[SQUEAKING]

[RUSTLING]

[CLICKING]

NORVIN RICHARDS: Today, we are going to finish syntax, not in the sense that you will now know everything there is to know about syntax. People spend their lives studying syntax. In fact, that's what I'm doing. But you'll know enough for 24.900. And if you're interested in these things, there is 24.902, which is all about syntax-- introduction-- more of an introduction to syntax.

So I was in the middle of talking, last time, about shortest move, and so I'm going to back up a little bit and we'll talk through the cases that I was talking about last time. Before I do that, though, I wanted to say, I got a really interesting question after class last time from someone who basically wanted to know whether it could be shown that the kinds of universals that I was showing you, observations like there's wh- movement to the left, but there isn't wh- movement to the right, or there's V2, but there isn't anti-V2--

Somebody wanted to know whether it could be shown that the absence of these things was statistically significant. That is, if you look at the languages of the world, would we expect to find anti-V2 is V2 common enough that it's surprising that the anti-V2 is absent. So I am working on working up some stats, and I will probably send out an announcement about that stuff later. So keep your eyes peeled for that.

In working up some stats, I'm having a look at a website, which I can recommend. It's called WALS-- oh dear, I was about to write the URL, and then I realized I don't know how. If you Google WALS-- WALS stands for the World Atlas of Language Structures. And I think it's something dumb like WALS.com or something like that.

AUDIENCE: [INAUDIBLE]

NORVIN RICHARDS: WALS dot what?

AUDIENCE: Dot info.

NORVIN RICHARDS: Info, huh? No wonder I don't know the URL. Language Structures-- Thank you. It is a typological database, gathering typological information about a bunch of different languages. So it has thousands of languages, observations by various linguists who work on them categorized by various phenomena. So there are all these parameters that you can look up. You can find out how many of these languages have the verb before the object. How many of them have the object before the verb.

You can get it to make you a map of where these languages are and all that cute stuff. And they take a stab at having a typlogically balanced genealogically-balanced survey, I guess. So the languages are not all Indo-European. They're from all over the world. There's just all kinds of stuff there.

Some of the generalizations that I was showing you, it's trivial to show that they are statistically significant. So, for example, there are according to WALS, roughly a third of the world's languages have wh- movement to the left. That is, they're like English. And the other 2/3 have wh- in situ. So if that is wh- goes wherever the wh- would normally go, it doesn't move. So when I told you that there is wh- movement to the left and there isn't wh- movement to the right, I'm not a mathematician, but that looks statistically significant, given that they're studying thousands and thousands of languages.

It's surprising if you thought that wh- movement to the right was, should be, just as common as the movement to the left. The absence of that in any of the languages we've studied is surprising and significant. But as I say, I'll write up some stats and send them to you. Questions about that or anything else that we did last time? OK.

This, as I said, we had gotten started on this, and I'll just back up and go through this again. We were talking last time about restrictions on movement. So I've given you the beginnings of some reasons to believe that there are cases where forming a tree for a sentence, forming a syntactic structure, isn't just a matter of merging things to each other, but that, sometimes, you take something which has already been merged and you move it someplace else. And we've talked about different kinds of movement.

And last time, towards the end of last time, I was starting to show you examples kinds of movement that you couldn't do. So I think one of the examples we talked about, you can say things like "She ordered a hamburger and fries." But that if you were to take "fries," replace it with a wh- phrase, and tried to wh- move it, giving you "What did she order a hamburger and?"-- even if you spell "did" correctly, which is surprisingly challenging!-- the result is very bad. So I showed you some examples like that, where if you arrange to put a wh- phrase in a certain kind of structure, it somehow can't escape, calling those structures islands. There's some kinds of wh- movement that you just can't do.

Does this sound familiar at all? We were doing this last time. And then I said, so there's big literature on syntax identifying these islands and trying to figure out what are the structures that you can't move out of. There's actually-- and then attempts to develop theories of why certain things are islands. Why are certain kinds of things opaque to extraction.

And I wanted to show you one theory of one particular set of examples like this, examples of places that you cannot move out of, because, well, they-- the explanation for why these particular things are opaque is particularly straightforward. So old observation, actually, that a number of the restrictions on movement that people have found can be unified into a single condition that has been called various things and formalized various ways. But today, I'll call it shortest move. It says, basically, if you have a choice between two movement operations, you should pick the shorter one. So pick short moves over long moves.

And I gave you this definition of "short." So one of the things people do in this literature is try to figure out exactly how we ought to define "short." So one way to define it would be to say, one movement is shorter than another movement, if it crosses a smaller number of nodes. So you start off dominated by a certain number of nodes, and you move to a position where you are not dominated by some of the nodes that used to dominate you. Let's call that your path. So the path is the set of nodes that dominate the position the moved item came from and don't dominate the position where it lands.

And what we're saying is you want your path to be as short as possible. So if you're comparing two moves, and then there are various ways to formalize this, but one is, if you're comparing to moves, count the nodes in the paths, and pick the one that has the smaller number. Another way to formalize it is to say, this only works if you're comparing two nodes that have overlapping paths and you are supposed to pick the one that is a subset, the path that's a subset.

So that's a story to tell here. I'll show you some examples. The first example, which I showed you last time, was the head movement constraint. So you can move heads but only over very short distances. So English forms yes/no questions by moving T into C. So you can say, ask questions, like "Will Mary type novels?" where you take what's in T, which is "will," and move it into C. That's a way to form that kind of yes/no question.

But I said, you do not, in English or in any language, form yes/no questions by moving the verb into C past the auxiliary. So English can't ask questions like "Type Mary will novels?" This is out. I'm showing you this with yes/no questions in English. I could have shown it to you with V2. So the same thing holds in V2, verb second, German phenomenon, and many other languages in which something has to be in C. And what happens is, whatever head is highest, moves into C. You do the shortest move.

In German, you move the auxiliary, and if there is no auxiliary, you move the main verb. If there are multiple auxiliaries, you move the highest one. So this is one example of shortest move. Oh, I did it again. Sorry, I haven't fixed this yet. The path from I to C, which is really the path from T to C, sorry, the path from where will is to where C is, consists of T bar and TP. That is, those are the nodes that dominate T and don't dominate C.

But the path from V to C consists of VP, as well as T bar and TP. Do people see that, even though I wrote the wrong things on the slide? So please mentally search, replace I with T, on this slide. I'm using an old term for IP, which I meant to go back and fix. There are no IPs anymore. So this is an example of how you use paths to explain to yourself what you mean when you say that one move is shorter than another. As you can see, this is also a case in which one of the paths is a subset of the other.

And then the second kind of case, which we talked about last time, and this is one of the reasons that this is only as far as we got because this case is a little shakier than the first one. The head movement constraint is extremely strong. If you violate the head movement constraint, then your sentences are almost uninterpretable. Superiority-- there are all kinds of complicated semantic things going on that allow you to sometimes violate superiority.

But, at least in some cases, out of the blue, if I ask you "Who bought what?" that's better than asking "What did who buy?" And I was getting general agreement with that last time. One of the things I said last time, and I think this is true, is that superiority judgments are particularly strong if you are talking about-- if there are only two answers. So wh- questions-- multiple wh- questions, what you're asking for is a list of pairs, usually. So if I ask you "Who bought what?" the answer is going to be, well, you know, "Sally bought chocolate, and Bill novels, and Mary bought a computer." So it'll be a list of people and things, such that the people bought the things.

Superiority-- we talked about this last time-- but superiority judgments are strongest when there's only one pair. So if you see two people fighting, you might ask "Who hit who first?" Compare that with "Who did who hit first?" For me, at least, that's a particularly strong judgment. Are there people who prefer one-- let's see. Let's see a show of hands, who prefers the first of these to the second? Who prefers the second to the first? Who finds them both fine and is not sure why some of you raised your hands the first time?

So there are a few of you who don't care whether there is only a single pair. But for many of you, this one is better than this one. There's something wrong with this. So this is a phenomenon which is not as strong as the head movement constraint but resembles the head movement constraint, in that, there's a preference when you've got a choice between two things which of them to move. There's a preference for moving the higher one, the first one.

And then here's the case number three, which we didn't get to last time. These are what are called wh- islands. "Island," again, is a name syntacticians use for these positions that you can't move out of. There's this metaphor, I guess, that involves wh- phrases not being able to swim. If they're stuck on an island, then they're stuck. So here's a sentence with an embedded wh- question. "I wonder what Bill gave to Fred."

So this whole sentence is not a question really. It's a statement. I'm telling you something about my mental state. My mental state is one in which I don't know the answer to a particular question. And that question is, "What did Bill give to Fred?" So there's wh- movements happening in the embedded clause. What has moved to the edge of the embedded clause. Is that clear? Does that make sense? That's what's going on in this sentence.

Now observation about embedded questions. If I ask you, "Who do you wonder what Bill gave to?" you are upset. So what did I do. Well, I turned Fred into a wh- question, a wh- word, zap. Now Fred is who, and I moved "who" out of the embedded clause into the matrix clause. "Who do you wonder what Bill gave to?" where the answer is, well, I'm wondering what Bill gave to Fred. It ought to be able to mean that, but it really, really can't. There's something badly wrong with this sentence.

So this is called a wh- island. A wh- question, like "what Bill gave to Fred," is an island. You can form that. That's what the first sentence says. "I wonder what Bill gave to Fred." But you can't wh- extract out of it. The proposal people have made-- well, look, there are at least two possible things that could be wrong with the green arrow there, the one that's going from the embedded clause into the matrix clause. One is, here I am in the matrix CP, and I'm trying to decide what to move.

And there are two wh- phrases. There's "what" and there's "who." I should really have a tree here. Let me draw a quasi tree. To "wonder"... Here we have "what." Then, I'm out of words, so I'll just use a triangle here, to who. So this is "You wonder what John gave to who." I know my handwriting is terrible, but can people see that that's what that tree is meant to be?

So this is the tree for what you-- for the second sentence, this is going to be my attempt to draw the second sentence. So "Who do you wonder what Bill gave to?" So we've got-- we can fill in some of the gaps here. "Bill gave (blank) to who." So we first moved "what" into the specifier of the embedded CP. And now, this is one of the few times in my life I wish I had colored chalk. Now we're going to "who," and we're going to move it up to here. And there's something wrong with this.

Try to figure out what's wrong with it. The shortest move story about what's wrong with it goes like this. Well, actually, there are two things that you could blame this on. One is, when we're here and we're trying to decide what to move into this position, well, at this point, there are two wh- phrases, "what" and "who." And "what" is higher. So maybe one thing that's wrong with it is, basically, superiority over again.

You've got two wh- phrases. You have to pick which one to move. You should move the higher one, if you didn't. So that you didn't pick the shorter move. And the other objection you might have to this green arrow goes like this. The wh- movement is to the spec of CP. Here's "who" sitting here. If you're going to move "who," well, you shouldn't move it here. You should move it here. Sorry. Let me do that without putting my body in the way. You shouldn't move it here. Here's a spec of CP to which it's going to land. But really what you should do is move it here. And you can't, because there's a wh- phrase here. This phrase is stuck.

So the ill-formedness of the sentence, the star, is this feeling you're having trying to satisfy multiple conflicting requirements. There's a Greek tragedy going on here. "Who" absolutely needs to land here, but there's "what" in the way. And so, "who" wants to kill its father and marry its mother, and then, bad things happen. You can't do everything that you want to do. So this wants to make the shortest possible move and it can't. And it's unhappy and it pouts. And that's got the shape of a star. That's a story, anyway, about why wh- islands are islands.

Do people see the problem? That, that sentence is bad. And it's not like it's unclear what it means, but you just can't say that. Yeah?

AUDIENCE: How would you say it?

NORVIN RICHARDS: You can't. "Who do you wonder what Bill gave to?" The closest you can come to saying it in English is to say things like, "Who is it that you're wondering what Bill gave to him or her." So sometimes, for some people, putting in a pronoun improves these sentences. For me, the effect is not so strong. There isn't a very good way to say this. There are languages in which this is OK, which is an interesting-- there are questions about why. But in English, not so much. Yes?

AUDIENCE: What about "What do you wonder Bill gave to who?"

NORVIN RICHARDS: "What do you wonder Bill gave to who?" So the point-- so one of the things I just said was, when we're asking what went wrong with the sentence that I've got up there, "Who do you wonder what Bill gave to?"-- one thing that you could blame it on is, you moved "who," and "what" is closer. What you should really have done is moved "what." I don't know about you guys, but, for me, "What do you wonder Bill gave to who?" I can't say.

So this is another one of these Greek tragedy things. Shortest move really wants this to be the thing that moves. But the result is that, let's think about what wh- movement does. It makes questions, right? So when you move "what" here, you're making this into a question. You wonder what Bill gave to Bill-- to Fred or whatever. If you move it up here, you're making this into a question. And maybe what we're seeing is that you can't do both. And we could demonstrate that without doing an wh- island. So it's also bad, at least for me. I'm going to star this.

It's also bad, at least for me, to say things like what do you wonder Bill gave to Fred. This is also out. So it's just independently impossible for "what" to start here, move here, and then move here. It's as though "what" can't be-- you're attempting to form two questions with a single wh- word, and you can't.

AUDIENCE: I thought the last one is OK.

NORVIN RICHARDS: "What do you wonder Bill gave to Fred?"

AUDIENCE:	No. you could say "What do you wonder whether Bill gave to Fred" is more normal to me, but also [INAUDIBLE].
NORVIN RICHARDS:	Yeah. For me, at least, I can't say this. But I agree with you, that if I were to make it, "What do you wonder if Bill gave to Fred"-- that's still bad, but it's better than this. That's my feeling about it. Joseph?
AUDIENCE:	"Wonder" replaced with "think" seems perfectly fine. So [INAUDIBLE].
NORVIN RICHARDS:	So notice-- good point.
AUDIENCE:	[INAUDIBLE]
NORVIN RICHARDS:	Right, that's it. So "wonder" selects for an interrogative CP. You can say "I wonder who left?" "why they left," "where they went," but not-- or "whether they left." There are various things you can say, but they're all questions. So "wonder" selects for a question. And "that she left" is no good. "Think" is the opposite. You can say, "I think that she left," but not, "I think whether she left," or "I think we left." Things like that. Yeah, so you're absolutely right.

If I make that "think," "What do you think Bill gave to Fred?" then "what" is going to be able to move up here, because "think" doesn't care, in fact, doesn't want this to be a question. But "wonder" does want this to be a question, with the consequence that if "what" goes here, it's as though it's stuck. It's got a job. It needs to make this a question. If it moves, then it isn't a question anymore. Something has gone wrong.

So we have two conflicting things. Your shortest move that says, in this example, "what" should move up to here should really be "what." And then, you have "wonder," which says, "No, 'what,' you have to stay here. You have a job." And these two things can't be reconciled. Notice that we are out of the domain of optimality theory here. So if you remember optimality theory, back when we were doing phonology, we were talking as though, sometimes, when you have two things and they're fighting, you just try to find some middle ground.

You find the thing that's best or you decide who's more important. That's not the way I usually settle fights between people, but apparently, in optimality theory, that's what you do. You decide which of these requirements is the most important one. The way I'm talking here is not that. This is more like, here you have two conflicting constraints and so you die. You can't do anything. There's no way to make everybody happy.

So this has been an exercise in, well, first, showing you some other places where movement is barred, and then, also, giving you just a hint of a very large and interesting literature in which syntacticians look at a variety of phenomena and try to unify them. So head movement constraint, and superiority, and wh- islands are all things that were discovered independently, at different times, by different people. And then another generation of syntacticians came along and said, no, these all belong in the same box. And that's where we are at this point.

Lots more work like this to talk about. But this is 24.900, and although I am a syntactician-- I looked at the syllabus, by the way, and we're actually, more or less, on track. I was astonished. We're supposed to stop talking about syntax today, and so, we will. One more thing for me to show you about syntax. It's actually kind of connected to this, to Joseph's point. Here's a sentence. "She will say that we should buy kumquats." Questions about this sentence? Does this make sense?

Did I put anything in here that's surprising or disturbing? I think I have a new thing in T, which is "should," but maybe that's not so alarming. And now what happens if we change "kumquats" into a wh- word, stop, and we wh- move it to the beginning of the sentence. Well, so that's me turning "kumquats" into "what, and also turning the TP into a triangle, because I was running out of room. And then we're going to move what into the matrix clause, so we'll get what will she say that we should buy.

So we've done wh- movement of "what," and we've also done head movement of "will" from T into C. I haven't drawn an arrow for that. And that's how we form that wh- question. But given everything I just said about shortest move, you might worry. You might say to yourself, but wait, isn't CT a closer place to land-- that lower CT, that we should buy, isn't that a closer place to land? After all, wh- words move to the specifier of CP. Here is an example of where there are two CPs. So what should we do?

And there are various theories you can have about that. One would be to say, yeah, a wh- phrase has moved to specifer of CP, but it's specifically interrogative CP. They form questions. So not that kind of CP. But another kind of theory we could have, would be to say, no, shortest move is correct. The fact that "what" can, in principle, land in the specifer of CP, means that it must. So it's not possible to do the arrow-- bless you-- the longer arrow that I showed you on the previous slide, where "what" just starts down there and moves in one hop up to there.

Movement is always-- the name for this is successive cyclic. It's always in little hops. You can't move from one CP, out of that CP, into another CP, without stopping at the edge of the CP that you started out in. This is something that was proposed by Noam Chomsky, who, decades ago-- and when he first proposed it, it was met with widespread derision. People were like "Just because of the shortest move constraint, you're going to say that we're doing all these little hops." And then, there was immediately a flood of really good evidence that this is true. It really does work this way.

I'm going to show you one piece of evidence that this is how wh- movement works. It's going to be kind of involved, so I'll try to go through it slowly. Did you have a question?

AUDIENCE: Yeah. So if we moved it up to where the CP is, then it would be like, "She will say what that we should buy." I feel like that sounds weird. I would say like, "She will say what we should buy," or something-- I don't know.

NORVIN RICHARDS: Yes. No, you're right. So "say," and we talked about-- there are verbs, like "wonder," that need to question. There are verbs like "think" that need to not have a question. "Say" can have either one. So you can say, "She will say that it is raining." Or She will say who left." So "say" has both options. It can have either a question or a statement. But actually, the evidence that I'm going to show you about successive cyclic movement shows that it actually doesn't matter whether the higher verb can select for a question or not. That even for verbs like "think," that have to select for statements, you get successive cyclic movement.

So you're raising a very good point, which is-- I'm sorry, I'm going to hijack your point. This movement, this first movement, it's not driven by the need to form a question. It's not that this wh- phrase is moving here to make that embedded clause a question. It's just moving there. And then there's this question about why, like why does successive cyclic movement happen. But what I'll try to show you now is that it does happen. And so, we need to get used to it and try to understand why. But we need a theory of why, because it's true. It does happen.

I haven't yet shown you have any evidence that this is true. So far, all I'm doing is asserting through the force of my personality that this is how the wh- movement works. Let me now show you some evidence. The evidence involves-- do we have evidence that this is right? Yes. The evidence comes-- there's lots of evidence for this. But I want to show you one of my favorite pieces of evidence. It comes from a language called Dinka, which is a Nilotic language. It's spoken in South Sudan and in lots of diaspora communities, including a big community here in Boston, by about 2 million people.

Its phonology is lots of fun. We did a field methods class on Dinka few years ago. It has all kinds of shenanigans it gets up to with vowels. Actually, let me see, I can play you these shenanigans in a way that you can hear. And I will see whether this works or not. So it has long and short vowels, which itself, is not all that unusual. But it has three different levels of vowel length. So there are short vowels and long vowels and really long vowels. So here are three minimal triple. You've got "mouse" and "charcoal" and "pieces of charcoal," both singular and plural. So here's the word for "mouse." Let's see if I can play it so you can hear it. No, I can't.

[SPEECH SOUND]

Oh, I think I know what happened. I will put these-- [SPEECH SOUND] if people will be quiet, they may be able to hear this. [SPEECH SOUND] And here is the longer version. [SPEECH SOUND] That's a longer vowel. And then we also, somewhere around here, have a really long vowel. [SPEECH SOUND] There. I'll put those sound files on the website so that you can hear them. Basically, the word for "mouse" is [SPEECH SOUND]. The word for "charcoal" is [SPEECH SOUND]. And the word for pieces of "charcoal" is [SPEECH SOUND].

It also has tone. And it has a contrast between what are called creaky and breathy voice. And I'll play those sound clips for you as well. Actually, here, let's see if I can get this to work. No. No. No. No. No. No. I'm sorry. My theory is that this was not working because I didn't have it plugged in when I opened the program. Let's see whether that's true. Doo. Doo. Doo. Doo. Doo. Ah. [SPEECH SOUND] There we go. [SPEECH SOUND] So that's creaky voice. That's the word for "berries."

Here's the word for "women." [SPEECH SOUND] [SPEECH SOUND]. So you do fancy things with your vocal cords when you speak this language. You either have to have-- it has different dialects of Dinka have different numbers of voice qualities. But in this dialect, there are two. There's creaky voice where your vocal cords are under a lot of tension, I guess, as you're speaking. [SPEECH SOUND] [VOWEL SOUND]. So that's the word for "berries." Here's the word for "women." [SPEECH SOUND] [SPEECH SOUND] where the voice is breathy. There's actually a more minimal pair in here somewhere, but I'm not finding it. Never mind.

So that's what Dinka sounds like. It is lots of fun to try to study, partly because a lot of its morphology is tonal, involves changes to tone or to creaky or breathy voice, or to vowel length. So you can see, for example, that the word for charcoal forms its plural by lengthening the vowel, which is already long. And also making it low tone, so it changes from [SPEECH SOUND] to [SPEECH SOUND]. We lived in fear that we were missing half of the morphemes.

[LAUGHING]

So that's enough about Dinka phonology. Let me tell you something things about Dinka syntax. Dinka is V2 language. So you can see some examples here. If you want to say things like "Can will buy Bol some clothes in the town," there's a position at the beginning of the sentence that has to get filled by some phrase. It can be filled by "Can" or by "town," or by "clothes." You can pick any of these things and move them into the first position.

That phrase is then followed by an auxiliary in all of these examples. If there isn't an auxiliary, then you get the verb in that position. And then you have the rest of the sentence. Dinka is unlike German in one or two ways. German doesn't have creaky and breathy voice, for one thing. But also, the verb in German, we saw, goes at the end of the verb phrase. The verb in Dinka goes earlier in the verb phrases. It's head initial. It's followed by its complement, with some complications, as we'll see.

So you can say "Can will Bol buy clothes in the town," or you can say "Clothes will Cán Bol buy in the town," or you can say "town"-- you can take any of these phrases and move them into first position. Dinka is also different from German in that there's a morpheme in Dinka that tells you the number of the thing you've put in first position. So you can see that the auxiliary in the first and the third examples starts with ah. And in the second example, starts with ah.

So the ah, in the second example, is indicating that the clothes are plural, that the thing in first position is plural. So German doesn't have that. There are other alternations that you can see there, which I won't try to talk about. Oh, well. So you can also see there's a difference between the auxiliary and the first example, which is [SPEECH SOUND]. That tells you that the thing in first position is the subject, whereas the auxiliary in the second and third examples is B is telling you that the thing in first position is not the subject.

So there's all this morphology, and as you can see, it's tricky to keep track of. So it's V2. The last example demonstrates this. So it's ungrammatical to just have nothing in first position. You have to put something in first position. V2 language. Now there is another position in the Dinka clause that has to get occupied. So if you want to say in Dinka, "I saw a giraffe," you can say, [SPEAKING DINKA]. No, sorry, [SPEAKING DINKA], so C is breathy.

You've got "I," the word for "I," in first position here, it is satisfying the V2 requirement. And throughout, I'm going to make things in the V2 requirement, things in the specifier or CP, things satisfying that need for there to be something in first position, I'll make those things blue. There is another position that has to get occupied though. So you can say "I (auxiliary) giraffe saw." That's how you say "I saw a giraffe." You can't leave "giraffe" after the verb.

If you-- basically, the generalization is that if there is a deep, an NP object, the NP object has to go before the verb. Everything else goes after the verb. But the NP object goes before the verb. So there's another position down there. I won't try to talk about how we figure out where that is in the tree. That won't matter for what I'm about to show you. But I want you to know about it, partly because it will make things slightly less confusing, I hope. If you have two objects, like you say things like, "I gave Ayen a book," you can choose either of them to go in first position.

So you can say either, "I have a book given Ayen," or "I have Ayen given the book." One of those two objects has to go before "give." You can't leave them both after "give." I don't think I have this anywhere on the slide, but you also can't put them both before "give." So it's a V2 language. Something has to be in first position. And there's another position right before the verb that also has to get occupied, if there is a noun-phrase object. If there is no noun-phrase object, then nothing goes in that second position. That lower position, the red position.

OK so far? This is all set up. So Dinka has two positions in the clause that absolutely have to be filled. There's the specifier of CP, so it's a V2 language. The blue position, the position at the beginning of every clause, has to get filled by some phrase. And Dinka is V2, so it can be filled by a variety of different phrases. And then there is another position that's right before the verb that also absolutely has to get filled. So if you say in Dinka, "Yaar told Ayen that Bol sent Deng to the cattle camp"--

The cattle camp is where the cattle are. Young people go to the cattle camp. Our consultant told us that the cattle camp is where young people get to know each other. So men and women mostly don't mix, but at the cattle camp, then they do. So Yaar and Ayen-- I'm trying to remember, "Yaar" and "Ayen" are women's names. And "Bol" and "Deng" are men's names. "Bol"-- I think "Bol" means "a person who is born after a set of twins." It's apparently a really common name. Twins, I guess, are really common among the Dinka.

"Ayen" is a name for a color, just like a-- yeah, anyway. So here's a sentence. The main clause and the embedded clause both have their subjects in the first position. So you've got Yaar before the auxiliary in the main clause and you've got Bol before the auxiliary in the embedded clause. And in the main clause, you've got Ayen, the person who's being told, going before the verb "told," following that red position.

And in the embedded clause, you've got Deng, the person who's being sent, preceding the verb, filling that red position. OK so far? So now a little bit of Dinka. Here's the thing, if you wh- extract-- so suppose you want to ask, "Who did Yaar tell Ayen that Bol sent to the cattle camp?"-- So here we've changed Deng into a wh- word, and we're going to move Deng into the main clause. So the object of "send" is going to be a wh- word and it's going to go in the main clause. The whole thing is going to be a question.

Here's the observation. If you do that, all of those positions that normally absolutely have to be filled have to be empty. So "who" started off as the object of "send." And so that rightmost red position, the one that "Deng" used to be in, is empty. That's not so surprising. That's where "who" came from. But what's interesting is that the blue position right above that, the one before the auxiliary of the embedded clause, the one that's normally-- that was filled by "Bol" in the first example, can't be filled by "Bol."

"Bol" has to not be there anymore. And similarly, the red position before "tell," the first red position in the second example there, the one that's an empty box, has to be empty. Normally it would be filled by "Ayen." That's what's it's being filled by in the first example. But if you wh- move across it, it has to be empty. So these positions that ordinarily absolutely, absolutely have to be filled, cannot leave them empty, suddenly they have to be empty if you're moving a wh- phrase across them.

Well we can understand why if we're willing to believe in successive cyclic movement. So we just have to be willing to believe the wh- movement is obliged to move not in one mighty leap, but in a series of little hops. It has to land in all of these open positions. And that's why they can't be filled the way they normally would be if you're doing long wh- movement across them. So there's an explanation for why these positions are emptied out. I'll show you one other cool thing about Dinka and then I think we're done with Dinka.

Dinka has a distinction between singular and plural versions of wh- words. So there's "yeŋà" which is the word for "who," and then there's "yèyíŋà," which is the word for "who" plural, "who all." English doesn't have a word for "who" plural, but plenty of languages do, and Dinka is one. If you ask a plural question, you put that "who" at the beginning in the spec of CP, of the clause that you're in. But you're required to leave behind the plural morpheme in the red positions, the positions before the verb.

So "Who all did Bol see?" You've got this "who" plural in first position. But you've also got this "ké" that goes in the red position, the position that's before the verb. If you wh- extract something from the verb phrase, like an object, you have to leave this plural morpheme behind. So interesting fact, if you do a longer question than that, like "Who all do you think that Bol saw?"--

So you've got "who" plural at the beginning, and you've got "ké," in both of the red positions along the way. As you wh- move up the clause, it's like you leave behind this little-- this was plural thing, as you move along. So you get multiple "ké"s as you go up. "Ké" sort of resembles the third-person plural pronoun, which is [SPEAKING DINKA]. So that's the word for they. So we figure it's somehow related to this.

So Dinka gives us some evidence for this idea, this wacky idea of Chomsky's from the '70's that wh- movement has to be successive cyclic, that it's not possible to just move in one big jump. You have to move in a bunch of little hops. So Dinka has a detector for landing in positions-- two detectors, actually. One is this "ké" thing. And the other is just whether certain positions are filled or empty. So these positions that normally have to be filled, have to empty themselves out if you're going to wh- move through them, by hypothesis, because the wh- word is landing in them and moving on the way up.

One piece of evidence. There are zillions of pieces of evidence for this. This is one of my favorites. Now we are done with syntax. Let us have a moment of silence for syntax. Does anybody have any questions about syntax before we leave syntax behind and begin talking about something else? So if you are looking at the syllabus, there was going to be a day on dialect. I will move that day to the end of semantics. So we're now, more or less, caught up with the syllabus.

We're going to spend some time doing semantics. And then, we will have a grab bag of topics after we're done with semantics, on various things. Any questions about syntax before we leave syntax behind? All right. Let us start in on semantics then. So we've done morphology, which is the building up of words out of morphemes. We've done syntax, which is the building of a sentences out of words. We're now going to do semantics, which is the study of how you make meanings out of smaller meanings.

That's what semantics is all about. There's a going hypothesis, which is that-- something like if you completely understand the meanings of the various parts of the sentence, the various morphemes that combine, that there ought to be a simple set of rules for how to combine meanings, that would give you the meaning of the sentence. It's called-- this idea is called compositionality. It's the idea that we should pay a lot of attention to specifying very completely what particular morphemes mean. That if we'll do that, we can have simple rules to generate the meanings of sentences.

So we're going to do some semantics. I'm going introduce you to semantics. And semantics is going to be like the other topics we've talked about in this class, in that, I hope to tell you enough about it to make it sound interesting. And then I will abandon you and let you study it on your own. Go take-- there is an undergrad intro syntax class-- semantics class that I encourage you to take, if you find the stuff that we're going to talk about interesting. There's lots of interesting work in semantics.

So let's talk about some meaning relations, some classics, like meaning relations involving words. So we can say that words are synonyms, if they seem to mean the same thing. So words like "purchase" and "buy." And that words are antonyms if they seem to mean opposite things. This is an antiquated example. I should fix this. So "male" and "female." But there are fancier things to say about meaning. So let's consider the various ways someone might want to refer to me.

So people usually say at the beginning of classes-- "It doesn't matter to me what you call me." Some people call me Professor Richards or call me Professor. Some people call me Norvin, which is my first name. If you can't remember my name, there are other things you might want to call me.

[LAUGHING]

All right. There's a variety of things that you might say about me, depending on the circumstances. And to say that these are all things that you can use to refer to me is to say that it's usually true if you have a sentence and it has one of those expressions in it, if you change just that expression to another expression, that the sentence, the meaning of the sentence won't change. In particular, if it was true before, it'll still be true. If it was false before, it'll still be false.

So here's a sentence. "Professor Richards is from Alabama." That sentence is true. I am from Alabama. And if you were to switch out the red expression for any of the other red expressions, the sentence would still be true. So to say that these all mean the same thing-- to say that "Professor Richards" and "Norvin" and "that guy with the beard" can all refer to the same person, is to say that if the first sentence is true, then changing from one of these to another one is not going to change that. If it's false, it's not going to change that. Sound right?

We have to be careful, because it's possible to get a little fancier with the meanings of words and phrases. People sometimes talk about what's called the "intension" and the "extension" of the meaning of a phrase or a word. Maybe the easiest way to think about this, at least for me, goes like this. The intension of a word, if you ask what the intension of a word is, what you're asking me for is the procedure that you will use. I'm going to give you examples of this in just a second. But the intension is the procedure that you will use to determine what that word or that phrase refers to.

Whereas the extension of a word or phrase is the value, the thing you will get if you apply that procedure, the value of that function. Let me show you what the heck I'm talking about. So the phrase "the President of the United States" has an intension and an extension. The intension of that phrase, "the President of the United States" is the procedure that you should use to find out who that phrase refers to. So what you should do is find out who won the election, who won the most recent election for president. That's the intention of that phrase.

The extension of that phrase is, well, what you'll get if you apply that procedure, which, right now, is Joe Biden. Where similarly, the phrase, "the current temperature" has an intension and an extension. The intension is the procedure we will use to find out what the current temperature is, like go look at the thermometer, go on to weather.com, or whatever. And then it has an extension, which is, well, whatever it is-- 45 degrees, let's say.

So I said before, when we say that these phrases mean the same thing, to say that is to say that you could take a sentence that's true and switch one of the phrases and still have a sentence that's true. We have to be careful, though, about things like intensions and extensions. So when we say "The temperature is 45 degrees," or "That guy with the beard is Professor Richards," it's true that "that guy with the beard" and "Professor Richards" are mostly substitutable for each other.

But we have to be careful with phrases like "the temperature" and "45 degrees." So the temperature has an intension and an extension. And its extension might be 45 degrees, but its intension isn't necessarily, which means that, for example, even if it's true that the temperature is rising, it doesn't follow that 45 degrees is rising, even if it's true that the temperature is 45 degrees and that the temperature is rising. So here's a place where it seems as though you can't substitute in one phrase for another.

That's because rising is interacting, specifically, with the intension. It's telling you something about what you will see if you look at the thermometer. It's not telling you something about the extension of the phrase, the temperature. So there are places where you can confuse yourself with intensions and extensions. Let's extend the focus a little bit and talk about sentences. So that's the beginnings of some things we'll have to watch out for when we look at the meanings of phrases.

When we start talking seriously about the meanings of sentences, there are some relations between sentences that it's going to be useful to keep track of. So one of them is entailment. So we say that a sentence A "entails" a sentence B, if whenever A is true, B must be true. So if John killed the ant, it has to be true that the ant is dead. That's what "kill" means. Yes?

AUDIENCE: For this temperature example, we have the intensions and the extensions, and the intension is not fixed, right?

NORVIN RICHARDS: Yeah.

AUDIENCE: It is 45 degrees now, up to 50 degrees.

NORVIN RICHARDS: Sure.

AUDIENCE: Next day.

NORVIN RICHARDS: Yeah.

AUDIENCE: If we said "the winner of the previous election," would that be always substitutable for "Joe Biden"?

NORVIN RICHARDS: So-- oh, "the winner"-- so let's see now. The phrase that-- let's go back to Joe Biden. Here he is. It's not always going to be true that "the winner of the previous election" is substitutable for "Joe Biden," because I can say things like "In 1945, the President of the United States declared war on Japan." And that phrase, and it's probably the wrong year, that phrase-- even if that sentence is true, I don't get to substitute that in for "Joe Biden." That's a case where it refers to a different person, to the person who won the election previous to that. Am I getting at your--

AUDIENCE: I feel like it could stickier than that?

NORVIN RICHARDS: Probably. This is day one of semantics. But yes, you're right. This is mainly meant to make you wary about expressions like "the meaning of a phrase." So the meaning of a phrase has more than one dimension. You have to be careful about what kinds of predicates it's interacting with. I mean, similarly, if I say something like, "The President of the United States has always been male," that's true. It's also true of Joe Biden, as far as I know. But it's-- those aren't the same claim.

Rising-- ants-- dead ants. Yes, so entailment-- one sentence entails another sentence, if whenever the first sentence is true, the second sentence has to be true. That's what entailment means. Similarly, to say "Norman is Don's nephew," is to say that "Don is Norman's uncle." The first of those sentences entails the second-- no, it doesn't. Actually, this is a lie! Neither of these sentences entails the other, unless you know that Norman and Don are both male.

If you know that Norman and Don are both male, then they entail each other. Otherwise, not. I should fix that. I think this one does work. "If John is here, then Mary is here, and John is here." That first sentence, that long sentence, entails that "Mary is here." So if that first sentence is true, the second sentence is true. So these are entailment relations.

Entailment relations are not about whether their sentences actually are true. So to say that sentence A entails sentence B is just to say, if you imagine that A is true, then B is also true. So "Joe Biden is a bachelor" entails that "Joe Biden is unmarried." They're both false, but if the first sentence were true, the second sentence would be true. Does the second sentence entail the first?

AUDIENCE: What is a bachelor?

NORVIN RICHARDS: An unmarried man.

AUDIENCE: If Joe Biden is a man and unmarried he may be a bachelor, but Joe Biden could be a woman for all we know.

NORVIN RICHARDS: Right. Yeah. That's an example. And actually, I think I misspoke when I said that a bachelor was an unmarried man. If his wife had died, he would be unmarried, I guess, but not a bachelor. I think a bachelor is someone who has never married. Yeah. Also false. So he's actually married. So entailment relations are not necessarily symmetrical. It's possible for A to entail B, and for B to not entail A. And entailment relations are about what life would be like if the first sentence were true. It's not about whether it is true.

And we say that A and B are in an equivalence relation, if they entail each other. We can also say that they're synonymous. So "Mary ate the bagel" and "The bagel was eaten by Mary." The first sentence entails the second. And the second entails the first. These are equivalent sentences. And we say that they contradict each other if each entails that the other is false.

So as long as "Noam" always refers to the same person, if Noam is here, that entails that it is not true that Noam is not here. And if Noam is not here, that entails that it is not true that Naom is here. I'm waiting for somebody to work hard on the meaning of "here," which I guess we could suppose he's halfway into the room or something. But forget about that stuff for a second. Let's pretend that people are either here or there, not here.

So we say that A and B contradict each other, if they each entail the falsehood of the other. Yeah?

AUDIENCE: I assume that it's possible for A-- is it possible for A to contradict B, but B not contradict A as false?

NORVIN RICHARDS: So for A to entail that B is false, but for B to not entail that A is false? Yeah. So if you go back to this slide, because I feel as though if we arrange things, correctly-- yeah. So "If Joe Biden is a bachelor"... nope. What's a better example? So if-- so we're looking for a case of a subset relation where all--

AUDIENCE: "If the rectangle is a square..."

NORVIN RICHARDS: Is a rectangle and square-- yeah, that's better, isn't it? Yeah, go ahead. Give us the rectangle and square example.

AUDIENCE: If you say that something is not a rectangle, that doesn't necessarily mean that it isn't square.

NORVIN RICHARDS: Yeah.

AUDIENCE: If it isn't a square, that means it's definitely not rectangle.

NORVIN RICHARDS: Yeah. OK. That's--

AUDIENCE: Other way around.

NORVIN RICHARDS: OK, other way around. Good. Yes.

AUDIENCE: I think that the logic rules are like if you have something like, "if p, then q," then it follows that "not q implies not p." But you have no idea whether q implies p or not.

NORVIN RICHARDS: Yes. Yes. Yes. Yes, that's true. So that is what people say about [INAUDIBLE]. Yeah, you're right. Yes. OK, good. I'm going to move away from entailment and start talking about presupposition. Presupposition is another kind of relation between sentences. Again, it doesn't matter whether the sentences are true or not, you're being invited to imagine what life would be if they were true.

So a sentence like "The present King of France is bald" presupposes that there is a present King of France. So this is different from entailment, in ways that I think I illustrate on the next slides. Yes. Crucially different from entitlement. So if I say "The present King of France is bald," or if I say "The present King of France is not bald," or if I say-- if I ask you, "Is the present King of France bald," all of those have this relation of presupposition to there is a present King of France. That is-- we can stick to the first two--

If I say "The present King of France is bald," or if I say "The present King of France is not bald," for either of those to be true, there has to be a present King of France. That's different from entailment. So for entailment, when we did things like "John killed an ant," and "The ant died," that's an entailment relation. If I say "John didn't kill an ant," well, if John didn't kill an ant, then the ant didn't die, at least, not necessarily. It might be alive.

So to say that John killed an ant entails that the ant died. And if I negate the first sentence, I no longer entail what I used to entail. But if you negate a sentence that presupposes something, so if you add not-- if you go from "The present King France is bald" to "The present King of France is not bald," you still have the preposition-- the preposition-- the presuppositions that you used to have. You still presuppose-- it still has to be true that there is a present King of France. Yes?

AUDIENCE: Let's say there is no current King of France.

NORVIN RICHARDS: Yes, which is true, by the way, if anybody is learning about the world from this class.

AUDIENCE: [INAUDIBLE]

NORVIN RICHARDS: Oh. So if there is no present King of France, ah. If there is no present King of France-- good point-- their truth value becomes difficult. This is sometimes called presupposition failure. So if I say a sentence that presupposes something false-- we're actually going to talk about this, I think, on the next slide-- your cognitive state becomes difficult. So this is a classic of-- it's used in politics and also in comedy.

Unfortunate example from the Marx brothers-- the Marx brothers asked at some point, "Have you stopped beating your wife?" The point of the question is that there's no good answer. If you say, yes or no, you're accepting the presupposition that you used to beat your wife. That's what this question does, right? The corresponding statement has the same presupposition. So "He stopped smoking" presupposes that he used to smoke.

And that means that if I presuppose something which is false, so if you ask me, have you stopped smoking, you're presupposing that I used to smoke. And if that's false, it's not enough for me to either say yes or no. I inherit your presupposition. I have to say something. I have to say something like, "Wait, I never smoked in the first place. Your presupposition is false"-- something like that. There's-- in the literature on Zen Buddhism, which I'm not an expert on, there's a kind of exchange between teachers and students that happens a lot where a teacher will ask a student the question.

The teacher-- the student will ask something like, "Does the dog have the Buddha nature?" or something like that. And the teacher, by way of answer, will haul off and slap the student, or pour cold water on the student, or shout "mu!" and the student is enlightened. This is a kind of story you see a lot in the Zen Buddhism literature. I don't know a whole lot about Zen Buddhism, but I've always wondered whether "mu!" means you are making a false presupposition.

Because it's an interesting fact about languages that we have words like "yes" or "no" that say things like "The statement that underlies your question is true or false." If I ask you "Is it raining?" you're asking me to evaluate the truth or falsehood of "It is raining?" And I'm supposed to say either "Yes, it's true that it is raining," or "No, it's false that it's raining." You ask me "Have you stopped smoking?" the statement that you're asking me to evaluate is "You have stopped smoking." And I have "yes" and "no" as my standard options.

But I don't have an option that says there is a false presupposition. And most languages don't. It's not common for languages to have something to say that means you have made a false presupposition. And so it's interesting that language work this way.

AUDIENCE: That's interesting, because I think in math, like in formal logic, if the-- if this, then that, then if this is just false, then it's the whole thing is true just by default. And the thing I'm wondering is like, does this mean that when you ask a question, you aren't actually asking, like "Have you stopped beating your wife?" You're asking, like, "Are all the presuppositions in this true, and is this also true?"

NORVIN RICHARDS: So that's just it though, I'm not asking you whether the presuppositions are true. That's why if I ask you this question-- let's change it to "Have you stopped smoking?"-- If I ask you "Have you stopped smoking?" you can't say no and have that mean-- and have me interpret that as meaning you never smoked in the first place. You're absolutely right that if you were-- this is the kind of thing that robots and aliens get wrong, standardly, in science fiction stories, that false presuppositions lead to ungrammaticality, or something like that. There's something weird going on.

Did I get it, the answer to your question? So presupposition failure, this case where I say something that has a false presupposition, it doesn't make the sentence false, it makes the sentence weird. Yeah, that's the expression, or the feeling that we have. I skipped some slides to get to this one. So let me go back a bit.

So "The present King of France is bald" presupposes that there is a present King of France. It entails that the present King of France has no hair, because that's what it means. And so, if I say "The present King of France is not bald," that no longer entails that he has no hair. That's the difference between entailments and presuppositions. Entailments don't survive negation. If you add "not," then you lose the entailments that you used to have. But you still have the presuppositions that you used to have. Yeah?

AUDIENCE: Did that say that entails the opposite?

NORVIN RICHARDS: Say it again.

AUDIENCE: Did you then just say that entailment is the opposite? Like it entails that he has hair?

NORVIN RICHARDS: Oh, in this particular case? Yes. I think we're going to find examples where A entails B, But not A does not entail not B. So yeah, if something is a rectangle, then it-- no. If something is a square, then it is a rectangle. Did I get that right? But if something is not a square, that doesn't mean that it's not a rectangle. So yes, that's a case where A entails B, but not A doesn't entail not B. Yeah, good. Phew.

And then presuppositions-- yeah, presuppositions are funny. So if depending on the presupposition-- so if we hear scratching at the door, I could say, "The cat is at the door," out of the blue. But there's a presupposition there, which is that "There is a cat." It's kind of like "The present King of France is bald" presupposes that there is a King of France. There's a process, what's called accommodating presuppositions, and this is why presuppositions are so handy in comedy and in politics.

You make-- you say things that presuppose things, and then people accommodate your presuppositions sometimes without realizing it. So if I, out of the blue, say, "The cat is at the door," you didn't know before that I had a cat. I hadn't mentioned a cat before. But my sentence presupposes that there is a cat. And so you learn from my sentence that there is a cat and you add that to your knowledge base.

If I were to instead say, "The giraffe is at the door," you'd probably be less peaceful about it. So if I make you presuppose something that's easy to presuppose, you do it without noticing it. It's not like you consciously go through a state of, if I say "The cat is at the door," it's not like you think to yourself, "Ah, he must have a cat. Write down in your mental notebook he must have a cat." Maybe that's happening on some very fast level, but you're not conscious of it.

On the other hand, if I say "The giraffe is at the door," then you have the sensation of having learned something significant. Right, and similarly, "I regret having been born in 1857." If I say that and somebody objects, I say, OK, "I don't regret having been born in 1857." Either of these presupposes that I was born in 1857. And in order for somebody to object, they have to say "No, wait, surely you were not born in 1857." So that's entailments and presuppositions.

There are also implicatures, which I think we have time for. The implicatures are things that you might tend to infer from hearing a sentence but that might not be true at all. So, for example, if I ask you a question, like "Can you open the window?" there's an implicature that I would like you to open the window. It's not entailed or presupposed. But you, when you hear me say that, you're likely to conclude that I wish that you would open the window. Or if I ask you, "Where's the salt?" there is a minimally cooperative answer to that in which you point, you know. But what I really want you to do is give me some salt.

Or if I say I am 21, there is an implication that I am 21, that, I'm, in fact, exactly 21. 21 is my age. Or if I say "Mary ate some of the cookies," there's an implicature that there are some cookies left. But all of these things could be false, under the right circumstances. So if I ask you, "Can you open the window?" probably what I-- under most circumstances, what I want you to do is open the window. But maybe what I'm doing is making a study of physical fitness in MIT students and I want to know whether you're capable of opening the window.

Or "Where's the salt?"-- maybe, in most circumstances, what I want you to do is hand me the salt, but maybe I'm making a map of the kitchen. Or there are circumstances in which I could say, I, personally, could say, I'm 21, namely, when I'm trying to go into a bar or something, and they tell you "You can't come in here unless you're 21." I could say "I'm 21." In fact, I'm 50. But what I mean is, I satisfy the requirement.

Do people agree with that? There's another kind of example like this that people give. Imagine that the government is going to have a tax break for people with two children, two or more. And so, I claim this tax benefit on my taxes. And then someone from the government comes by and says, you claimed this benefit. You're claiming to have two children. I say, I do have two children. In fact, I have six.

This is something that people seem to think about-- numbers, that numbers imply exactly the number, but they don't entail exactly the number. They just imply it very strongly. And under the right circumstances, you can convince yourself that what they really mean, what they actually entail is that number or more. These kinds of circumstances lead people to think that. Yeah?

AUDIENCE: I wonder if in languages where instead of saying things like "I am 21," you're saying "I have 21 years," whether it be more likely that you accept like oh yeah, like if you're 50, you have 50, then you probably have 25. Like maybe, because we think of it as an identity thing [INAUDIBLE].

NORVIN RICHARDS: It would be interesting to study that. So people, when I said that I could say to the guy at the bar "I'm 21"-- yeah. I'm sorry, I'm stepping on what you're saying. You're absolutely right. There are languages out there, like Spanish, in which to say I'm 21, you say "I have 21 years," or something like that. Were people just being polite when I said to-- that I could say to the guy at the bar I'm 21? Did people want to object that would be a weird thing for me to say? Some people think that would be a weird thing for me to say. What should I say? I'm 50. Yeah?

AUDIENCE: [INAUDIBLE] like, "I'm over 21."

NORVIN RICHARDS: Oh, "I'm over 21." Suppose the guy has just said to me, you have to be 21 to get inside. First of all, notice, he can say that. He can say you have to be 21 to get inside. He doesn't mean we don't allow 22-year-olds, right? He means you have to be 21 or higher. And what I'm saying is I satisfy your requirement. But I take your point. All of you go to bars and try this out. No--

[LAUGHS]

Oh, darn, I've been recorded saying that. This is bad. Oh yeah, and "Mary ate some of the cookies" implies that she didn't eat all of them, but maybe she did. So presuppositions are different from this. So I can say things like "I'm 21. In fact, I'm 50." Or "Mary ate some of the cookies. In fact, to be perfectly frank, she ate them all, just so you know." And that's, perhaps, a slightly odd way of telling you that, but I can tell you that. There's nothing too surprising about it. On the other hand, if I say "The King of France is bald, oh, and by the way, there is no King of France," then I am very weird.

And I know. I have spent a lifetime researching ways to be very weird. This is one of the best ones. So saying something that presupposes-- saying A that presupposes B, and then, saying oh, and B is false, that's just like a very peculiar thing to do. So to summarize, we've talked about three kinds of relations between sentences. So a sentence can have entailments. So the entailments of a sentence A, have to be true if A is true.

Presuppositions have to be true for A to be either true or false. So "The King of France is bald" presupposes that there is a King of France. So there has to be a King of France for it to be either true or false that "The King of France is bald." And then implicatures are things that yeah, could be true. You might be inclined to think that they're true if A is true, but they might be false. And if I say A and then say oh and by the way, this implicature is false, you're not distraught.

Or to put it another way, if you're asking about one sentence P, is P an entailment, or a presupposition, or an implicature of A, the thing to ask yourself is, "Does P have to be true for A to be either true or false?" If so, then it's a presupposition. "Does P have to be true just if A is true?" If so, it's an entailment. So it's not a presupposition. It's an entailment. And then "Does P have to be true at all, or is it just something you might be inclined to think?" So then it's an implicature.

I want to practice this for like two minutes. So if I say, "Bill isn't aware that Susan is pregnant," that's a sentence. And now here are two sentences that we can talk about the relationship between the first sentence, and the second, and the third. So "Bill isn't aware that Susan is pregnant." What's the relationship between that and the sentence "Susan is pregnant?" Is that presupposition or entailment or implicature?

AUDIENCE: Presupposition.

NORVIN RICHARDS: Presupposition, why?

AUDIENCE: Well because whether Bill is aware of or not aware that Susan is pregnant, they both mean Susan is pregnant versus--

NORVIN RICHARDS: Right. That's the way to demonstrate that. So both the sentence-- for either "Bill isn't aware that Susan is pregnant" or "Bill is aware that Susan is pregnant" to be true, Susan has to be pregnant. It has to be true that Susan is pregnant. What about the second sentence, or last sentence, "You should tell Bill that Susan is pregnant." That's an implicature. So there could be circumstances under which I would say that first sentence on order to communicate to you that last sentence, but it doesn't have to be true.

It's just the kind of thing you might conclude. So that's a presupposition. That's implicature. We will do much more of this next time. Have a good weekend.