the subjects' clothing for instance, it appears brighter than it really is. And the subjects, the people being portrayed, Neel paid special attention to faces. The way she paints the eyes and how the faces are portrayed, these are quite realistic, like the realists' work. But another thing Neel did was use elongated, sort of stretchy figures.

Student But didn't a lot of expressionist painters do that? So really your are saying that Neel's techniques were similar to what other artists were doing. What was it that she did, that was like all her own?

Professor Ok, well, I think it has to do partly with the way she combined these techniques. So, for example, those realistic faces and eyes, but bright, distorted figures. It is a mix. You'll see that her portraits do reflect reality, the people that were actually sitting there. Realism was important in the sense that she wanted to show people as they really were, much

like a photographer would. But Neel wasn't satisfied with photo-like realism, she went beyond that. And this is where expressionism comes in.

She believed in capturing the whole person, not just what was on the surface, that's where the expressionists' distortion is important, in an attempt to reveal the subjects' character or personality.

But Neel's paintings are distinctive for her time in part because they are portraits. Remember I said that photography and art photography had largely taken the place of portraiture, to the extent that some critics had declared the genre of portraiture to be dead. But Neel felt that painting should reflect reality, a real realist's stance9 you could say. And to her, individuals, people best reflect the reality of their time, of the age that they lived in, so she painted portraits. And if you look at her work, we are talking in the vicinity of10 three thousand paintings. If your looked at them, it is like this gallery of the whole century, an enomous range of subjects: families, women, children, artists, people in poverty--these paintings really span class, age and gender. It is like she transformed the genre, it is not just formal depictions of presidents and ancestors any more.

But keep in mind that she was doing this when abstract art dominated the art scene. Representations of people weren't fashionable in the art world. And it wasn't until fairly late in the century that critics recognized the power of what she did.

TPO 22 Conversation 1 (Faculty Advisor)

Narrator: Listen to a conversation between a student and a faculty advisor for the university newspaper.

Student: Hi, I am sorry to bother you, but…

Faculty advisor: Yes?

Student: This is about the newspaper.

Faculty Advisor: Oh, Ok. Well. I am only the advisor; the newspaper office is off campus on Pine Street. Eh…what was it? Did you want to work for the paper? We are always looking for writers.

Student: Well, my problem was with the writing actually, with an article that was published in yesterday's newspaper.

Faculty Advisor: Oh? Which one?

Student: The one about the student government and its president Sally Smith.

Faculty Advisor: Is this something to do with what the editor wrote about the statue? Eh, the statue at the main entrance of the university?

Student: Well, that's part of it. But you know, the editor used the situation to say some really unfair things, about the student government, and the president Sally Smith in particular. I think the paper should publish a retraction, or at the very least an apology to Sally.

Faculty Advisor: Ok. Um… if I remember correctly, what you are referring to wasn't a news story, but an editorial, right? Eh, it was on the opinion page, it was signed by one of the editors, and was clearly labeled as commentary.

Student: Well, yes. But the thing about the statue, Sally made this simple comment that was in really bad condition and should be replaced. And, well, the tone in the editorial was demeaning. It accused her of not respecting the past and it had some personal stuff that seemed unnecessary.

Faculty Advisor: Wait a minute. Remind me.

Student: Well, you know, it implied that Sally doesn't know much about the university's history and it called her a big city politician because she's from Boston. It's just mean-spirited, isn't it?

Faculty Advisor: Haven't you heard the saying "all publicity is good publicity"?

Student: Well…

Faculty Advisor: I'd say the article is bringing attention to the student government organization, which is pretty invisible. Eh, you rarely hear about what the student government is doing.

Student: But this article…

Faculty Advisor: And the piece, well, yeah, it had a bit of an exaggerated tone. It was satirical, or at least it was meant to be. It wasn't just poking fun at Sally, but the whole idea that our school is sort of rural, and you know, not cosmopolitan.

Student: Well, none of us thought it was very funny.

Faculty Advisor: Well, sometimes it's best just to roll with it. It is just a cliché; everybody knows it is not true.

Student: But I thought we could expect better than that here.

Faculty Advisor: Well, I am certainly in favor of getting a variety of viewpoints. [so why don't you go talk to the editor, Jennifer Hamilton, and tell her you want equal time? You or Sally could write a response.]

Student: [Really? She would let us do that?] Didn't she write it?

Faculty Advisor: I'll let Jennifer know you are coming, she feels the same way I do. She is journalism major. She would be happy to publish another point of view.

TPO22 Lecture 1 (Anthropology)

Narrator: Listen to part of a lecture in an anthropology class.

Professor: One of the big questions when we look at prehistory is why did the earliest states form? Well, to begin we'd better define exactly what we mean when we talk about states. The human groups that are the smallest and have the least social and political complexity, we call bands. The groups that are the largest and most socially and politically complex, we call states. So, the level of complexity here refers to the organization of people into large, diverse groups, and densely populated communities. And there are four levels in total: bands, tribes, chiefdoms and states.

But, but back to my original question. Why did early states form? Why not just continue to live in small groups? Why become more complex?

One theory called the environmental approach hypothesizes that the main force behind state formation was population growth. It assumes that centralized management was critical to dealing with issues caused by sudden population surges, like a strain on limited food supplies.

At the least complex end of the spectrum, the few families living in bands are able to meet their own basic needs. They usually hunt together and forage whatever foods are available to them, instead of domesticating animals and planting crops. In order to efficiently take advantage of the wild foods available, bands are often nomadic and move around following herds of animals. This strategy is feasible when you have a small population.

But when you have a large population, well, the whole population can't just get up and move to follow a wild herd of animals. So you need sophisticated technologies to produce enough food for everyone. And there is an increase need to resolve social problems that arise as people begin to compete for resources. To manage intensified food production, to collect, store and distribute food, you need centralized decision-making, centralized decision-makers.

It's the same thing when it comes to maintaining social order. You need to create and efficiently enforce a formal legal code. It makes sense to have a centralized authority in charge of that, right? So a hierarchy forms. By definition, states had at least three social levels. Usually, an upper class of rulers, a middleclass comprised of managers and merchants, and a lower class of crop producers and agricultural laborers.

The environmental approach hypothesizes that states appear in certain environmental settings, settings which have a severe population problem or a shortage of agricultural land. But not everyone agrees with the theory. It definitely has some weaknesses. For example, states have developed in places like the mild lowlands of Mesoamerica and in Egypt's Nile River Valley. Both places had vast areas of fertile farmland, no shortage of agricultural land. And what about population increase? Well, there were some early states that formed where there wasn't any sudden population increase. So it seems that these are valid criticisms of the environmental approach.

TPO22 Lecture 2 (Astronomy)

Narrator: Listen to part of a lecture in an astronomy class.

Professor: Today, I want to talk about a paradox the ties in with the topic we discuss last time. We were discussing the geological evidence of water, liquid water on Earth and Mars three to four billion years ago. So, what evidence of a liquid water environment did we find in rock samples taking from the oldest rocks on Earth?

Student: Eh… Like pebbles, fossilized algae?

Professor: Right. And on Mars?

Student: Dry channels?

Professor: Good. All evidence of water in liquid form, large quantities of it. Now, remember when we talked about star formation, we said that as a star ages, it becomes brighter, right? Hydrogen turns into Helium, which releases energy. So our standard model of star formation suggests that the Sun wasn’t nearly as bright three to four billion years ago as it is today, which means the temperatures on Earth and Mars would have been lower, which in turn suggests…

Student: There would have been ice on Earth or Mars?

Professor: Correct. If the young Sun was much fainter and cooler than the Sun today, liquid water couldn’t have existed on either planet.

Now, this apparent contradiction between geologic evidence and the stellar evolution model became known as the faint young Sun paradox.

Now, there have been several attempts to solve this paradox.

First, there was the greenhouse-gas solution. Well, you are probably familiar with the greenhouse gas effect, so I won’t go into details now. The idea was that trapped greenhouse gases in the atmospheres of Earth and Mars might have caused temperatures to raise enough to compensate for the low heat the young Sun provided. And so it would have been warm enough on these planets for liquid water to exist. So, what gas do you think was the first suspect in causing the greenhouse effect?

Student: Um…carbon dioxide, I guess. Like today?

Professor: In fact, studies indicate that four billion years ago, carbon dioxide levels in the atmosphere were much higher than today’s levels. But the studies also indicate that they weren’t high enough to do the job—make up for a faint Sun.

Then some astronomers came up with the idea that atmospheric ammonia might have acted as a greenhouse gas. But ammonia would have been destroyed by the ultra-violet light coming from the Sun and it had to be ruled out too.

Another solution, which is proposed much later, was that perhaps the young Sun wasn’t faint at all, perhaps it was bright. So it is called the bright-young-Sun solution, according to which the Sun

would have provided enough heat for the water on Earth and Mars to be liquid. But how could the early Sun be brighter and hotter than predicted by the standard model? Well, the answer is mass.

Student: You mean the Sun had more mass when it was young?

Professor: Well, if the young Sun was more massive than today's, it would have been hotter and brighter than the model predicts. But this would mean that it had lost mass over the course of four billion years.

Student: Is that possible?

Professor: Actually, the Sun is constantly losing mass through the solar wind, a stream of charged particles constantly blowing off the Sun. we know the Sun's current rate of mass loss, but if we assume that this rate has been steady over the last four billion years, the young Sun wouldn't have been massive enough to have warmed Earth, let alone Mars, not enough to have caused liquid water.

Student: Maybe the solar wind was stronger then?

Professor: There is evidence that the solar wind was more intense in the past. But we don't know for sure how much mass our Sun's lost over the last four billion years. Astronomers tried to estimate what solar mass could produce the required luminosity to explain liquid water on these planets. They also took into account that with a more massive young Sun, the planets would be closer to the Sun than they are today. And they found that about seven percent more mass would be required.

Student: So the young Sun had seven percent more mass than our Sun?

Professor: Well, we don't know. According to observations of young Sun like stars, our Sun may have lost as much as six percent of its initial mass, which doesn't quite make it. On the other hand, this estimate is based on a small sample. And the bright-young-Sun solution is appealing. We simply need more data to determine the mass loss rate of stars. So there's reason to believe that we will get an answer to that piece of the puzzle one day.

TPO22 Conversation 2 (Professor)

Narrator: Listen to part of a conversation between a student and his music history professor.

Student: So, I was wondering what I could do to improve my paper before the final draft is due.

Professor: Well, Michael, I have no problem with your writing style. It's graceful and clear. Eh, and it's interesting that you are writing about your grandmother's piano concert.

Student: Yeah, when you said we had to attend a concert and write about it, I immediately thought of her. I have been to lots of her concerts. So I am really familiar with her music.

Professor: That’s not necessarily an advantage. Familiarity sometimes makes it hard to see things objectively.

Student: So I shouldn’t write about my grandmother?

Professor: No, no, no. I am just talking in general. But as I mentioned in my comments, I’d like you to place your grandmother’s concert in… in a broader context.

Student: Yeah, I saw that, but I wasn’t sure what you meant. I mean, I mentioned my grandmother’s childhood, how much her parents love music, how she played the piano at all our family gatherings.

Professor: Ok. I see what happened now. By broader context, I mean how the concert relates to some period in music history.

Student: I see. Ok. Um… I have an idea.

Professor: Ok.

Student: Well, as you read in my paper, my grandmother performs classical music.

Professor: Yes.

Student: That’s her true love. But for most of her career, she performed jazz. She originally studied to be a classical pianist. But jazz was in its heyday back then, and when she got out of the conservatory, she was invited to join a jazz orchestra. And the opportunity was just too good to turn down.

Professor: Really. Well, that’s fascinating. Because she probably had to reinvent her whole musical style.

Student: She did. But jazz was where the money was at that time, at least for her.

Professor: But she eventually went back to classical?

Student: Right. But only recently.

Professor: Ok.

Student: So if I can show how her choices relate to what was happening in the world of music at the time…?

Professor: I think that might work very nicely.

Student: And if I do that, I guess I’ll have to like, interview her.

Professor: Right.

Student: And I guess that would mean…

Professor: You’ll have to rewrite most of your paper.

Student: Ouch!

Professor: Yeah. Would an extra week ease the pain?

Student: Definitely.

Professor: Ok. So are there other musicians in your family?

Student: Yeah. My mother plays piano, too. Not as well as my grandmother, but…

Professor: And you?

Student: I don’t play any instruments, but I sing in the university choir. In fact, we are performing next week, and I have a solo.

Professor: That’s great! Could I tell the class about your concert?

Student: Um…sure. But…about my paper… what question should I be asking my grandmother?

Professor: You know what, I have a meeting now. Why don’t you come to class a few minutes early tomorrow?

Student: Will do.

TPO22 Lecture 3 (Zoology)

Narrator: Listen to part of a lecture in a zoology class.

Professor: A mass extinction as when numerous species become extinct over a very short time period, short, geologically speaking that is, like when the dinosaurs died out 65 million years ago. And the fossil record, it indicates that in all the time that animals have inhabited Earth, there have been five great mass extinctions, dinosaurs being the most recent. In each of the others up to half of all land animals and up to 95 percent of marine species disappeared.

Well, today we are witnessing a sixth mass extinction, but unlike the others, the current loss of bio-diversity can be traced to human to human activity. Since the Stone Age, humans have been eliminating species and altering ecosystems with astounding speed. Countless species have disappeared due to over-hunting, habitat destruction and habitat fragmentation, pollution and other unnatural human causes.

So, as a way of repairing some of that damage, a group of conservation biologists has proposed an ambitious, or some might say, a radical plan, involving large vertebrates, or , megafauna. Megafauna include elephants, wild horses, big cats, camels, large animals. Eh, actually, the proposal focuses on a particular subset of megafauna, the kind that lived during the Pleistocene epoch.

Ok. The Pleistocene epoch, most commonly known as the Ice Age, stretched from 1.8 million to 11,500 years ago. In the Americas, many megafauna began disappearing by the end of the Pleistocene.

So here's the biologists' idea. Take a select group of animals, megafauna from places like Africa and Asia, and introduce them into other ecosystems similar to their current homes, beginning in the United States. They call their plan Pleistocene rewilding.

Now, the advocates of Pleistocene rewilding cite two main goals. One is to help prevent the extinction of some endangered megafauna by providing new refuges, new habitats for them. The other is to restore some of the evolutionary and ecological potential that has been lost in North America. What do I mean by restore evolutionary potential? Well as you know the evolution of any species is largely influenced by its interactions with other species.
So during the Pleistocene epoch… let's take the now extinct American cheetah, for instance. We believe it played a pivotal role in the evolution of the pronghorn antelope, the antelope's amazing speed, to be exact, because natural selection would favor those antelope that could outrun a cheetah. When the American cheetahs disappeared, their influence on the evolution of pronghorn and presumably on other prey animals stopped. So it is conceivable that the pronghorn antelope would have continued to evolve, get faster maybe, if the cheetahs were still around. That's what's meant by evolutionary potential. Importing African cheetahs to the western United States could, in theory, put the pronghorn back onto its… uh, natural evolutionary trajectory according to these biologists. Another example is the interaction of megafauna with local flora, in particular, plants that rely on animals to disperse their seeds. Like Pleistocene rewilding could spark the re-emergence of large seeded American plants, such as the maclura tree. Many types of maclura used to grow in North American, buy today, just one variety remains and it is found in only two states. In the distant past, large herbivores like mastodons dispersed maclura seeds, each the size of an orange in their droppings. Well, there aren't any mastodons left, but there are elephants, which descended from mastodons. Introduce elephants into that ecosystem and they might disperse those large maclura seeds, like their ancestors did.

Get the idea? Restoring some of the former balance to the ecosystem? But as I alluded to earlier, Pleistocene rewilding is extremely controversial. A big worry is that these transplanted megafauna might devastate plants and animals that are native to the western United States. In the years since the Pleistocene epoch, native species have adapted to the changing environmental there, plants, smaller animals, they have been evolving without megafauna for millennia. Also, animal species that went extinct 11,000 years ago, uh, some are quite different genetically from their modern-day counterparts, like elephants don't have thick coasts like their mastodon ancestors do when they graze the prairies of the America West during the Ice Age. Granted, the climate today is not as cold as it was in the Pleistocene. But winters on the prairie can still get pretty harsh today. And there are many more considerations. Well, you see how complex this is. If you think about it though, the core problem with this sixth mass extinction is human interference. Pleistocene rewilding is based on good intentions, but you know, it probably would just be more of the same thing.

TPO22 Lecture 4 (Music History)

Narrator: Listen to part of a lecture in a music history class.

Professor: So, uh, if you are a musician in the United States in the early twentieth century, where could you work?

Student: Same as now, I suppose. In an orchestra, mainly.

Professor: Ok. And where would the orchestra be playing?

Student: Uh, in a concert hall or a dance hall?

Professor: That’s right. And smaller groups of musicians were needed in theaters as accompaniment to visual entertainment, like cabarets and variety shows. But the largest employer for musicians back then was the film industry, especially during the silent-film era.

Student: Really? You mean being a piano player or something? I thought movie theaters would have used recorded music.

Professor: Well, no. Not during the silent-film era. We are talking a period of maybe thirty years where working in movie theaters was the best job for musicians. It was very well-paid. The rapid growth of the film industry meant movie theaters were popping up everywhere. So suddenly there was this huge demand for musicians. In fact, over 20,000 jobs for musicians were gone, disappeared at the end of the silent-film era, 20,000. Ok. So from the beginning, music was a big part of film, even at the first…

Student: Excuse me, professor. I think I read somewhere that they used music to drown out the sound of the film projectors?

Professor: Yeah. That’s good story, isn’t it? Too bad it keeps getting printed as if it were the only reason music was used. Well, think about it. Even if that were the case, noisy projectors were separated from the main house pretty quickly, yet music continued to accompany film. So, as I was saying, even the very first public projection of a film had piano accompaniment. So music was pretty much always there.

What’s strange to me though, is that at first film music didn’t necessarily correspond to what was on the screen. You know, eh, a fast number for a chase, deep bass notes for danger, something light and humorous for comedy. And that’s instantly recognizable now, even expected. But in the very early days of film, any music was played. A theater owner would just buy a pile of sheet music and musicians will play it, no matter what it was. Pretty quickly though, thankfully, everybody realized the music should suit the film. So eventually, film makers tried to get more control over the

musical accompaniment of their films., and specify what type of music to use and how fast or slow to play it.

Student: Are you saying there was no music written specifically for a particular movie?

Professor: Yeah. Original scores weren’t common then. Rarely a filmmaker might send along an original score composed especially for a film, but usually a compilation of music that already existed would be used. Yeah, that was a good time for a lot of musicians. But that all changed with the introduction of sound on film technology. Actually, even before that, organs could mimic a number of instruments and also do some sound effects. So they were starting to replace live orchestras in some movie theaters, and it only takes one person to play an organ.

Student: Ok. But even after that someone still had to play the music for the sound for the sound recordings, the soundtracks.

Professor: Yeah. But think of all the movie theaters there were, most employing about six to eight musicians, some even had full orchestras. But in the early 1930s, most theater owners installed new sound systems. So suddenly a lot of musicians were looking for work. Once recording technology took off, studio jobs working exclusively for one film company, eh, studio jobs did become available. But the thing is, each major movie company pretty much had only one orchestra for all their productions, a set number of regular musicians. So if you could get it, studio musician was a good job. If you were cut out for it, musicians had to be able to read music very well, since the producers were very conscious of how much money they were spending. They didn’t want to waste any time. So a musician was expected to play complicated pieces of music pretty much without any preparation. If one couldn’t do it, there were plenty of others waiting to try. So there was a lot of pressure to do well.

TPO 23:CONVERSATION 1

Narrator: Listen to a conversation between a student and the director of campus activities.

Student: I'm here 'cause... well, there's something I don't understand. I set an announcement for an event. And this morning I checked the events section of the university's website. And nothing, there is no mention of it.

Director: And when did you summit this request?

Student: Last Wednesday. I followed the instructions very carefully. I am sure it was Wednesday, because know announcements have be submitted three business days ahead of the posting day.

Director: And what's it for?

Student: A reading.

Director: A reading?

Student: Yes. A poetry reading.

Director: Oh, OK. When is it?

Student: In three days. It is an author from France we have been trying to get for a while. And now that he has finally

agreed to come, no one will be there.

Director: Wow. This person is really coming all the way from France?

Student: Oh, no. He is teaching promising there will be in New York City this year. We were able to sell him on a nice size crowd , felt confident about that. Because the idea by I know how enthusiastic our group is.

Director: And your group ? do you have a name?

Student: Um ? it is kind of a loose group, you know, just a bunch of students in the French department who are interested in French literature. There's no formal structure or anything. I guess you could call us the French Literature Reading Group.

Director: OK. And it is a recognized group? By the university, I mean.

Student: No

Director: OK.

Student: But the French Department is funding this, on the condition that we do all the legwork.

Director: All right. Hold on a second while I check. Well, it looks like we did receive your announcement last Wednesday. Uh, looks like the editors must have decided not to include your event in this week's listings.

Student: Not included? Why?

Director: Well, we don't post things automatically. We get so many requests that we couldn't possibly post them all. So events that are thought to be too specialized, without the potential for really wide appeal...

Student: Wow, I got to say that does surprise me. What am I going to do now? I mean, he really is quite famous. I really do think there would be a genuine interest beyond my group. It would be a shame if no one shows up because there isn't enough publicity. Is there anyone else I can talk to?

Director: I don't think that would do you much good since we are already working on next week's schedule. But maybe you could ask the French department to post the announcement on its website. And maybe you could approach some other departments as well, you know, relevant ones.

Student: I knew we should have done a poster. But everybody was like, oh, you can just post it online. In any event, thanks for you help. It's something to consider.

TPO23 Lecture l- Archaeology (Antikythera (Mechanism)

Narrator: Listen to part of a lecture in an archaeology class.

Professor: I was talking to one of my colleagues in the physics department the other day, and we ended up discussing how one discovery can change everything. My colleague mentioned how the theory of relativity completely changed the field of physics. At any rates, that conversation got me thinking about archaeological finds that really changed our understanding of ancient civilizations. So I want to talk about the discovery of the Antikythera Mechanism.

The Antikythera Mechanism was found a hundred years ago, under water in an ancient Greek shipwreck in the Mediterranean Sea. It was in extremely poor condition and in many corroded pieces. But once we figured out what it was and reconstructed it. Well, I simply don't have the words to convey how extraordinary this find was.

The Antikythera Mechanism is a relatively small device, roughly the size of a shoebox, made of gears fitted inside a wooden case. In its original state, there were rotating dials and other indicators on the top, with letters and drawings showing the Sun, the phases of the moon and different constellations. Inside the box, bronze gears would have rotated the displays. The displays, uh, the indicators of the Antikythera Mechanism, would then moved to show the motion of the Sun and moon relative to the planets and stars. The device could be used to tell the different phases of the moon and much more.

Well, scientists have recently analyzed the inscriptions on the mechanism and re-examine the other cargo in the ship wreck, and the evidence makes an absolute case that this device dates back to ancient Greece somewhere between 150 and 100 B.C.E. What makes that so fascinating is that before we found the Antikythera Mechanism, the earliest device we had that could track the Sun and moon like this was invented over 1,000 years later. So when this was first found, people literally would not believe it. Some of my colleagues insisted it had to have been made well after 100 B.C.E. But this physical evidence was conclusive. It was that old.

Of course part of what made this find so unusual is that the Antikythera Mechanism is constructed of bronze. Now, it is not that bronze was all that rare in Greece then, it is just that bronze was valuable and could easily be recycled. It would have been relatively easy for a person with knowledge of metals to melt down bronze objects and forge them into ? well, say, coins. Bronze was used to made money back then. Or mold the bronze into anything else of value for that matter.

We are very fortunate that the device ended up under water, because otherwise it probably would have ended up recycled into ? who knows what. Now, it was a challenge to figure out the Antikythera Mechanism. It spent over 2,000 years at the bottom of the sea before it was discovered. And even after it was discovered, it was still a number of years before we really understood what it was. You see, the mechanism had corroded underwater, and many of the gears were stuck together in a mass. Cleaning it was only partly successful. We could only get a good look at the structure of the gears after gamma-rays were used to see inside, very similar to the way X-rays are used to see your bones.

Now, once we got a good look inside, we saw a really complex device. The many gears not only moved in a way that could indicate the phases of the moon. The Antikythera Mechanism also tracked both the lunar year and the solar year. Additionally, the gears also moved to match the motions of the planet and predicted eclipses. But one thing that is particularly notable is that the mechanism was so precise that it even took into account a particular irregularity in the moon's orbit, which requires some very complex math to replicate in mechanical device.

You could say that the Antikythera Mechanism was a very precise calendar, which stands to reasons calendars were very important to ancient peoples. Religious festivals had to be held at the right time of year, crops needed to be planted at the right time as well. And let's not forget that eclipses in planetary motions had important symbolic meanings.

TPO23 Lecture2 - Environmental Science (Earth Budget)

Narrator: Listen to part of a lecture in an environmental science class.

Professor: Basically, a cloud either contributes to the cooling of Earth's surface or to its heating. Earth's climate system is constantly trying to strike a balance between the cooling and warming effects of clouds.

It's very close, but overall the cumulative effects of cloud are to cool Earth rather than heat it. And this balance between the amount of solar radiation, energy from the Sun, that's absorbed by Earth, and the amount that's reflected back into space. We call this Earth's radiation budget. And one way we keep track of the radiation budget is by looking at the albedo of the different surfaces on the planet.

A surface's albedo is the percentage of incoming solar energy, sunlight, that's reflected off that surface back into space. Oceans have a low albedo, because they reflect very little energy. Most of the solar energy that reaches the ocean gets absorbed and heats the water. Um... rainforests also have low albedos. Well, by contrast, deserts and areas covered by ice and snow, these places have high albedos. And clouds, in general, cloud also have high albedos. That means that a large percentage of the solar energy clouds receive is reflected into space.

OK. Now, when we say that clouds have a high albedo. We are talking about the effect of all the clouds on earth averaged together. But different types of clouds have different reflective properties, they have different albedos.

Student: So which type of clouds cools Earth? And which type heat it?

Professor: Well, high thin clouds contribute to heating while low thick clouds cool Earth. High thin clouds are very transparent to solar radiation, like, uh, clear air. So they mostly transmit incoming solar energy down to Earth. There's not much reflection going at all. At the same time, these clouds trap in some of Earth's heat. Because of the trapped heat, these clouds have an overall heating effect.

Student: Oh. OK. Since low thick clouds are not transparent to radiation...

Professor: Exactly. They block most of the solar energy so it never reaches Earth's surface. They reflect much of it back out into space.

Student: So that's how they contribute to cooling?

Professor: Yep. And as I said earlier, this cooling effect predominates. Now, what if there was a process that could control the type of clouds that form?

Student: Are you talking about controlling the weather?

Professor: Well, I am not sure I would go that far. But we recently noticed an increase in cloud cover over an area of the ocean waters around Antarctica. An increased area of low thick clouds, the type that reflects a lare portion of solar energy back to space and cools the Earth.

Well, the reason for this increased cloud cover, it turns out, is the exceptionally large amount of microscopic marine plants. Well, the current hypothesis is that these microorganisms produce a chemical, dimetho sulfide that interacts with the oxygen in the air, creating conditions that lead to the formation of the low thick clouds we observed. Well, that's true. It could have huge implications. So, maybe we are talking about controlling the weather. Perhaps, if the microorganisms near Antarctica really are responsible, perhaps we can accelerate the process somehow.

TPO 23 Conversation 2

Narrator: Listen to a conversation between a student and his English professor.

Professor: Hi, Bob. How is it going? Are you enjoying the Introduction to Literature class?

Bob: Yeah, it's great. Araby, that short story by James Joyce we read last week, it was awesome.

Professor: I'm glad you like it. Most of Joyce's work is very complex. A lot of students say that he is hard to understand. Normally, you wouldn't tackle Joyce in an Intro class, but I'd like to give my first year students a taste of his style, his psychological approach to literature, because ? mainly because it influenced other writers. I only wish we had more class time to discuss it.

Bob: Me too. So why did you pick Araby instead of some other story?

Professor: Well, um, first you should know that Araby is one of fifteen short stories by Joyce in a book called Dubliners. Uh, all the stories are related to one another, and they are set in the same time period. But Araby is the easiest one to follow. Though all the stories in the collection are written in stream of consciousness, which as you know, means they are told through the narrator's thought, through an inner monologue, as opposed to dialogue or an objective description of events. But Araby is easier because it's linear, the story unfold chronologically.

Bob: Still, I wish we could read whole novels by Joyce and discussed them in class.

Professor: That's what happens in my Master Writer Class.

Bob: Master Writer Class?

Professor: Yeah, I teach one on Joyce every spring. It's such a privilege, spending an entire term diving into a single body of work. And my students, they bring so much insight to the table that it's easy to forget who the professor is.

Bob: Oh, wow. That could actually solve my dilemma, uh, what I originally wanted to ask you ? um, I am working on my schedule for next term, and I've got room for one more course, and I'd like to take more literature. Could I take your Master Writer Class on Joyce?

Professor: I'm sorry. I should have mentioned. Uh, Master Writer is an advanced seminar. So students need to get a strong foundation in literary theory and criticism before I let them in the room.

Bob: But I have gotten really good grades on all my paper so far, I'm sure I can keep up. Couldn't you make an exception?

Professor: Your grades are excellent. But in our intro class, you are reviewing the basics, like plots, setting and character and getting your first real exposure to different literary styles.

Bob: But why do I have to study different styles to understand Joyce's novels?

Professor: There are a lot of little details involved in interpreting literature. And like with Joyce. His novels have very unique structures. The only way to appreciate how you meet there is by studying a variety of authors.

Bob: Oh, OK. So could you suggest a different literature class then?

Professor: Sure. There's doctor Clain's course on nineteenth-century novels. It's more focused than the class you're in now. But it will build on your current knowledge base and give you the background you need. That, plus a couple more foundational classes, and you will definitely be ready for my seminar.

Bob: Sweet. Thanks.

TPO23 Lecture3 Biology (Dolphins)

Narrator: Listen to part of a lecture in a marine biology class.

Professor: We have been talking about how sea animals find their way underwater, how they navigate, and this brings up an interesting puzzle, and one I'm sure you'll all enjoy. I mean, everybody loves dolphins, right?

And dolphins, well, they actually produce two types of sounds. Uh, one being the vocalizations you are probably all familiar with, which they emit through their blowholes. But the one we are concerned with today is the rapid clicks that they use for echolocation, so they can sense what is around them. These sounds, it has been found, are produced in the air-filled nasal sacs of the dolphin.

And the puzzle is how does the click sounds get transmitted into the water? It's not as easy as it might seem. You see, the denser the medium, the faster sound travels. So sound travels faster through water than it does through air. So what happens when a sound wave um ? OK.

You've got a sound wave traveling merrily along through one medium, when suddenly; it hits a different medium, what does gonna happen then? Well, some of the energy is going to be reflected back, and some of it is going to be transmitted into the second medium. And ? and ? and if the two media have really different densities, like air and water, then most of the energy is going to be reflected back, very little of it will keep going, uh, get transmitted into the new medium. I mean, just think how little noise from the outside world actually reaches you when your head is underwater.

So, how did the dolphin's clicks get transmitted from its air-filled nasal sacs into the ocean water? Because given the difference in density between the air in the nasal cavity and the seawater, we'd expect those sounds to just kind of go bouncing around inside the dolphin's head, which will do it no good at all. If it's going to navigate it, needs those sounds to be broadcast and bounced back from objects in its path.

Well, turns out dolphins have a structure in their foreheads, just in front of their nasal sacs, called a melon. Now, the melon is kind of a large sac-like pouch, made up of fat tissue. And this fat tissue has some rather fascinating acoustical properties. Most of the fat that you find in an animal's body is used for storing energy, but this fat, which you find in dolphins, and only in the melon and around the lower jaw. This fat is very different, very rich in oil. And it turns out it has a very different purpose as well.

Now, one way to um, modify the overcome this mismatch in the density of air and water would be ? if you travels through velocity of the sound wave, make it precisely match the speed at which water. And that's exactly what marine biologists have discovered the melon Note that the bursa, these little projections at the rear of the melon, are right up against the air-filled nasal sacs. And these bursa, it turns out, are what's responsible for transferring sound to the melon.

The sound waves are then transmitted by the bursa through the melon. First through a low velocity core, and then through a high velocity shell, where their speed is increased before they are transmitted into the surrounding seawater. So now the signals can be efficiently transferred into the water, with minimal reflection.

The only other place, this special fatty tissue, like that in the melon, the only other place is found in the dolphin, is in the lower jaw. Turns out that the lower jaw, well, it is made of a specially thin bone. And it is very sensitive to vibrations, to sound energy traveling through the seawater. It turns out that the jaw is primarily responsible for capturing and transferring returning sound waves to the dolphin’s inner ear. So these rapid clicks that are sent out bounce off objects, maybe a group of fish swimming over here, a boat coming from over there. The sounds bounce off them and the lower jaw captures the returning sounds, making it possible for the dolphin to sense what's in the surrounding water and decide where to swim.

TPO23 Lecture4 Choreography (Screen Dance)

Narrator: Listen to part of a lecture in a choreography class.

Professor: Now, when you think about choreography, well, uh, for your last assignment, you choreographed the dance that was performed on stage in front of live audience. Now, screen dance is very different. It is a dance routine you will be choreographing specifically to be viewed on a screen, on a computer screen, a TV screen, in a movie theater, any screen. So the question we have to ask is, what's the difference between choreography for a live performance and choreography for on-screen viewing?

OK. Think for a minute. When you see a movie, is it just a film of people acting on a stage? Of course not. Movies use a variety of camera angles and creative editing. Movies can distort time, slow movement down, or speed it up, show actors fading in and out of scenes, etc. All of these ? all of these film-making techniques, things that can't be used in a live performance, are possible in a screen dance. Now, we'll cover these concepts in greater detail later, but you should be getting the idea that I don't want you to just film dancers on stage and turn it in as your screen dance project. Uh, Yes? Debbie.

Student: But isn't something lost here, Professor Watson? I am a dancer, and when I perform on stage, I am so energized by the audience's reactions, the applause. I actually, and for a lot of dancers, it ? it really inspires us.

Professor: You're right. Screen dance, which is a relatively new, isn't for everyone. Uh, some dancers may seem reluctant to participate in your project, because they do thrive on the immediacy of performing live. If this happens, you could point out that screen dance offers other ways for dancers to connect to their audience. For example, dancers can express themselves, even change the whole mood of the scene through a facial expression. And you could film close-up shots of their faces. Facial expressions aren't as important in live performances generally, because the choreographer knows that someone in the back row of a theater may not be able to see a dancer's face clearly.

Student: But ? um, I have never used a movie camera or edited film before. How will we learn everything we need to know to ? ?

Professor: Oh, don't worry. The cameras you will be using are pretty simple to operate. And you'll get to play with the film-editing software several times before beginning your project. You'll also have the option of working with a student in the film department, someone who's familiar with the technology. But the choreography and the end result will be your responsibility of course.

Student: Could you talk some more about the film - making techniques, you know, the ones that work best forscreen dances?

Professor: I'll show some of my favorite screen dances next week to give you a better idea. But, uh, OK. Here's one technique that can create the illusion of flow in a screen dance. You film the same dancer, entering and exiting the frame several times. Moving slowly at first, then faster and faster. Then in the editing room, you can digitally manipulate these images, like you might put five or ten or twenty copies of that same dancer meeting himself in the middle of the screen, to make it look like he is dancing with himself.

Obviously, this can't be done in a live performance. Another example, in one screen dance I saw, the dancers leap through sheets of fire in a big abandoned building. Of course, the building wasn't really on fire. A technique called super-imposing was used. The dancers were filmed and layered in the editing room. The fire was added to the background.

Student: That sounds awesome. But if anyone can watch a dance on a computer screen. Why would they pay to go see a live performance? What if screen dance got so popular that it replaced live dance?

Professor: Screen dance is an entirely different type of presentation. It could never replicate the immediacy, the kind of drama that live performance offers. There will be an audience for that. I think what screen dance will do, though, is heighten awareness of dance in general. Because it is a way ? u h, it can reach people in their homes, in their workplaces, at anytime really. And if someone discovers that they love dance by watching a screen dance, there's a good chance they will get interested enough to buy a ticket to see a live performance.

TPO 24 Conversation l Student & Clerk in the Bookstore

Narrator: Listen to a conversation between a student and a clerk in the bookstore.

Student: Hi. Can you tell me where to find New Kind of Science? By, uh, by Stephen Wolfram.

Clerk: OK

Student: ...uh, I couldn't find it

Clerk: OK. Let me look it up on the computer for you. Who would you say the author was?

Student: It's a Stephen Wolfram.

Clerk: OK. Let's see... Hmm... no, it's not coming up. Hmm..,. I am not seeing it

Student: Um...hmm.

Clerk: This is for a course here at the university, right?

Student: Yeah, It's assigned reading for a class I am taking.

Clerk: It's for the semester, right? You are not buying it in advance for next year or anything.

Student: No, no. It's for a class I am taking now.

Clerk: Hmm...

Student: Oh, oh, you know what? Um, it's for a graduate class. Would that maybe make a difference? I mean, I am an undergrad, but I am just taking this one class in the graduate department, so...

Clerk: No, no. I don't think that's it. That shouldn't make any difference. But, hmm... let me see... maybe it's just...it could be that whoever that entered it misspelled the title or the author's name, so I can't find it on the computer and I can't tell if it's sold out. But if it's sold out, we would probably be getting a new shipment within about a week or so.

Student: Well, uh, I was hoping to get it sooner because like we already have assignments and you know, I mean, I guess I can get it from the library.

Clerk: Right, of course. But I am trying to check. If we've ordered more, then that back orders information should be in the computer too. Let's see... back order... Wolfram, Stephen..,. no, no. I am not seeing it. I am sorry. We just don't seem to carry it.

Student: Uh-huh.

Clerk: This is odd though. What is...what's your professor's name? I could try searching for his or her classes in the database. That might help

Student: Um...OK. It's professor Kayne.

Clerk: K-A-N-E?

Student: No. It's professor Kayne, K-A-Y-N-E. He's in the computer science department.

Clerk: Oh. It's for a computer science course, is it?

Student: Yeah.

Clerk: Well, that must be it. Computer science books are sold across the street in the computer bookstore.

Student: Are there signs up anywhere?

Clerk: I don't know.

Student: Maybe they should put some up. It could have save us both some time.

Clerk: Yeah. Well, anyway, I'll bet that's the problem. Check across the street. I'll bet they have it. But if not, come back, and I'll help you find it somewhere else. I can call around to see if other bookstores might have it. OK?

Student: OK. Thanks a lot. Bye

Clerk: Bye

TPO 24 Lecture l-Biology (Crocodile Vocalization)

Narrator: Listen to part of a lecture in a Biology class.

Professor: OK. For today, let's look at a reptile, a predator that hasn't evolved much in the last seventy million years. No discussion of reptiles would be complete without some mention of crocodiles.

Now, we tend to think of crocodiles as, uh, kind of solitary, hiding out in a swamp, uh, kind of mysterious creatures. But we are finding out that they aren't as isolated as they seem. In fact, crocodiles interact with each other in a variety of ways. One way is with vocalizations, you know, sounds generated by the animal. This is true of the whole crocodile family, which includes crocodiles themselves, alligators, etc.

Take American alligators. If you were to go to a swamp during the breeding season, you'd hear a chorus of sounds, deep grunts, hisses, these are sounds that male alligators make.

And some of them are powerful enough to make the water vibrate. This sends a strong, go-away message to the other males. So the alligator can focus on sending other sound waves through the water, sound waves that you and I couldn't even hear since they are at such low frequency. But they do reach the female alligator, who then goes to find and mate with the male.

Vocalization is um...well, it is used for other reasons, like getting attention or just, um... letting others know you are distressed. Let's see. New-born crocodiles, or hatchlings and their interactions with their mothers. When they are born, croc... baby crocodiles have a sort of muffled cry while they are in their nest. Hatchlings are really vulnerable, especially to birds and small mammals when they are born. But their mother, who has been keeping vigil nearby, hears their cry for help and carries them to safety, meaning, to water.

So she takes them out of the nest. Uh, uh, all the eggs hatched at once, so she has about forty newborns to look after. Well, she takes about fifteen out of the nest at a time, carrying them in her mouth to the nearby water. While she is taking one load of hatchlings, the others wait for her to come back.

But do you think they are quiet about it? No way. They are clamoring for the mother's attention, sort of squeaking and practically saying-don't forget about me!

I heard some great examples of this on the television program on crocodiles last week. Anyone catched it? It had a few interesting bits. But you know, uh, you have to be careful, think critically. Sometimes I don't know where these shows find their experts.

Student: Excuse me. But, um... does all that crying defeat the purpose? I mean, doesn't it attract more predators?

Professor: Hmm...good question. I guess, well, I am guessing that once the babies have the mother's attention, they are safe. She's never too far away, and, and I think...I mean, would you mess with a mother crocodile?

So after the mother transports all the youngsters, they still call to each other, and to their mother. This communication continues right through to adulthood. Crocodiles have about eighteen different sounds that they can make.

There's...um...um… you have deep grunting sounds, hisses, growls, are many different sounds to interact or send messages. This is more typical of mammals than of reptiles. I mean, crocodiles' brains are the most developed of any reptile. In that sense, they are closer to mammals' brains than other reptiles' brains. And we know that mammals, dogs for example, dogs vocalize many different sounds. Crocodiles have a similar level of, uh, vocal sophistication, if you will, which makes them unique among reptiles.

Another thing would be, um, if a hatchling gets separated from the rest of its family, once the others get far enough away, its survival instinct kicks in. It will make a loud distress call, which its siblings answer. It calls again. And they continue calling back and forth until they all find each other again.

Another thing, something that wasn't on that TV show I mentioned. Um... mother crocodiles lead their young from one area to another, like when they have to find a different source of water. Usually she will lead them at night, when it is safer for them, moving ahead and then letting out calls of reassurance so that they will follow her. Her voice helps give the babies the courage they need to leave the area and go some place that's a more desirable home for them.

TPO 24 Lecture2-Art History (Modern Dance)

Narrator: Listen to part of a lecture in a dance history class.

Professor: As we have been studying, ballet, the classical ballet, is based on formalized movements, specific

positioning of the arms, feet and the body. So, now let's move on to modern dance, also known as theatrical dance. Modern dance evolved in the late nineteenth, early twentieth century, and in most cases, audiences were very receptive to this radical new type of performing art.

Student: Um... what made modern dance so radical?

Professor: Well, for example, I think the best analogy to modern dance is modern art or modern music. Compared to their classical predecessors, these newer art forms are freer, more experimental, more improvisational.

Modern dance seeks to show how deep emotions and the music itself, how these intangible attributes can affect and inspire physical movement, and how movement can convey emotions to the audience. As I said, in classical ballet, emotions are conveyed through a set of strictly formalized movements.

Now, a pioneer of modern dance was Isadora Duncan, who was born in 1878. Isadora Duncan did study ballet briefly as a child, but she quickly developed her own unique style, which she called free dance. And by age fourteen, she was teaching her free dance to young children and giving recitals.

Her early dance technique was loosely based on the natural movements of children, running, skipping, acting out stories, also on motions from nature, waves crashing onto shore, trees swaying in the wind. Her expressive gestures were motivated from within rather than from being dictated by strict technique. Duncan also wore her hair down, ballerinas typically wear their hair in a tight bun behind the head. And instead of the short steep skirts and rigid toeshoes worn by ballerinas, Duncan wore loose, flowing tunics, and she dance bare foot. Now, that was something her audiences had never seen before.

Duncan performed in Paris composers, but avoiding set audiences, for the most part, and other European cities, dancing to the music of classical movements and steps, no two performances were alike. And adored her.

In 1904, she opened a school of modern dance in Berlin. And the next year she performed in Russia. But the Russian critics were not really kind. Some said Duncan's art form was closer to pantomime than to dance. But her style was a clear rebellion against ballet, and ballet is extremely important in Russia. A question, Julie?

Student: Yeah. What did Duncan have against ballet? I mean, she studied it as a child.

Professor: As a youngster, she might have found it too restrictive, uh, not creative enough. I think that feeling is exemplied by something that happened earlier in her career, in Russia. Duncan attended a ballet, and the lead dancer was the renowned Russian ballerina，Ana Pavlova. The following day, Pavlova invited Duncan to watch her practice.

Duncan accepted but was appalled by what she saw. To her, the exercises that Pavlova and the other ballerinas were doing seemed painful, even harmful, standing on tiptoe for hours, moving their bodies in unnatural ways. After seeing this, Duncan publically denounced ballet as a form of acrobatics, uh, complicated and excruciating mechanism she called it. This critic generated I think some undue rivalry between ballet and modern dance, and it would take a long time, many years in fact, for the rivalry to calm down.

TPO 24 Conversation 2 一 Student & Geography Professor

Narrator: Listen to a conversation between a student and his geography professor.

Student: Hi. Professor Brown.

Professor: Hi. Paul. What can I do for you?

Student: I have a question about the final exam. I mean, will it cover everything we've done all term? Or just what we've been doing since the mid-term exam.

Professor: Everything we've done all term.

Student: Oh, boy. You know, I am still not too clear about the hydrologic cycle, um, the transfer of water back and forth between the earth and the atmosphere. I really blew the question about it on the mid-term exam. I want to do better on the final exam. But I am still having trouble with it.

Professor: Well, uh, have you been to the tutoring center?

Student: No, not for geography anyway. Isn't that just for when you need help with writing, like an essay or a research

paper.

Professor: Oh, no. you can get tutoring in a lot of subjects. Some graduate students from this department tutor there.

Student: That's good to know. But I hardly go there because I have a part-time job. I never seem to be free when they are open.

Professor: Well, they will be extending their hours when final exams begin. You might try then. But um... Well, since you are here now, can I help you with something?

Student: Well, the hydrologic cycle. I remember we went over a diagram in class. And from what I remember, water changes back and forth from water in lakes and oceans to vapor, and then back to water again when it falls as rain or snow, as precipitation. It's constantly being recycled through evaporation and condensation.

Professor: That's it. Basically. Um... so exactly what is it you don't understand?

Student: OK. I guess what I am really confused about is how the topography of the land, the mountains and valleys and stuff, affects precipitation.

Professor: OK. Good question. Precipitation is influenced by topography among other things. Um, why don't we talk about lake-effect snow? It's a phenomenon that occurs anywhere you have a large lake that doesn't freeze and have cold air flowing over it, mostly in the Northern Hemisphere

Student: Like the great lakes in the United States?

Professor: Yeah. What happens is that the cold arctic air blows across the lake from the north in winter. And as the air crosses the lake, the lower layer is warmed by the lake water, which is much warmer than the arctic air. And as this air is warmed and picks up moisture, it becomes lighter than the air above it.

Student: So it starts to rise, right?

Professor: Yes. And clouds begin to form. When the air gets closer to the shore, it's slowed down by the land and starts to pile up. So it rises even faster because it has nowhere else to go, that's where topography comes into the picture.

Student: And then it snows because as the air rises, it cools off and loses its capacity to hold water vapor.

Professor: That's right.

Student: OK. Thanks. Any chance you'll have this question on the final?

Professor: I don't know yet. But you seem to have a handle on it.

TPO 24 Lecture3-Archaeology (Megafauna in North America)

Narrator: Listen to part of a lecture in an archaeology class.

Professor: Between 11,000 and 10,000 B.C.E., North America was populated by a wide variety of great beasts, like mammoth and mastodons, both elephant-like creatures with big tusks, and camels, giant sloths, the list goes on. By about 10,000 B.C.E., all those giant creatures, the Metgauna of North America were gone. We don't know exactly what happened to them, but there are some theories.

One theory is that they were hunted to extinction by humans. The humans who coexisted with these giant species in North America at that time were what we today called the Clovis Peopple. And there is a Clovis site in a valley in southern California where the remains of thirteen mammoths were found. And spear points, tools for processing meat, and fire places.

That would appear to be some pretty compelling evidences. Mammoth bones have also been found at some other Clovis sites.

But then at other Clovis sites, there's also a lot of evidence that the Clovis people mostly gather plants and hunted small game, like rabbits and wild turkeys. Also there are several places in North America where you have natural accumulations of mammoth bones that look very similar to the accumulations at the Clovis site, except there's no human debris, where the mammoth almost certainly died as a result of some kind of natural disaster. So I think it is quite likely that those thirteen mammoths in southern California also died of natural causes, and that the Clovis people simply took advantage of the situation. Um...OK. That's the hunting theory.

Now let's look at another theory, uh, an alternative to the hunting theory, the climate change theory. At around 11,500

B.C.E.，the world was coming out of an Ice Age .And with that came increased seasonality, that is, the summers became warmer, and the winters actually became colder. These extreme shifts would have put a lot of stress on the bodies of animals that were used to a more moderate range of temperatures.

But the most important impact of this increased seasonality may very well have been its effect on the distribution of plants.

Today we take for granted that there horizontal bands of plant communities. In the far north, it is tundra, which gives way to forest as you move southward. And even farther south, grasslands take over. But during the Ice Age, these plant communities actually grew together, mixed with one another. So Ice Age animals had access to many different types of plants, different types of food. But when the seasons became more distinct, the plant communities were pulled apart, that meant, in any given area, there was less plant diversity. And as a result, uh, so the theory goes, the Ice Age animals that depended on plant diversity couldn't survive. And the great beasts were the ones that needed the most diversity in their diet. Again, we have what at first seems like a pretty attractive theory, but then, how do you explain the fact that this has happened before? You know, global cooling followed by global warming, and there was no extinction then.

Uh, you know, I recently read an interesting article about an archaeologist who tried to solve this puzzle with the help of his computer. What he did was, he wrote a computer program to simulate what would happen to mammoth under certain conditions. Say, for example, there is a drought for a couple of decades, or hunters are killing or five percent of the population, and so on.

One thing he found was that humans didn't necessarily have to kill these animals in great numbers in order to nudge them toward extinction. That's because very large animals have a slow rate of reproduction, so all you have to do is remove a few young females from the herd, and you can, fairly quickly, significantly reduce the population. And then he came up with a scenario that combined some hunting by humans with some environmental stress, and...Bang! The simulated mammoths were extinct within decades.

So it seems the mixture of hunting and climate change is a likely scenario. Uh, of course, computer simulations are not a substitute for hard evidence.

TPO 24 Lecture4-Astronomy (Shield Volcanoes on Venus)

Narrator: Listen to part of a lecture in an astronomy class.

Professor: Many people have been fascinated about Venus for centuries because of its thick cloud cover, this so-called planet of mystery and all of that. Well, what's under those clouds? What's the surface of the planet like? Some questions about the surface are still unresolved but, but we have learned a lot about it in the past several years.

First of all, let me talk about how we have been able to get past those clouds. First, there were Soviet modules2 that landed directly on the surface and sent back some images of what was around them. Second, we did some radar imaging from satellites from above. Radar can get through the clouds. So what have we learned? Yes, Karen?

Student: Well, I remember reading that there's not really a lot going on, that the surface of Venus is just flat and smooth in a lot of places.

Professor: Yeah, smooth in a lot of places. But that's not, um... that's not the whole picture. In other areas, you've got canyons, ripped valleys, meteo craters, uh, lava domes, these lava formations that look like giant pancakes. And also volcanoes.

Well, one of the most interesting features on the surface are in fact the shield volcanoes. Shield volcanoes formed when magma comes out of the ground in the same spot over and over again. Remember, magma is hot molten rock that's underground, and it is called lava when it reaches the surface. Uh, so the lava builds up, and hardens, and a volcano forms.

Now, the lava on Venus is thin. It spreads out easily. So shield volcanoes have very gentle sloping sides. They are called shield volcanoes, because viewed from above, they kind of resemble shields, you know, like a warrior's shield.

But what's particularly interesting about these volcanoes is that most of the volcanoes here on Earth are not shield volcanoes. Instead, they are other volcano types, like strata volcanoes, for example, which are a result of tectonic plate movement. Remember tectonic plates?

Underneath the Earth's crust, there are a number of shifting slabs or plates that are slowly moving. And in the zones on

the edges of the plates where different plates meet and interact, that's where we get most of Earth's volcanoes

On Venus, however, volcanoes are not clustered in discrete zones like they are on Earth. Instead, they are more or less randomly scattered over Venus's surface. Well, that's significant. Venus has mostly shield volcanoes, and they are randomly scattered, that indicates that Venus does not have moving tectonic plates, and that's a big difference compared to Earth. Here on Earth, moving tectonic plates are a major geological element, just crucial for the whole surface dynamic, right?

So why doesn't Venus have them? Well, there are a few theories. One of them is that this has to do with the fact that Venus has no surface water that's needed to kind of lubricate the movement of the plates, you know, like oceans on Earth. Yeah, I forgot to spell that out. Uh, Venus has no surface water.

Student: Wait a second. Did you say we have shield volcanoes on Earth? Can you give an example?

Professor: Sure. The volcanoes in the Hawaii islands, in the Pacific Ocean are shield volcanoes. They are formed over a hot spot of magma. So while on Earth we have several types of volcanoes, on Venus there's mostly the one type. Uh, Eric?

Student: Are the volcanoes on Venus still active?

Professor: Well, that's an interesting question. There is still some discussion on that point. But here's what we do now. First, the level of sulfur dioxide gas above Venus's clouds shows large and very frequent fluctuations. It is quite possible that these fluctuations, the huge increase and decrease of sulfur dioxide, happening again and again. It's quite possible that this is due to volcanic eruptions, because volcanic eruptions often emit gases. If that's the case, volcanism could very well be the root cause of Venus's thick cloud cover. And also we have observed bursts of radio energy from the planet's surface. These bursts are similar to what we see when volcanoes erupt on Earth. So this too suggests ongoing volcanic activity. But although this is intriguing evidence, no one's actually observed a Venus volcano erupting yet, so we can't be positive.