Ten Lectures on Cognitive Construction of Meaning

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Ten Lectures on Cognitive Construction of Meaning

By

Gilles Fauconnier

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The Library of Congress Cataloging-in-Publication Data is available online at http://catalog.loc.gov
LC record available at http://lccn.loc.gov/2018008440

Typeface for the Latin, Greek, and Cyrillic scripts: "Brill". See and download: brill.com/brill-typeface.

ISSN 2468-4872
ISBN 978-90-04-36070-9 (hardback)
ISBN 978-90-04-36071-6 (e-book)

This book is printed on acid-free paper and produced in a sustainable manner.

Contents

Note on Supplementary Material

All original audio-recordings and other supplementary material, such as hand-outs and PowerPoint presentations for the lecture series, have been made available online and are referenced via unique DOI numbers on the website www.figshare.com. They may be accessed via a QR code for the print version of this book. In the e-book both the QR code and dynamic links will be available which can be accessed by a mouse-click.

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The complete collection of lectures by Gilles Fauconnier can be accessed through scanning QR code and the following dynamic link: https://doi.org/10.6084/m9.figshare.c.3989073.

 | DOI:10.1163/9789004360716_001

Preface

The present text, entitled *Ten Lectures on Cognitive Construction of Meaning by Gilles Fauconnier*, is a transcribed version of the lectures given by Professor Gilles Fauconnier in May 2008 as the forum speaker for *the 5th China International Forum on Cognitive Linguistics*. Professor Fauconnier received his first PhD from the University of California at San Diego in 1971, and two other doctorate degrees from the University of Paris VIII and the University of Paris VII respectively in 1973 and 1976. He has been engaged in cognitive linguistics and cognitive science research throughout the succeeding nearly four decades. Fauconnier is the author of *Mental Spaces, Mappings in Thought and Language*, and *The Way We Think* (with Mark Turner). He is one of the eminent linguists who have made original contributions to Cognitive Linguistics. In these ten lectures, he elaborates on major issues in cognitive construction of meaning, especially his conceptual blending theory. The text is published, accompanied by its videodisc counterpart and Chinese guide, as one of the *Eminent Linguists Lecture Series*.

The China International Forum on Cognitive Linguistics provides a forum for eminent international scholars to talk to Chinese audiences. It is a continuing program organized by six prestigious universities in Beijing. The main organizing institution is Beihang University (BUAA); its co-sponsors include Tsinghua University, Peking University, Beijing Normal University, Beijing Foreign Studies University, and Beijing Language and Culture University. Professor Fauconnier's lecture series was mainly supported by *the Beihang Grant for International Outstanding Scientists* for 2008 (Project number: Z0854, Project organizer: Thomas Fuyin Li).

The transcription of the video, proofreading of the text, and publication of the work in its present book form, have involved many people's strenuous inputs. The initial drafts were done by the following: Mo Chen, Yujuan Chen, Ke Li, Yang Liu, Fan Wang, Jing Wang, Jia Xiao, Xiaobo Xu, Shuying Yin, Wenjuan Yuan, Yujie Zhou. Then we editors did the word-by-word and line-by-line proofreading work and prepared the Chinese guide. To improve the readability of the text, we deleted the false starts, repetitions, fillers like *now, so, you know, OK, and so on, again, of course, if you like, sort of*, etc. Occasionally, the written version needs an additional word to be clear (a word that was not actually spoken in the lecture). We've added such words between double brackets [[...]]. To make the written version readable, even without watching the film, we've added a few "stage instructions", in italics within single brackets: [...]. The stage

instruction describes what the speaker was doing (pointing at a slide, showing an object, etc.). The speaker, Professor Fauconnier did the final word-by-word revision. The published version is the final version approved by the speaker.

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Gilles Fauconnier is Distinguished Professor Emeritus in the Department of Cognitive Science at the University of California San Diego. Fauconnier is one of the founders of cognitive linguistics through his work on pragmatic scales and mental spaces and the author of a number of books on linguistics and cognitive science, including *Mental Spaces*, *Spaces, Worlds, and Grammar* (with Eve Sweetser), *Mappings in Thought and Language*, and *The Way We Think* (with Mark Turner). A former Guggenheim Fellow, Fulbright scholar, and Fellow of the Center for Advanced Study at Stanford, Fauconnier was a professor at the Ecole des Hautes Etudes en Sciences Sociales in Paris and the University of Paris VIII; he was a visiting professor at universities in Europe, Japan, North and South America, China, and Africa. His recent research explores conceptual integration, compression of conceptual mappings, and emergent structure in language and beyond.

Fauconnier first specialized in mathematics, and graduated in 1965 from the Ecole Polytechnique in Paris. He discovered linguistics through Roland Barthes, and went on to study syntax and semantics under the supervision of S.-Y. Kuroda, after completing in France an advanced degree in mathematical logic and algebra of categories. After some noteworthy contributions to theoretical syntax, Fauconnier's work took an interesting turn with the discovery of several 'pragmatic' phenomena and theoretical principles, having to do with quantification, polarity, scales, and anaphora. The work was useful in showing some of the logical and pragmatic complexity behind surface structure of language; it also confirmed the limits of purely syntactic (structural or generative) approaches to syntax itself, a surprising result at the time. Additional research was successful in linking performative speech acts and Benveniste's autoverification to more general sociological notions.

The mental space framework was developed at the same time (1977) and revealed extensive invisible cognitive organization behind everyday language use and structure, offering very general solutions to longstanding central problems in philosophy of language, such as referential opacity, presupposition inheritance, and the semantics of counterfactuals.

All this gave rise in turn to the study of conceptual integration ("blending"), a dynamic operation with uniform properties that runs through many superficially different types of cognition. The present book is largely devoted to this area of research.

In 1988, Gilles Fauconnier was one of the founding members of the Cognitive Science Department at UCSD, the first of its kind in the United States. From 1998 to 2001, he was Chair of that department.

LECTURE 1

Mental Spaces

The fundamental thing to remember and remind yourselves of all the time about cognitive linguistics, is that we are not just studying the surface appearance of the language, but more ambitiously, we are actually studying what is going on behind the scenes when we speak and more generally when we think, and it turns out that there is a lot that's going on. And so language only shows us a very small aspect: language is extremely powerful, it is powerful in order to trigger these much more elaborate mental constructions.

Hidden behind simple words and everyday language (that of course all human beings basically, almost all human beings, can do), there are vast conceptual networks manipulated unconsciously through the activation of powerful neural circuits. And we take all this for granted, because for us, it's so easy: we've learned it as children, our brains unconsciously have learned these tremendously complex connections. So we take them for granted and everybody around us can do them and we don't see them as mysterious or complex, but in fact they are, and this is true of course of many aspects of human cognition. For example, vision, we also take for granted. We take our eyes as just a camera taking pictures of the outside world. This is not in fact what's happening. What's happening is that on the basis of partial information from the outside world, our brains are building the world that we see, that we experience. So everything that goes on is much more complex than what we are consciously aware of.

Furthermore, another very interesting and fundamental aspect of cognitive linguistics is that language and thought are embodied. The mind is not like a computer, separate from the body. In fact the mind is not at all like a computer, for one thing. But also, body and mind work together, and you cannot have a mind without a body and a body without a mind, needless to say. But also the whole, the entire system of building the mappings that we need is actually a body-plus-mind construction, and this explains why naïvely

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 | DOI:10.1163/9789004360716_002

we might think that chess or mathematics is much harder than language because everybody can speak but it's hard to learn chess. But in fact, if you ask the question: "What is harder: to program a computer to play chess at the grand master level? Or to program a computer to speak like a three year old?", well, the three year old simulation is much, much more complex and in fact has not been even remotely approximated by any computer or computational model at this point. Whereas of course there exist models that can even beat world champion Kasparov. You can relate that, by the way, to another aspect here: that chess is high level and has been simulated computationally, but not the low level activity of just moving the chess pieces on the board. That is, simulating what the body does, by trying to build robots, is much harder than modeling the game of chess itself. So chess can be simulated, but what *we* take to be very simple motion, cannot be, and the same is true of language at all levels, whether it's language for speech, phonology, phonetics, syntax, and of course, the much more mysterious world of meaning.

Now, in the lectures that I will try to give over the next few days, the background will be this: that language is only the tip of the iceberg, that meaning construction, crucial in order to understand language, is also operating in many other areas of human activities: art, mathematics, religion, technology, poetry, etc. and in fact those areas of human activity are typically the ones that are distinct for human beings, that other species do not have. And one of the reasons we surmise this is the case is precisely because the kinds of conceptual mappings that humans have are not the same as, let's say, other primates and a fortiori other species. Therefore, and this is the methodology here, linguistics sheds light on general human thinking. It's not just a study of an isolated little piece.

A great mistake of generative grammar, which was popular in the 1970s and 1980s, was to isolate language and study it as a separate kind of thing, different from other things that humans do. And that prevented linguistics from actually connecting to the other deeper aspects of meaning. It didn't look at meaning at all, just superficial syntax, a very uninteresting way of studying linguistics. But notice that conversely the study of meaning construction in other domains (understanding meaning construction in religion, in art, in poetry) will help us also to do linguistics. Because it will help us understand these aspects of mappings and meaning constructions that we need. The two go together.

So cognitive linguistics is not divorced from cognitive science in general. You have to look at everything in order to understand the general principles, but conversely cognitive science depends very strongly on linguistics because the evidence we have from language is fantastic evidence. There are so much language data out there that if we interpret that as we should, if we do grammar in the right way and meaning interpretation also, then we will also have much greater insight into general cognition, not just linguistic cognition.

Here is the outline of the lectures that will come. I will start, this morning, by talking to you about mental spaces, that organize a lot of our backstage cognition. (I call backstage cognition these unconscious operations that are going on when we think and when we speak). Then we will go on to conceptual mappings and in particular the study of conceptual integration, which has been a very fertile ground for the scientific study of mind in the last 10 or 15 years.

Next, this afternoon, we'll look at conceptual integration and then, tomorrow morning, we'll look at some very new work on causal compressions and how human beings are capable, on the basis of very sparse information from language, of rebuilding very complex causal sequences. That is a striking feature of our species. We don't just go from word to meaning—one word, one meaning. From a few words, we build huge meanings. This brings in the fourth lecture on emergent structure, on creativity, the fact that we are creative in our everyday life. But of course, even more, some groups, using the same mappings, the same integrations, the same conceptual systems, will create new organization, and this will account for the progress of mathematics and it will account for artistic creativity, it will account for technology. So there is a great question here, both about the child learning and being creative in learning the system, and the entire culture being creative in expanding from one generation to the next, using these fundamental conceptual mappings, expanding various areas.

Then, we'll talk about metaphor in the fifth lecture, and as you well know—you had George Lakoff here a few years ago—as you well know, metaphor is one of the cornerstones of cognitive linguistics and of human thought. Then, we will talk about grammar and how grammatical constructions are also dependent on these conceptual mappings. And then in the seventh lecture, I will discuss with you our theory about the origins of language and thought which is connected to the evidence, to the data we get from the mappings, but also the archeological evidence and the genetic evidence. And then we will connect to material culture and see how the linguistic systems correspond to technological systems in the elaboration of computers, of ATM machines, (where you get your money), of airplane cockpits, airplane dials—very appropriate for this university specialized in aeronautics and astronautics. And then, in the last two lectures, I will expand in other directions: I will show you more complex aspects of integration, and finally, in the last lecture, reflect on what all this means for methods we should use as linguists, and more generally as cognitive scientists.

Let me start then this morning with the first part, a background for the rest that we'll need for the other lectures. And that's the study of mental spaces. Now mental spaces are a very simple idea and for those of you who are not familiar with that, I will illustrate it with some intuitive examples and you

will see it's an intuitive idea, not one that's either abstract or questionable. The basic ideas that when we think, we can partition our thinking into separate mental spaces and we can connect them together. So let me give you some informal examples of that.

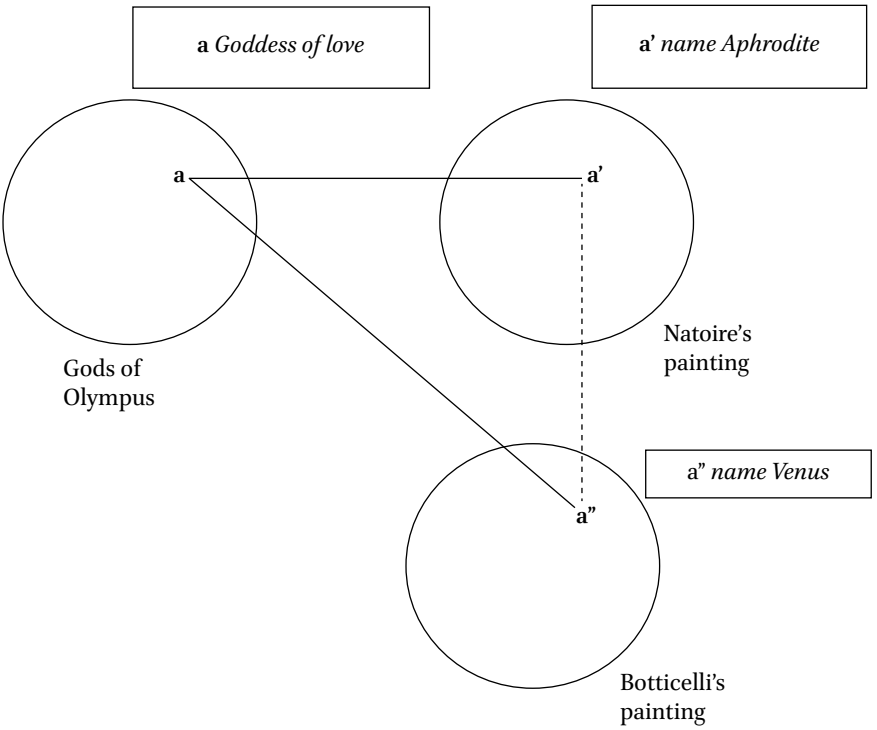
The kinds of things that you see here, are examples. For example, in the story of Superman that some of you probably know, Superman is also Clark Kent, a man who works in an office and who is in love with Lois Lane. Though Lois Lane has no idea that Clark Kent is superman, the reader knows that there are two separate mental spaces. One in which, you have Superman and the other one in which, you have Clark Kent working in the office and the two, of course, are connected. Clark Kent is Superman, although they don't look alike and they don't have the same powers, and yet they are the same person. Many other examples follow here, for example, the actor Sean Connery is connected to the character in the movie, James Bond. Baby Georgie and president Bush in the United States are the same person, although they don't look alike or have the same functions or do the same things.

And I'll show you the next example in just a minute. We will see more relations later, but some of the very basic relations are identity, analogy, representation, and causal relations: cause to effect. So, let me illustrate.

This is a painting, by an obscure French painter, Natoire, and it has Aphrodite in here. Aphrodite is the goddess of love in the Greek mythology. So Aphrodite is the goddess of love, and you can see, in the painting, how she is represented. Way up there.

In this other painting, much earlier painting—because the first one was 1700 something, this one is the late 15th century, it's a famous painting by Botticelli—it's the birth of Venus. And Venus of course is the same as Aphrodite. Venus is the Roman name, Aphrodite is the Greek name. So we have these two paintings and when we see the two paintings, without any special mental effort because we know the frames of painting and the frames of mythology and frames of representation, we immediately unconsciously construct a number of mental spaces. And I will diagram them for you. In sequence, I represent the mental spaces with circles. The circles are just a pedagogical way of talking about these mental spaces.

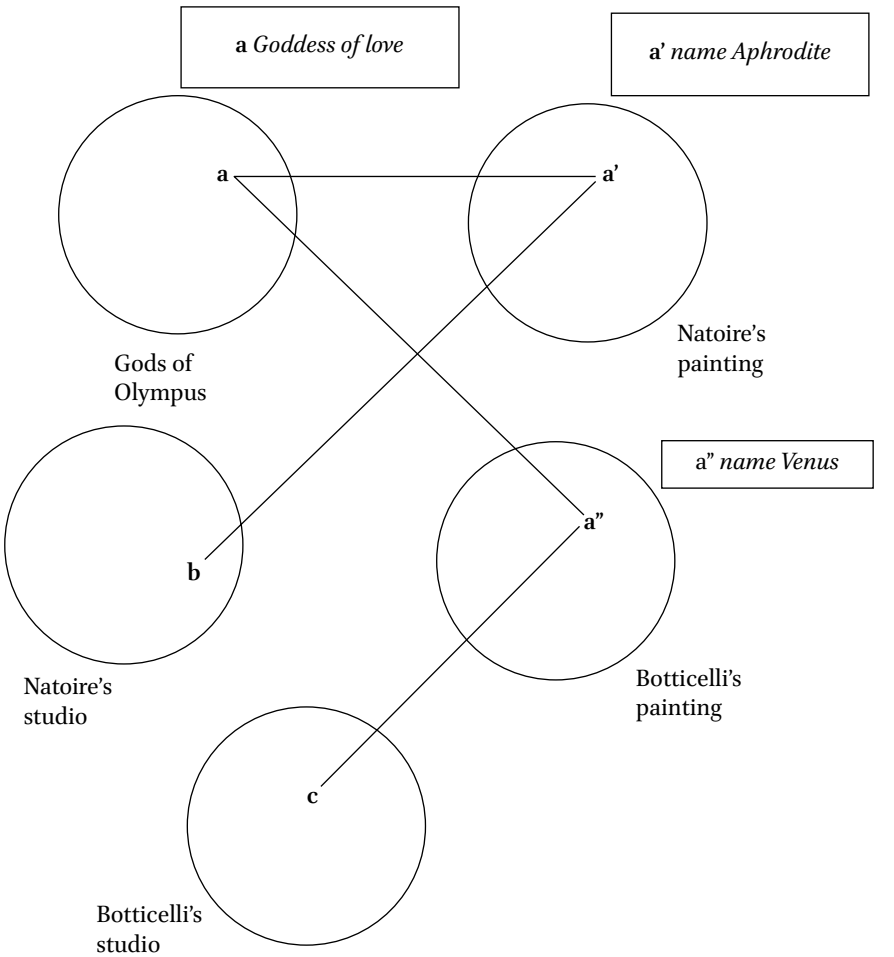
So, in the case of the paintings, in Greek mythology, you have a mental space here: when we think of this, we think of the Greek gods and the goddess of love, and different other gods, the Sun god, and so on. And then, in each one of the paintings, there is a representation of a little piece of the mythology. So in the first one, the Natoire painting, you have one representation of Aphrodite. And in the other one of course, you have a representation of Venus. So this is a', a" and a in the three different mental spaces. You can see that they are all connected, in the sense that this is meant by the painter: a' is meant to be Aphrodite, that is, to be identical to a, the actual goddess, who is a fictive goddess by the way, probably. So, it's in our imagination that we have the mental



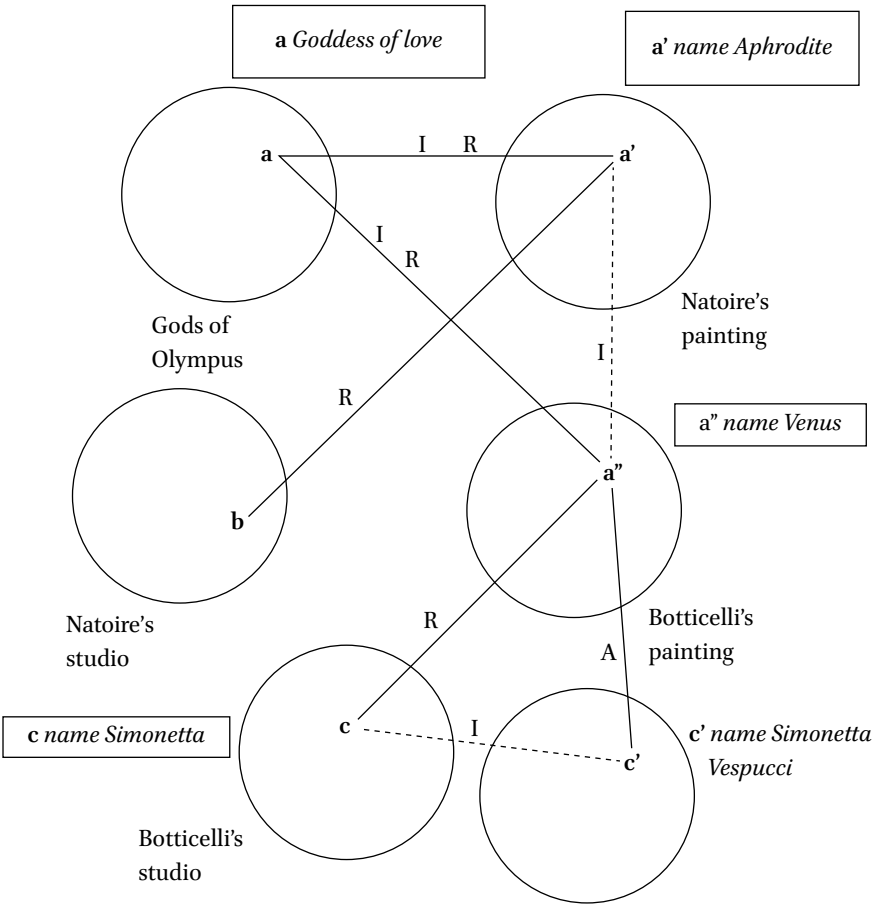
space of the gods. Now you can see that because a" is identical to a, and a' is identical to a, then a' and a" are also identical. So the two characters in the paintings are the same person, namely Aphrodite. In these rectangles, I put properties of the elements in the mental spaces. Because you can see that they can be different from one mental space to the other. These elements, a" and a', do not look like each other and they don't have the same name. But they are identical by virtue of both being the goddess Aphrodite.

But now, presumably each one of the painters was using a model and so think of the first painter Natoire. There is his painting, but there is also (we can think of) his art studio and that is another, a different, mental space. They are not the same thing. And in the art studio, there will be a model, Lise; I call her Lise up there and it's the element b in the mental space and her name is Lise, and she is a model for the character in the painting. Now the two, a' and b are related by a representation relation. But not by an identity relation. Venus or Aphrodite is not the same person as Lise. Those are two different persons. Even though one is the model for the other in the representation. So you can see that the painting represents on the one hand, Aphrodite in the world of

the gods and also represents Lise, because Lise was the model. These are two different representations of course. And same thing for the Botticelli painting, Botticelli studio and the model called Isabella here (we don't know who the model really was).



Taking all that into account, we see that in just looking at the paintings, we are able to build immediately four, five, mental spaces. The Mental space for the gods, the mental space for the first painting by Natoire, the second painting by Botticelli, the studios, Natoire's studio, Botticelli's studio. And they are connected in various ways. Now, how are they connected? Well, we already saw that there was identity of a, and a' and a''. So that's identity. And then we also saw that there was a representation relation are going from a' to b, a'' to c. No identity, this is the models. There is representation and is probably analogy because the painting looks like the model. So there is also an analogy relation between the two, but now there is also a representation relation up there. So a' is both identical to a, the goddess Venus/Aphrodite, and also represents her in the painting: a' is the representation of the goddess.



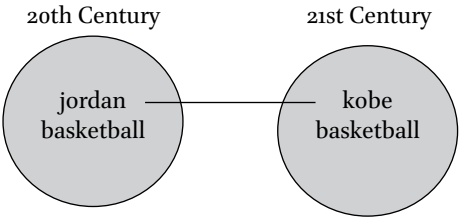
Up there, we have two relations, I and R, identity and representation. Down here, we have only representation, and if we complete the whole picture, then here is what we find; there is also identity between a' and a''. Now, crucially, there is no representation relation here, because Natoire, the second painter was not trying to represent the woman in Botticelli's painting at all. He was trying to represent Venus; he was not copying the painting of Botticelli. So even though we look at the two paintings and we say: "oh, they are identical, it's the same person," one is not a representation of the other. This is a simple example, this example with the famous paintings, the Botticelli and Natoire paintings.

This is an example to show you, independently of language here, because we don't need language explicitly. We need language to talk about it, but we don't need language to have these mental spaces formed in our head, we can just look at the paintings and because of our prior knowledge of what paintings are, how they are done, the frames and so on, we can have these mental spaces very easily. Now, as a matter of fact, I looked on the internet this morning and I was surprised but happy to find that the painting by Botticelli is believed to be a celebration of the love of Giuliano with Simonetta.

So independently of the fact that it represents Venus, for the people at that time, they could also interpret it as a representation of familiar nobility, Giuliano on the one hand, and Simonetta, on the other. So they were forming an additional mental space that you and I would not spontaneously form. But they would have the mental space: "oh, this is a painting of Venus, but it's also a painting of Simonetta." And in fact this little internet information says that Simonetta was also believed to be the model for the painting. So now you can see things get very interesting and complicated because in the mental space with models, I put 'Isabella' but it turns out to be Simonetta, so Simonetta is in the mental space of the model in the studio. But she is also in a different mental space where there is a love story with Giuliano and the painting is connecting to that story. And we could add Botticelli believed to be in love with Simonetta. So the capacity of human beings for immediately building very intricate networks of mental spaces is a very strong capacity, a very powerful capacity.

Quickly, here is an illustration of these fundamental relations that we have. Identity: I took this basketball example from my colleague Seana Coulson. And I don't know how many of you follow the American basketball NBA, but Michael Jordan was a famous basketball player and he at one time played for the Chicago Bulls and then he played for another team that he founded, that was the Washington Wizards, and so in 2002, we can say: "In 1993, Jordan played for the Bulls. Now he plays for the Wizards", and we set up very easily a mental

Analogy Mapping

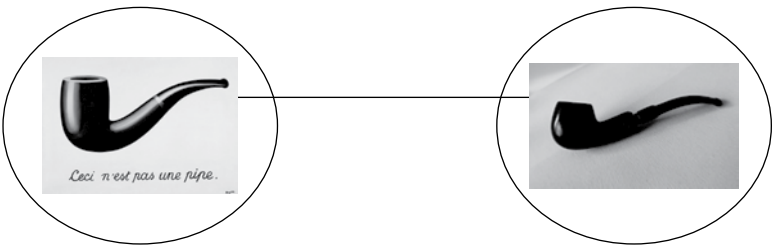


Kobe Bryant is the Jordan of the 21st century.

space for 1993, a mental space for 2002, and of course it's the same Michael Jordan, but he has different properties. In fact he is not as good a player as he was before, and so on. This is a little bit different from analogy mapping: so Kobe Bryant is another famous basketball player, in the US, in California, and so you can say: "Kobe Bryant is the Jordan of the 21st century." And what that does is it connects Jordan in the basketball frame with Kobe in the basketball frame, but in two different centuries, two mental spaces. And it transfers properties from one to the other. So this tells us that Kobe Bryant is a very good player, he has a great future and so on.

And finally the representation mapping that we talked about with the Botticelli and Natoire paintings. There is a thing like a pipe which of course on the screen here is not really a thing. It's still a picture of a pipe. But imagine that is a pipe and then there is a picture of the pipe which is a representation of the pipe. So those are very fundamental relations.

Representation Mapping



Representation Actual

This is a pipe.

A mental space has a content. If you look at your handout now, on the first page of the handout, you have these examples, and they all have in common the fact that the content is 'you, climbing Mount Rainier.' Mount Rainier is a mountain in the northwest of the US. All of these say that you are climbing Mountain Rainier, but they say that in different mental spaces. In the first one, there is a time 2001, so climbing is in 2001. In the second one, it's a counterfactual construction. It says: "if you had climbed Mountain Rainier," so in fact you didn't climb Mountain Rainier; but I can set up a mental space, a counterfactual mental space, where you did climb Mountain Rainier. And that's using words like *if* or using various grammatical constructions.

The third one: "Max believes that you climbed Mount Rainier." This is a mental space for Max's beliefs which can be completely different from reality or anything else. Fourth case: In the picture, somebody draws a picture of you climbing Mount Rainier, and even though you never saw Mount Rainier, and you never went there, in the picture, you are climbing Mount Rainier. These Mount Rainier examples all have what we call space builders. Each one has a linguistic device, a prepositional phrase, *in 2001*, a special kind of conjunction *if*, a subject verb complex *Max believes* or another prepositional phrase, *in the picture*. And by means of these grammatical elements, we set up the various mental spaces. Now, as I mentioned before, you don't have to have grammatical elements to have mental spaces formed in your head. We saw the example with paintings. But language typically can explicitly tell you what kind of mental space to set up, whether it's a time space, a hypothetical space with *if*, a belief space, *Max believes* or a representation space, *in the picture*. Now, when we set up all these mental spaces—and believe me when we talk, we are setting up many, many, many of them—in order to be able to keep track, to go from one to the other, we need to know what is connected, what is not connected.

There is a fundamental principle of connection between the mental spaces. And that principle, the Access Principle, tells you that if you have two counterparts, two connected counterparts, *a* connected to *b, a* in one mental space, *b* in a different mental space, then in order to identify *b*, in order to access *b*, you have a choice. You can either access *b* directly using the properties in its own mental space. Or you can access it through its counterpart: you go to the counterpart *a*, you describe *a* and then you connect to *b*. So let's look and see how that can work.

Here is a little example. This is a comic strip, which, actually, my friend and colleague Ron Langacker gave me many years ago. He said: "hey, here is a good example of mental spaces". And I had to modify it a little bit, because at the time it was the older George Bush, the father, who was president. Well, assume this is now the younger George Bush, and one of the men on the bench here is asking: "what was the president's name in 1958?" Now, most people would understand that as saying: "let's see, who was president in 1958?" and then, if they know it was Eisenhower, they would answer: "the name was Eisenhower." But the other guy answers: George Bush". Why does he answer: George Bush? Because we can interpret the first sentence in a different way. What was the president's name in 1958? Well, the president is George Bush, so what was the president's name? What was George Bush's name in 1958? Well, his name was still George Bush! He hasn't changed his name, right?

So the two readings depend on the possibility of using the Access Principle. Over here, you start out with your initial space, we call this the base space. It's up there in 2008. Now, you say "in 1958" and then you are looking for "the president." The mental space "1958" contains on the one hand *a'* who is the counterpart of George Bush, so *a'* can be a young child or a baby, but it's whoever George Bush was in 1958. And of course *a'* happens to have the name George Bush. On the other hand, you have in that mental space "1958" another element, *b*, corresponding to a different person, president Eisenhower, and that's the man who was president. If you don't use the Access Principle, you say "what was the name of president?", you go and look for the president in 1958, and "oh, it's *b*," What was his name? Eisenhower. You answer "Eisenhower," but if you use the Access Principle, then you say: "in the base space, in 2008, who is the president? Oh, it's George Bush," right? So, therefore, it points to *a, the*

president points to *a*, and then with the Access Principle, you can go from *a* to the counterpart *a'*, and therefore, the question gets interpreted as "what was the name of *a'*? And *a'* of course has the name George Bush. So you can see you have these two possibilities.

If you multiply the number of spaces, you can have many, many possibilities; it gets more and more complex. Again, the thing to remember is: for us human beings, this is not a source of cognitive effort. It's not difficult for us to do that, we have the capacity to build many spaces, and to do it recursively, to build one space within another space, within another space.

So here is an example. This is from one of my books, the book *Mappings in Thought and Language*, and you'll find it also, in detail, in one of the readings on the website. It's just an example to illustrate how we build and construct these spaces as we move along.

The first sentence is: *Achilles sees a tortoise*. So, we build for Achilles the first mental space that you see on your handout, and here it is. It's the base space that we start from, and we have two elements *a* and *b*. and one is Achilles and the other is the tortoise. And there is a connection between the two: relations "*a* sees *b*," and also "*a* chases *b*". All that is in the little rectangle that simply describes what is going on in the structure of that mental space.

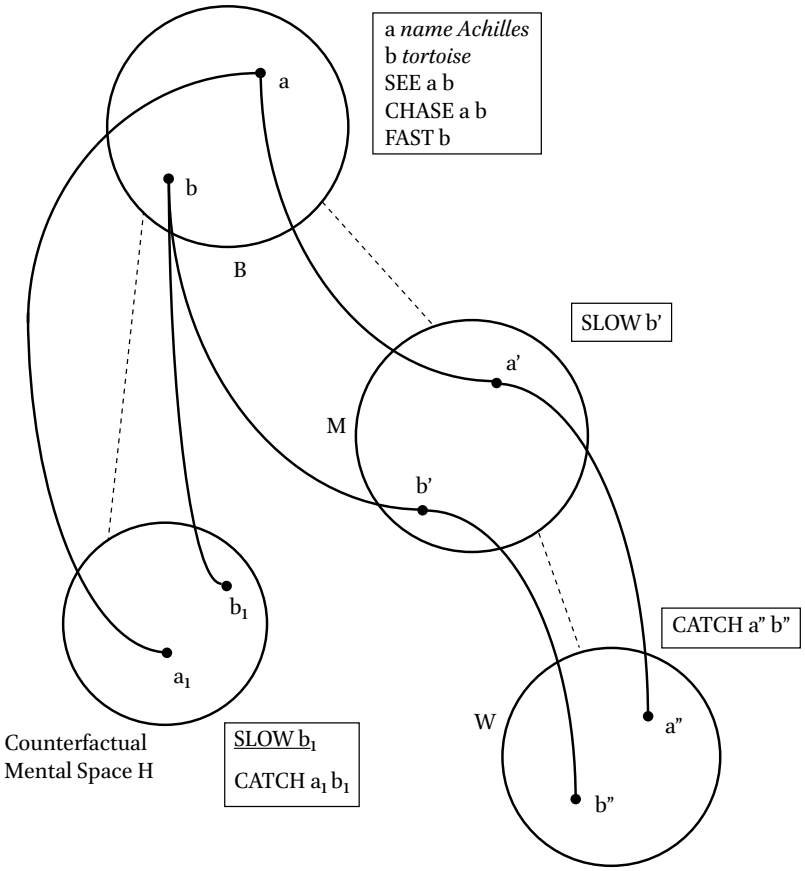
Now the next sentence comes along: *He thinks that the tortoise is slow and that he will catch it.* The elements in red on the screen are space builders; each one builds a new mental space. So the first one builds a belief space for Achilles: what Achilles believes. And the next one with WILL, the future tense WILL, helps to build a future relative to the belief space and so the configuration looks like this. Here you build the belief space first. In that belief space, the tortoise is slow because that's what Achilles thinks. He thinks the tortoise is slow, and so that is indicated over here: the counterpart of the tortoise b' is slow in the belief space of Achilles. (I don't see b' in there, there is a little mistake, there should be a b' in that rectangle, because that's the tortoise. So b' got lost.)

Then a future space comes along: *He believes he will catch it.*

So the next space over here is relative to this one—the belief space. It is future: in that future space, a" catches b". The next sentence says: *But it is fast*. So what happens is, it adds structure to the higher mental space, up there: you can see *fast* is suddenly on there, because the tortoise is actually fast. So there is a difference between the base space reality and what Achilles believes—that the tortoise is slow. This is a very important aspect of mental spaces, that by partitioning in different ways, the same element, through its counterparts can have different properties in each one of the mental spaces. And so we go on like this: now we build the hypothetical "*If the tortoise had been slow, Achilles would have*

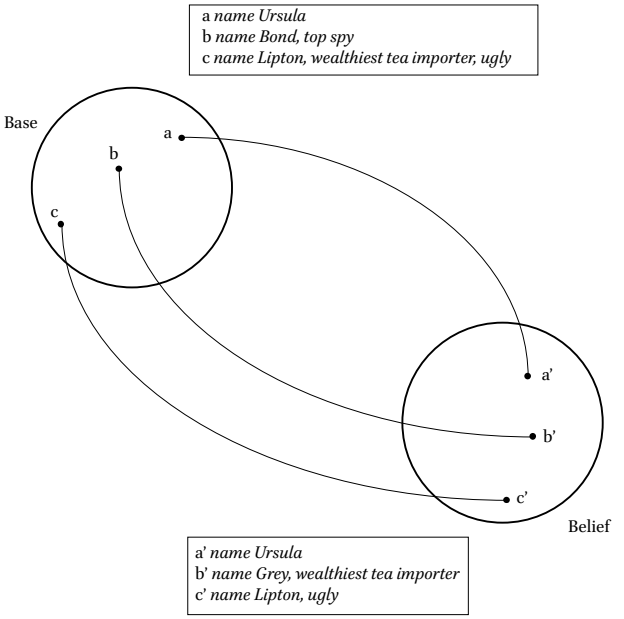
caught it." And this is a counterfactual that we build: the tortoise is in fact fast, but now we build the counterfactual "*if the tortoise had been slow*," using the space builder *if* and using the appropriate tense and mood. So every language differs here on how to mark the mental spaces with tense and mood. No two languages do it at the same way. Some languages, I understand, Chinese for example, are very economical in terms of tense and mood. Other languages have different organizations, different systems.

So now, you have more mental spaces, you have a counterfactual here and you have the belief of Achilles. In the belief of Achilles, he catches the tortoise. In the counterfactual, he also catches the tortoise, because tortoise is slow in the counterfactual, and slow in the belief of Achilles. But those are two different mental spaces. The Achilles' example illustrates how, given grammatical cues—like IF and WILL and BELIEVES and so on—you build a large array of mental spaces.



Now, mental spaces, among other things, among many things, solve a fundamental problem of philosophy of language, which is the problem of opacity.

Philosophers have worried a lot about what they called referential opacity and so you will find a huge literature on referential opacity. And the idea in referential opacity is that with language, there are cases when two noun phrases have the same referent, they point to the same person, and yet you cannot substitute one for the other. So here is a little story to illustrate that. It's on the handout also, so be sure you are imagining the story in your head. It's a story about James Bond. James Bond is really a top spy, as you know, but people don't know that he is a spy. So there is a big reception. And James Bond is posing as a wealthy tea importer, somebody who sells or buys tea. Ursula is another young woman in the story and she sees James Bond and she is very "seduced" by James Bond, she thinks James Bond is very handsome, but she doesn't know he is a spy, she thinks he is a wealthy tea importer. So given that, it's true that "Ursula thinks the top spy is handsome." We can say that because we know that the top spy is James Bond, so we can say to each other, "oh, Ursula thinks the top spy is handsome." But that's because as you'll see in a minute, we are using the Access Principle. But Ursula doesn't know he is a top spy, so she couldn't say: "the top spy is handsome." Because she doesn't know that. But we can also say "Ursula thinks the wealthy tea importer is handsome", because, even though we don't believe that James Bond is a tea importer, Ursula believes he is a tea importer.



So here is the kind of mental space configuration that we set up. We start from the speaker's knowledge, and the speaker's view, and in the speaker's knowledge up there, (you see, it's on your handout), you have the character *a*, who has the name Ursula, character *b*, who is Bond and a spy. And character *c*, who is a very ugly man, whose name is Lipton, and Lipton is really a wealthy tea importer. But Ursula doesn't know that. So now we build Ursula's belief space over here. And there is a counterpart for Ursula, *a'*, a counterpart *b'* for Bond, who has a different name, because Bond is pretending to be Earl Grey, that's his name. (Earl Grey is a brand of tea in England and United States). And finally you have *c'* here, that's the ugly Lord Lipton. Now in Ursula's world, *b'* is the wealthy tea importer, and he is very handsome. In the speaker's world, up here, in the mental space corresponding to the speaker's belief, the reality presumably is: *c* is the ugly tea importer and *b* is James Bond, the top spy. So now, you can see that we can either:

1) Not use the access principle; then we say *Ursula believes*, we go directly to Ursula's belief, we find *b', b'* is a wealthy tea importer, and also Ursula believes that he is handsome. So in that mental space, *b'* is handsome. And so that will give us the sentence "Ursula believes that the wealthy tea importer is handsome."
2) On the other hand, if we use the access principle, then we'll go to the top space. we find *b* up there, and *b* is the top spy, and then, by the access principle, we will access the counterpart *b'* and so we can say: "Ursula believes that the top spy is handsome."

So, that's fundamentally the explanation behind opacity phenomena. Philosophers of language and logicians have struggled to explain this by using a special intentional logic of language. But that's not really what's going on, because the Access Principle is a very general cognitive principle that applies way beyond the belief context. It's a much more general principle than what the philosophers have discovered.

You can see that you don't have substitutions. So the first one up here is true. "Ursula thinks *the wealthy tea importer* is handsome," is true. But even though we know that the wealthy tea importer is Lord Lipton, we cannot substitute; we cannot take 'the wealthy tea importer' and replace it by 'Lord Lipton,' preserving truth. Because now, this one is not true. "Ursula thinks *Lord Lipton* is handsome" is false. Even though again, this one the wealthy tea importer and that one Lord Lipton are in fact the same. So that was the opacity puzzle for philosophers and as you see, it finds an easy solution within the mental space framework.

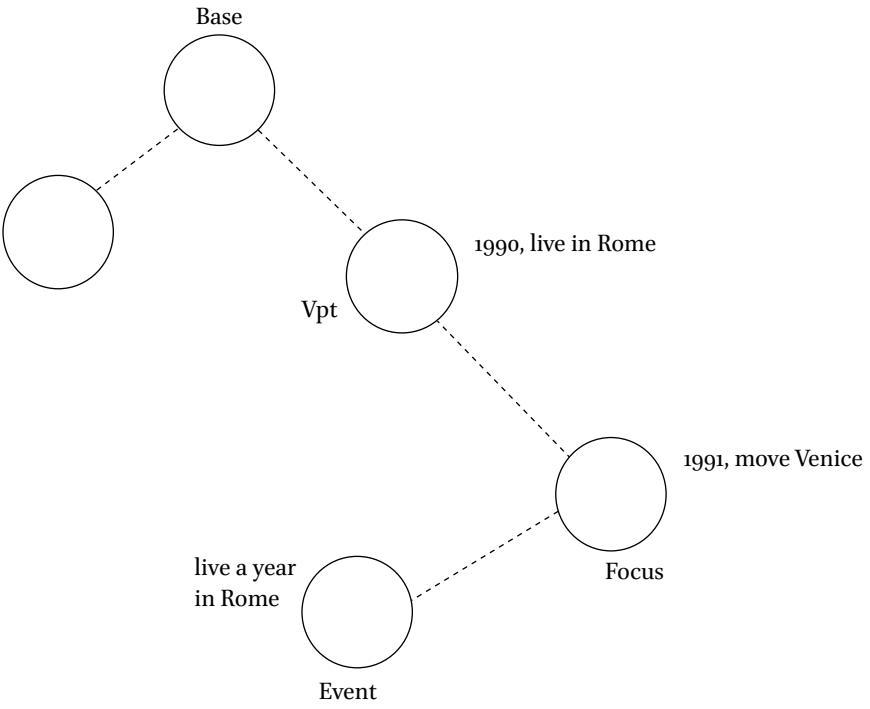
Now, let me move on. Mental spaces organize our conception of time in discourse, and this was very nicely discovered and worked on initially by John Dinsmore and then later, elaborated into a wonderful theory by Michelle Cutrer. On the website, you'll find the entire PhD dissertation of Michelle Cutrer with the full explanation of all the tenses and aspects, constructions in English. That's a very, very important piece of work.

I will just illustrate with a very tiny part, but it's a huge topic obviously. I will illustrate how the organization of time sets up these different mental spaces. So I illustrate by means of a simple piece of discourse (this is accessible on one of the readings in the website). It's a very simple little story: "Max is 23. He has lived abroad. In 1990, he lived in Rome. In 1991, he would move to Venice. And he would then have lived a year in Rome." So notice the different tenses and different moods in English. The *would*, the *will*, the *have* mood, and so on, are being used to organize time. And in mental space terms, this is how all these operate: You start as before from a base space, an initial space that tells you that Max, the young man, is 23, and this space is the base, but it's also what's in focus and it's also your viewpoint. (I don't have time to explain the details of this: Michelle Cutrer's very interesting work separates the notion of base space that you start from, the viewpoint—you are looking at things from a certain view point, the focus—what you are looking at, and the event space—where some events happened).

So you start with a single space that is simultaneously base, viewpoint, focus. Then, using the English perfect form "has lived", you build an event space over here, which tells you that Max lived abroad, but it doesn't change the focus. The focus stays in your base space, and that is why English has a present form for the perfect event *has lived*. It has a past on the participle of *live*, but has a present on *has* because the present indicates that we are not changing the focus and viewpoint. We still have the viewpoint up there. And we are putting this aside, "Max living abroad." But we are not changing our focus. Now, we change the focus. In the next sentence, on the handout here, on page 7, figure 9, you will now see that you've already built the space on the left. *He has lived abroad*. And now you are changing focus, and you say *He lived in Rome in 1990*, so you are switching to the 1990 space, which now becomes your focus; your viewpoint is still from the base space. That's why there is a past form on there. Your viewpoint is from the present, you put a past "*he lived*". But the focus is now on 1990, on the new space that you've got here.

Next page on the handout, another shift. This time, the viewpoint shifts to 1990, but the event and focus go to 1991. So that's why you say: "In 1991, he would move to Venice." Notice the form, *he would move*. You could have said just: "he moved to Venice." That would be the viewpoint from the base. But

you say: "he would move." Why do you say *he would move*? Because it's a future with respect to this one, 1990, future 1991, so it's a future with respect to 1990. That's why you get "would". But it's a past with respect to the base space. That's why you get "would" and not "will". You get the past form of "will". And finally, *He would then have lived a year in Rome*. You build another perfect space here without changing focus and without changing viewpoint. So when you are at this point, your base is still up there. But your viewpoint has shifted to 1990, your focus has shifted to 1991, and finally the event you are talking about is a separate event, the event of living in Rome for a year.



Now this is typically how language operates in order to build up time. It builds up different spaces. And then those spaces are connected. So you look at the base up there, and 1990: they are connected by PAST. These two are connected by FUTURE. And these two are connected by the notion of PERFECT. This is what what the grammar does in English. Each language has different systems for allowing you to reconstruct the right mental space configuration. So in English, what happens is that you have, if you look at the line up there, you have the base space, it's connected by PAST in the semantic sense, semantic

PAST to viewpoint space, connected by FUTURE to the focus space. Then what the grammar does is it takes PAST, in capital letters, and it codes it in English as simple past, in English it gets coded like that, and then the FUTURE gets coded as *will*, so you get simple past, *will*, and then the verb "*move*" that corresponds to the event that's happening, moving to Venice.

And now, you combine these grammatical forms: simple past+*will*, well, the past of *will* is *would*, so simple past +*will* gives you *would*, and then "move" is the form of the verb, so you get *"would move", "would move to Venice"*. And that allows you subconsciously to reconstruct the right configuration of mental spaces.

Another little comic strip, not because we study comic strips specially. We are not in the business of studying comics. But comics are interesting because they usually tell a very short story. And so they can be used as examples. And they have some visual aspect also, that helps us to understand the context. So this comic strip, for example, is a case where the father is watching television, and he is watching a wrestling match with a very impressive wrestler, Hulk Hogan. And the father boasts and he says "Oh, when I was a young man, when I was in my prime, I was very strong and I could have pinned Hulk Hogan in a matter of seconds" (*pin* means to win in wrestling). So the father is boasting, and the son asks his mother: "Is that true? Is that true that father can do that?" And the mother says: "Probably." And then of course, there is the punch line in the joke. She says: "Of course, when your dad was in his prime (if you go in the past), Hulk Hogan was in kindergarten. So he was a little child; so that explains why your dad could probably have pinned Hulk Hogan, who was a five-year-old." In other words, we understand one meaning, but the mother switches, and what the mother is doing is using the possibility of a different mental space configuration in order to get a new meaning from the same words.

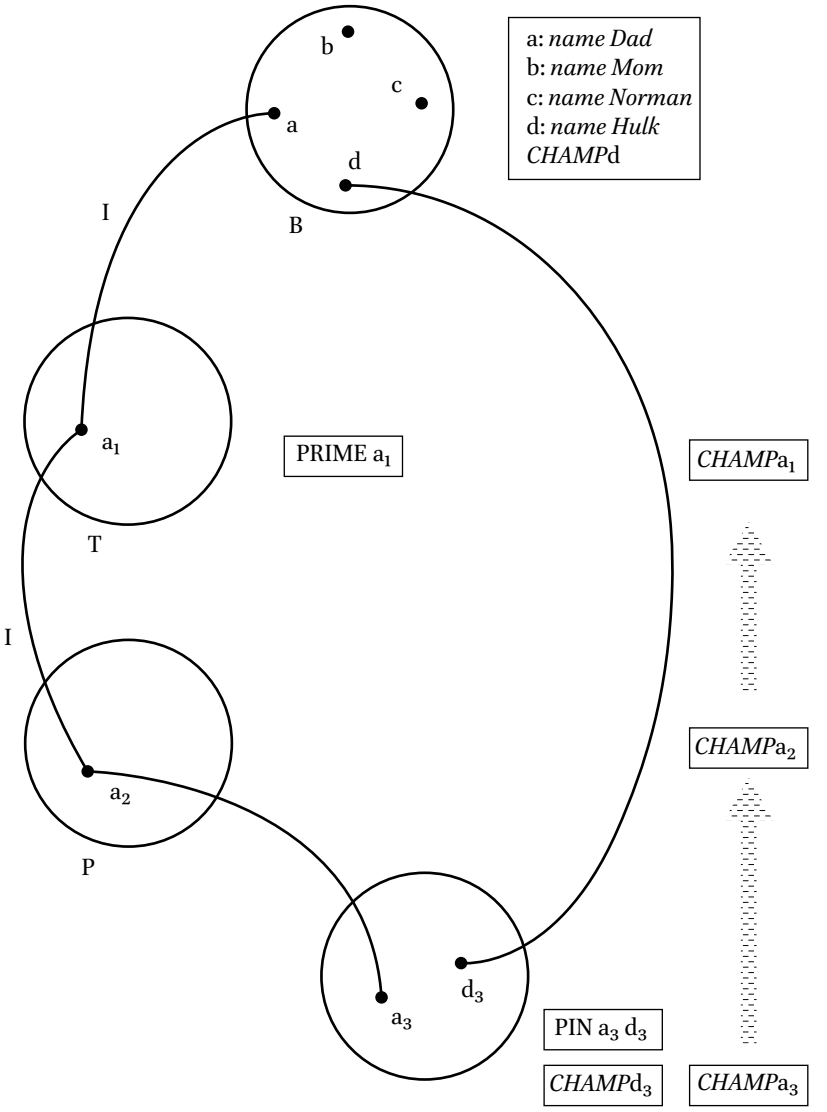
And again this is very typical, very important; a single sentence in the language can have many, many corresponding mental space configurations. But often in context, there will be one that is very salient, the one that everybody thinks of, and then, if like the mother, you think of another one, then you can transform the situation.

So, quickly, (and you can look later at your handout for the details) the way all this is built is: you start from a base space, in which you have the television with the wrestling champion, Hulk Hogan, and then you have the family, Dad, and Mom and their son, Norman. Everybody is in that initial space, and of course, *d—d* is Hulk—is the champ. Now the father starts the talk, the father says: "when I was in my prime," so he builds another mental space, P, and there is a counterpart of the father here, a_1. a_1 is in his prime, so that's the father when he was young, a young vigorous father. And then he says "I could have", and here he builds another possibility, this is a possibility space. He doesn't say that happened. He doesn't say that he actually beat even a strong wrestler. He just says *he could* (possibility), so this is a possibility space, "I could do it." And then he says: "I could have pinned," and that actually builds a counterfactual space. You can see the whole sequence, with a single sentence here, "I could have pinned Hulk Hogan." It builds a whole series of related mental spaces, and we end up in this one: we have the counterpart of the father, a_3, and the counterpart of Hulk Hogan d_3, and of course, the father Bill beats the wrestler, beats Hulk Hogan. We transfer unconsciously, automatically, the properties of Hulk Hogan, a very strong wrestler, and so we see the father here beating a very strong wrestler, and therefore, we conclude, in that space, that the father is a champion, champion a_3. a_3, the father back then, was a champion.

And we build up so that it transfers to all the spaces. It goes up; it percolates up to the different spaces. And so the end result of this construction is that we understand that the father in his prime was a real champion wrestler.

What the mother does is she puts in counterparts of Hulk Hogan, counterparts of the wrestler. She puts them in these spaces. So that now, you have d_1, d_2, and d_3. Now of course, when the father was in his prime, then d_1 here was a child, right? So now, we have over here, in this space: d_3 is a child and a_3 the counterpart of the father beats, pins, d_3. So we have a totally different space now, we have the father beating up on the poor small child, right ? And of course what happens then is this child has been transferred and so this time, the interpretation is not going to be that the father is a champion. It's going to be that the father, when he was a boy in fact beat up on small children.

So those examples are meant to give you a flavor of how we build up all these mental spaces, in discourse, in thinking, in looking at paintings. I have barely scratched the surface, of course.



I've only shown you a few simple examples, but they'll be useful in the next few lectures in understanding the basis for conceptual integration. Let me just mention other cases without analysis. Let me look at some other examples. Here are some, a little bit more complicated, mental space examples. This is a comic strip, Calvin. I don't know if you know this strip. Calvin and Hobbes, the tiger. Calvin is writing to himself, but to himself in the future, he is saying: "dear Future Calvin, I wrote this several days before you will receive it." Notice he

says "I wrote this," in the past although he is writing it in the present, because when future Calvin gets the letter, then it will be the past, when the letter was written. And so he is saying: you've done things I haven't done. He says this to his future self. Of course because there are maybe three days, between when he sends the letter and he himself receives the letter. Future Calvin, in those three days, he's done many things, and so he says : "you are lucky, you know things I don't know. You lucky dog!" And Calvin says: "I feel so sorry for myself two days ago. Now he goes back, two days in the past, he says: "poor Calvin, two days ago, who didn't know what I know". So this is of course a kind of joke. But you need the mental spaces to understand it. And it's very unreal. These are very unrealistic mental spaces and yet everybody understands very easily.

This is a series of examples, further examples that you can read about in the readings. These are forms of metonymy, but this is to show you that the Access Principle goes far beyond just belief spaces or imagining spaces, so here are some cases. Let's just look at these three, these four. Norman Mailer, who is a writer, Norman Mailer "loves to read himself." Well, there is a connection between Norman Mailer and the books that Norman Mailer writes, And so using the Access Principle, you can say "Norman Mailer," to indicate the books. And then "Norman Mailer loves to read himself." You can get a reflexive pronoun here. The literal meaning of that—to say: Norman Mailer loves to read himself—would be that Norman Mailer on his stomach has many things written (like Chinese characters) and then he likes to read, you know, "himself." Now, that's not what this means. This means he likes to read books by Norman Mailer. So the Access Principle is working. Same thing of course with a metonymy of this sort: "Plato is on the top shelf next to Homer." It doesn't mean the two writers are sitting on your shelf; it means the books are on the shelf. In the restaurant, you can tell the waiter who comes with the dishes: "oh, I am the quiche and she is the ham sandwich." Again, the access principle operates from the person who orders to the dish they order. Over here, "the mushroom omelet left without paying his bill." So in the restaurant, it means, not that the omelet itself, suddenly is walking, but that the person who ordered the omelet left without paying.

So the Access Principle is allowing you to use the description: omelet, the dish ordered, to access the counterpart customer. And I'll finish with one last example. These are variants of the George Bush story, and let's see, if I have one more example. These are more comic strips, but we won't do them. So here is the last example I'll use: this is a story where John and Betty are married. So this is a married couple, the husband and the wife, and Betty asks, "if I died first", she asks her husband, "would you get married again?" So she is building a possibility space. It's not reality, and she says: "would you get married again?"

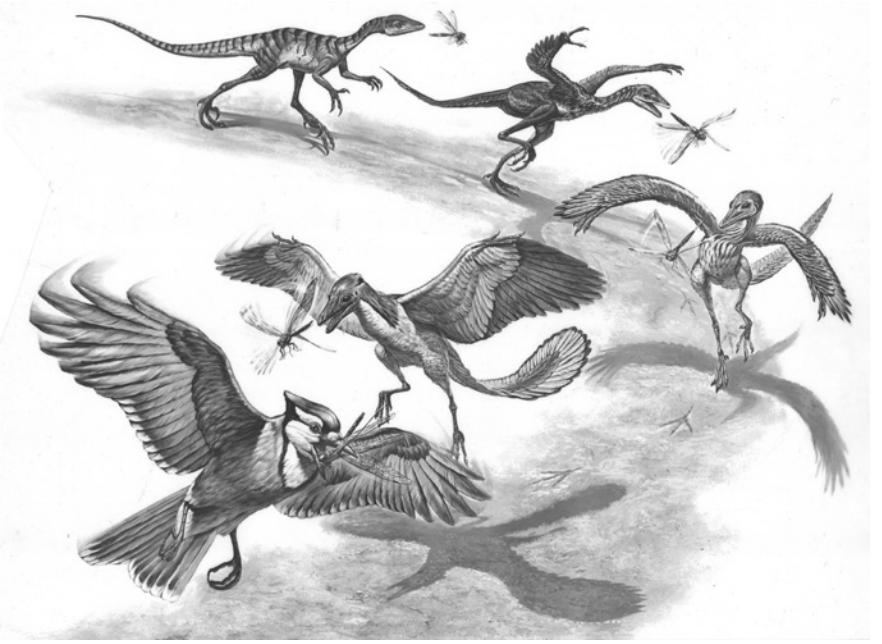
And the husband says:" well, I'm only 36, so you know it's possible I might." And then she says, "would you live here in our home with her?" He says "I suppose so," and then: "what about our bed, would you use our bed too?" "Sure, sure," he replies. "What about my new golf clubs? Would you let her use those too?" And then George says: "oh, no, she is left-handed." So, now when you get the punch line, the last line, you have to reconstruct all the mental spaces to see that in John's mind, there was already a counterpart in the base space, and so he was going from the base space. He knew the woman that he would marry if Betty dies. Of course in Betty's construction, there was no such woman, and he reveals his perversity with a little bit of grammar. That's why grammar is so dangerous. Because notice that it's because of this little "'s", *she's left-handed*, that we know we have to go back to the base space, and we find the woman that he is preparing to marry.

I'll stop for this lecture and we can probably stop the camera rolling. And then we can have some discussion.

LECTURE 2

Conceptual Integration

I have permission from professor Li to resume, to start the second lecture. The second lecture is on conceptual integration which is a central mapping scheme, that we find in many human activities, but in particular for language. It's crucial for human language, both for grammar and for the construction of meaning, to have conceptual integration.



All original audio-recordings and other supplementary material, such as any hand-outs and powerpoint presentations for the lecture series, have been made available online and are referenced via unique DOI numbers on the website www.figshare.com. They may be accessed via this QR code and the following dynamic link: https://doi.org/10.6084/m9.figshare.5831154.

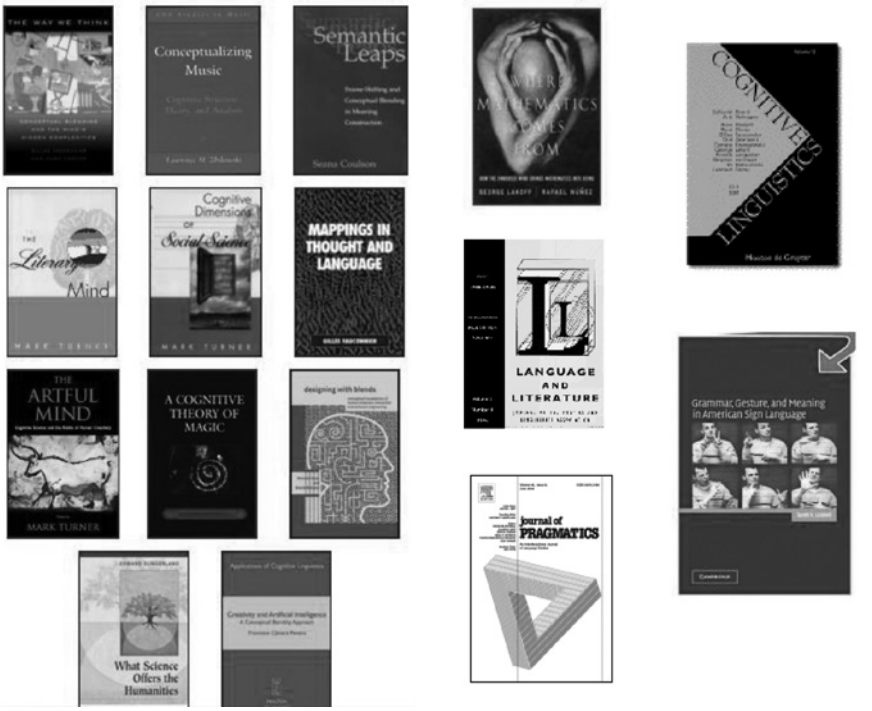
 | DOI:10.1163/9789004360716_003

The picture on the slide here is actually taken from a book for children and it does several things. It is meant to illustrate in an accessible way, both for children and for adults, the process of evolution, but of course in a very compressed, very simplified form. So what you see here is the evolution of dinosaurs changing over a long period of time over millions of years until we finally have birds as a result of the biological evolution and natural selection process. Now, of course, if we look at the picture by itself, what we see literally are five different animals. The first three are dinosaurs, the fourth is in between, and the last one is a bird.

If we look at the pictures we see the five different ones. But it is very natural for us to integrate them into a single animal that will be chasing a single dragonfly. There are in fact five dragonflies, but we can immediately perceive this, if we want, as a single dinosaur in a very short period of time, chasing the dragonfly, and changing as it tries to catch the dragonfly. And the pressure to be able to catch the dragonfly makes the dinosaur change until it becomes a bird and then it gobbles up, it eats up, the dragonfly. So this is an integration because we have even at the superficial level here five different pictures in one and then in our minds we form a single motion with a single animal, a single dinosaur bird chasing a single dragonfly. So let's look in some more detail at how the integration process actually works.

And before I do that, let me give you a little bit of background. A lot of this work is joint work with my colleague Mark Turner and we started working on this a while back, actually in 1993, but we made several notable discoveries as we went along, and in particular in 1999–2000, we worked together at Standford and eventually published this book, the book called *The Way We Think*. And in the Standford work we discovered compression phenomena that we had not discovered before; before, we had focused on conceptual blending and integration. But in the year 2000, we started to notice the systematicity of compression phenomena. So what I will be talking to you about are both blending on the one hand, and compression on the other. You can access a lot of literature through the website that I gave this morning or, for blending, you can go directly to blending.standford.edu. (You can also access through the first one, mentalspace.net).

Now, on that website, you will find a lot of recent work, many books and articles and so on. What's interesting, I think, from the cognitive linguistic point of view, is that out of this work on conceptual blending, that started with preoccupation for language, emerged work in a lot of other areas, again corroborating what I was trying to say this morning: that the mental cognitive operations that we have are used not just for language and meaning in language, but also for constructing meaning in many other domains like art, religion and so forth. So here are some books:



See these books on the website blending.stanford.edu.

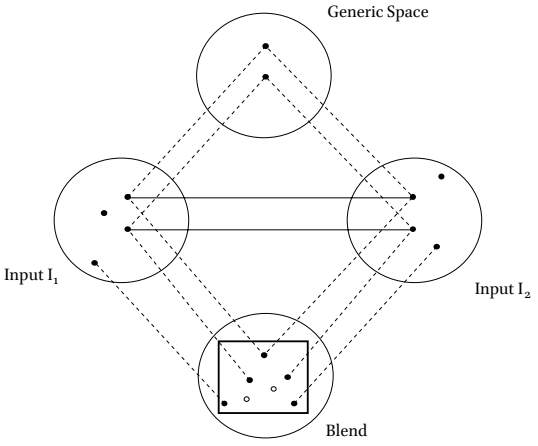
This is a book on art. This is a book on magic and religion. This is a book on design. People doing design have found interesting ideas from conceptual blending theory. This is a book on religion again, and more generally culture, anthropology. This is a book on artificial intelligence and computational models of conceptual blending.

And up there, you have the book by Rafael Núñez and George Lakoff on mathematics which explores the successive blends that create more and more and more mathematics; it's extremely interesting to see the construction of mathematics through conceptual blending by mathematicians. This is a book by Scott Liddell on sign language. And sign language, as you know, is extremely interesting for linguists because it's the language often spoken by the deaf and there are different sign languages. There is American sign language, Chinese sign language and so on. And they reveal interesting structures because the sign languages operate in a gestural modality and not in a spoken oral modality. And so we can tease apart the aspects of language that are entirely due to speech and phonetics and the aspects of language that are deeper, that are due to the construction of meaning: what we are interested in this afternoon.

Here (one, two, three) you see some special issues of journals, the *Cognitive Linguistics* journal, the *Language and Literature* journal, the *Journal of Pragmatics*, and all of those issues are special issues, all about conceptual blending. And so again, you can find papers and articles that explore problems of literature, or problems of pragmatics, in terms of conceptual blending. So I put that on to give you an idea of the range of things. Now, you might say: "Well I am a linguist, I am a teacher of language and so, you know, why should I care about mathematics, or about design and about religion?" But in fact, we think, in cognitive linguistics: One of the things that makes cognitive linguistics the most exciting is precisely the fact that we find corroborating evidence and applications in the neighboring areas.

So we can use one to explain the other and vice versa. And also, for those of you who are teachers, from the purely pedagogical point of view, I believe it should be extremely useful to explain to your students some of these ideas and some of these notions using, precisely, domains outside of language, so they can see the correlations. These may be domains they are familiar with or interested in independently. There is a book on music way up there for example. So it's a nice combination, but it's also, if you like, a vindication of the early ideas when we started cognitive linguistics in the late 1970s with other colleagues like George Lakoff and Ronald Langacker, (who came here), or Leonard Talmy. One of the claims at the time was that because we had very general operations, we would find them in these other areas. And then we did. So, you know, a number of people were able to do a lot of work in other areas, vindicating in some sense the idea that you don't want to separate language from other

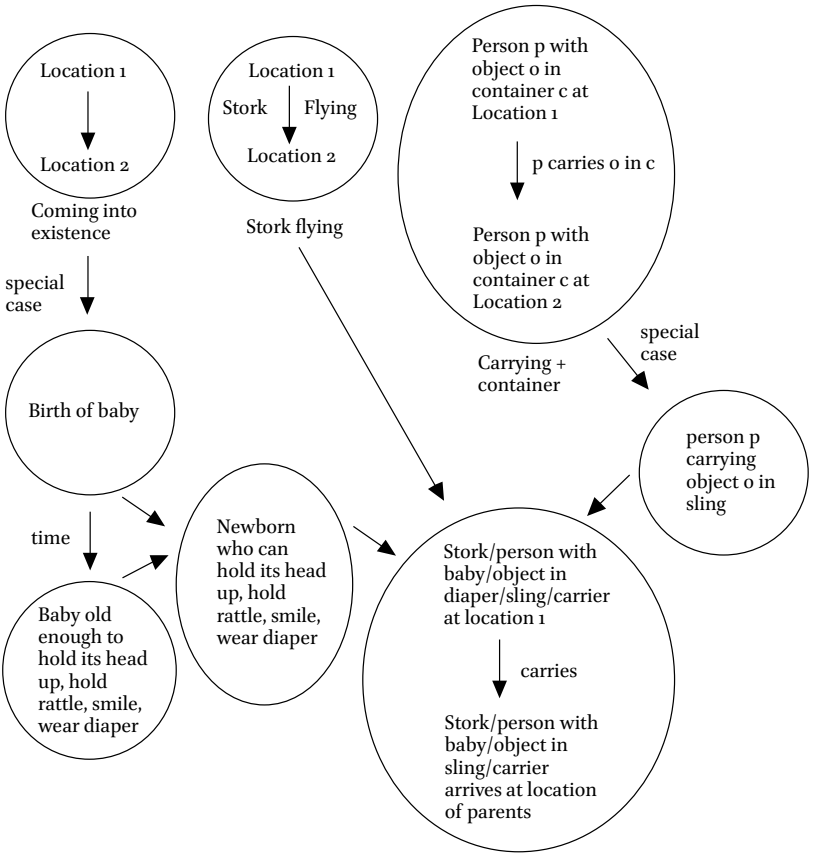
A conceptual integration network with two input mental spaces.



things. You want to study them together as far as meaning construction goes and this is what I was alluding to this morning.

So let me start with a very familiar example that some of you have already seen because it is in the books I talked about in other lectures. In fact, in China, I have used this example, just because it's a simple example to get the basic idea of conceptual blending. Here I put on the screen the very general diagram of blending two mental spaces together. This morning we talked about mental spaces. And here we take two mental spaces that are different but that have some correspondences between them. And up here we have something called the generic space which is what is common to the input spaces. And then we do projections, partial projections, into a novel blended space. And in that blended space, there will emerge novel structure, emergent structure. That's the power of the integration.

Now on your handout which starts on page 12 of the book, you find this diagram, but you will find also another diagram with many mental spaces, because typically what happens is you don't just blend two mental spaces, but you often have several, you have many together, and then they give you a blended space which in turn can blend with other spaces. So the real networks, the ones that we manipulate, (unconsciously, remember) in everyday



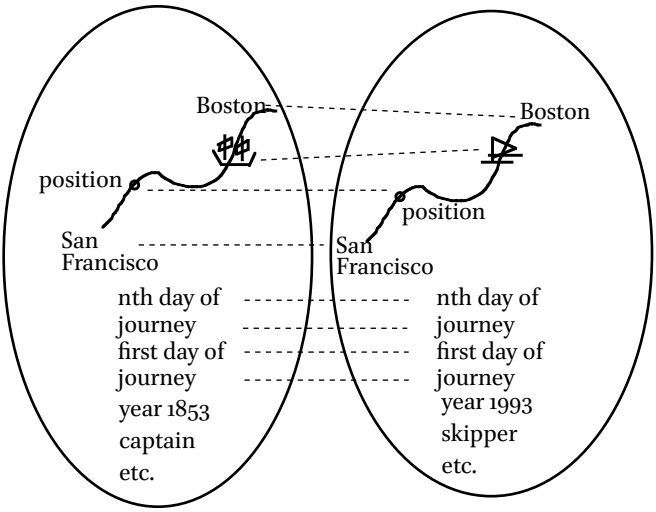
life, are typically much more complex than just two spaces. But I will illustrate the basic principles with two spaces. This more complex network is what you need to construct in order to understand something pretty simple which is the stork bringing babies.

You know the legend of how babies come into the world. Well, there is a stork that brings the babies into the world. Simple idea? But if you unravel that idea and find all the mental spaces that are connected in order to produce this single image, you find in fact many more than two mental spaces. You find at least all of these and probably more.

Now, as you see, the principles behind creating novel blended spaces are the principles you see here. You have to find a matching between at least two inputs. Then you have to find what they have in common. That's the generic space. And then you do blending by projecting selectively, projecting part of the inputs into a new mental space. And then you have the emergent structure which is produced by composition (composition is just putting things

together), but also pattern completion. Pattern completion is having a part of a pattern and completing it to a larger pattern. For example, if you see this for the first time, most of you, although you only see this and that, in your mind you will probably complete it and you will assume that there is a straight pointer. Of course you don't really know. It could be a trick by a magician. There could be a little pointer here and a little pointer there and nothing behind. Or there could be a very crooked pointer. But our minds do pattern completion all the time. We see somebody from behind going into the door and we complete the pattern we assume that this is that person. Let's say Thomas: because we see part of Thomas, we complete it [the part] into one person [Thomas] that we happen to know. Of course, in order to do that, we have to have in our minds the templates, the patterns, the complete patterns that we can complete in this way. So, because we have a pattern of a straight line, it's easy, when we see two parts of the straight line it, to complete it into a single straight line.

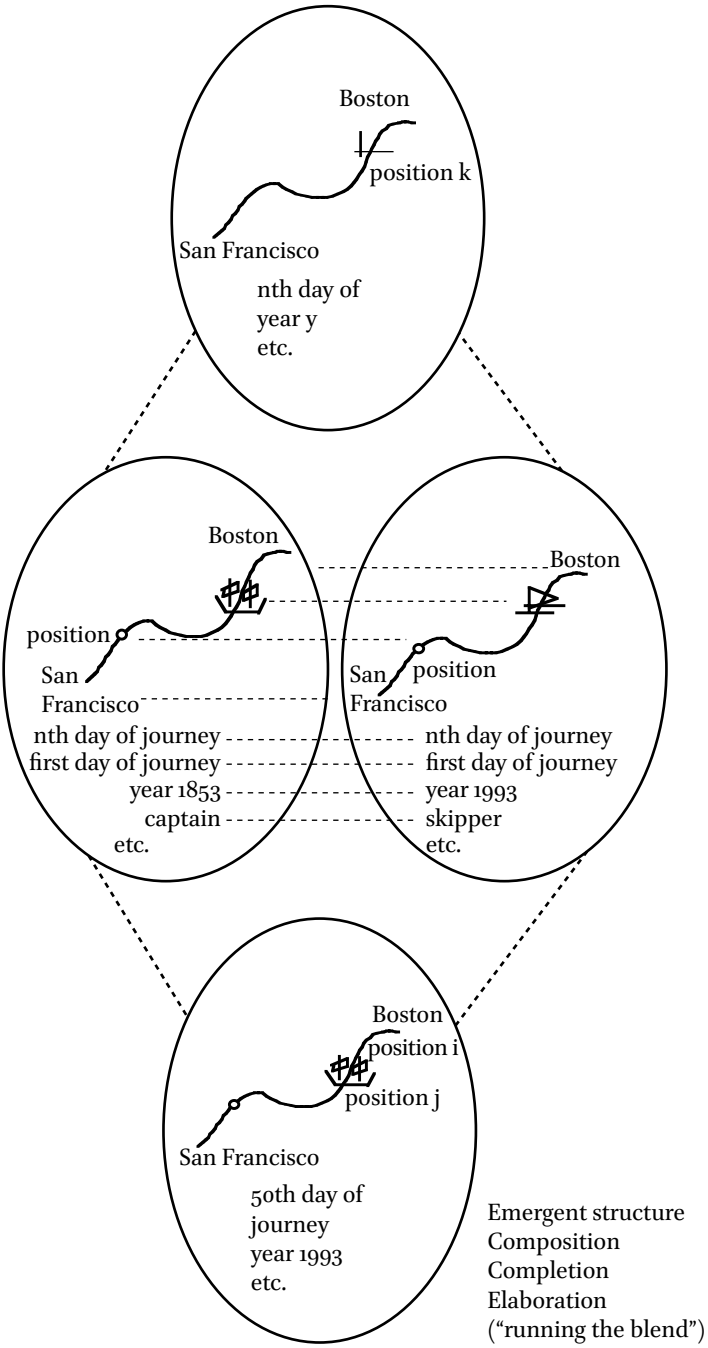
To introduce the notion, I use again this familiar example, with apologies to those who have already seen it. This is to illustrate the notion. This is a little article taken from a sailing magazine. And the situation is this: It's happening in 1993. There is a catamaran—you know, a boat, a sail boat with two hulls. And the catamaran is going around the Cape Horn in South America, sailing from San Francisco all the way to Boston. And it's trying to go fast. But it's also trying to go faster than a clipper, a ship, back over a century before, in 1853. The ship sailed in 76 days from San Francisco to Boston. So this catamaran is sailing by itself. But it would like to be faster, to break the record of the early ship that was a century and a half before. And so when you look at the way this is described in a magazine you see the two sailors on the catamaran, Rich Wilson and Bill



Biewenga, and they were "barely maintaining a 4.5 day lead over the ghost of the clipper *Northern Light*." It is described as if the clipper was actually sailing at the same time as they are sailing and was behind them by 4.5 days' distance. Of course in reality, the clipper sailed many years before. This construction using the word *ghost* is a typical blend. And what's happening is an example of the general schema of integrating mental spaces. So the two input mental spaces are the one with the clipper, with the old ship in 1853, sailing around Cape Horn. And the other input mental space is the present day catamaran doing the same course, sailing on the same course.

Those were the two input spaces. We can match them easily because they share a lot in common. They have the same course. They have boats in each one. Not the same boat but two boats, two sail boats. We have skippers and captains. We have sailors and sailors. So there are a lot of things that we can match, they correspond. And here is how you do the matching. You take the two input spaces and you match the parts of the spaces. So the journey as you can see is the same from San Francisco to Boston up here. And then you can match the nth day, like the 20th day of the journey: you can match it with the 20th day of the other journey. And over here, the year 1853 corresponds to the year 1993 and so on. Many things correspond. Many things match. Now, they match because there is a generic space which represents what these two inputs have in common. And the generic space is simply here the more abstract frame, inside the mental space: the more abstract frame of any sail boat, sailing from San Francisco to Boston, on some day in some year and in some position.

So we project from the inputs. This is the input that has NL, meaning *Northern Light*, that's the name of the clipper. And this is the other input that has GA, *Great America*, that's the name of the catamaran. We project both of those into the novel blended space. So that now on any given day, we project the corresponding position of the boats in the input, days on the journey, like the 20th day in the journey with what was the position of *Northern Light*, and what was the position of *Great America*. You can see this has the same mental space structure that we studied this morning. There are input spaces and then the element up here, NL, has a counterpart in the blended space NL', just like the ones we had this morning, a, a', a", and so on. Now in the blended space, by composition you have got the two boats together. Of course, this is an act of imagination. It's not reality. And in the imagination, then, the two boats are together. So this is the blended space. Here is the journey, at some point at some day, of the journey, in some year 1993. The blended space takes on the date 1993 from one input. It takes the clipper from the other input. It doesn't take everything. For example, it could not take the year 1853 because then that would contradict the year 1993. So it picks some things and leaves others out.



Emergent structure
Composition
Completion
Elaboration
("running the blend")

We end up with this kind of configuration. There is the generic space up here, the two inputs here and then the blended space that you are creating. Now, the blended space is created by producing its own emergent structure. How does it do that? Well, first of course, composition. It has two boats instead of one. Each of the inputs has only one boat and the blended space has two boats. But in addition to that, we have pattern completion (that I was talking about). When you have two boats on the same course, it's very easy to complete that pattern into a race between boats and say "Oh, those boats must be competing, they must be racing. They are on the same course." So pattern completion creates additional structure, the structure of the race between the boats, which of course could not be in the input, where there is only one boat.

Then we do the third part of producing the emergent structure. That's elaboration, what we call "running the blend". The blend is a dynamic thing. It's not just the circles you see on the screen; it's a dynamic motion scene. And in that scene, you have the boats racing. So you can compare their positions and, in particular, you can have the skipper of the catamaran boat look back and see they are still ahead of *Northern Light*. So in the magazine article, when it says "maintaining the lead over the ghost", you introduce this ghost of a ship so that the people on the boat *Great America*, the catamaran, can be aware of the clipper. But the clipper of course could not be aware of them, because in the original input they had no knowledge that one day much later there would be a catamaran that would come and try to break the record.

So this explains, then, what we get in the actual text in the language. It explains why we get this particular formulation: "They were barely maintaining a 4.5 day lead over the ghost of the clipper." That describes, not the input, but the blended space. It allows the readers of the article to look back, and because, again, we have these unconscious blending capacities, we read that, and we automatically decompress, and so we go to the inputs, we go from the blended space to the inputs and we can therefore compare the two positions of the boats in the different inputs, which actually have been described to us in the single blended space input.

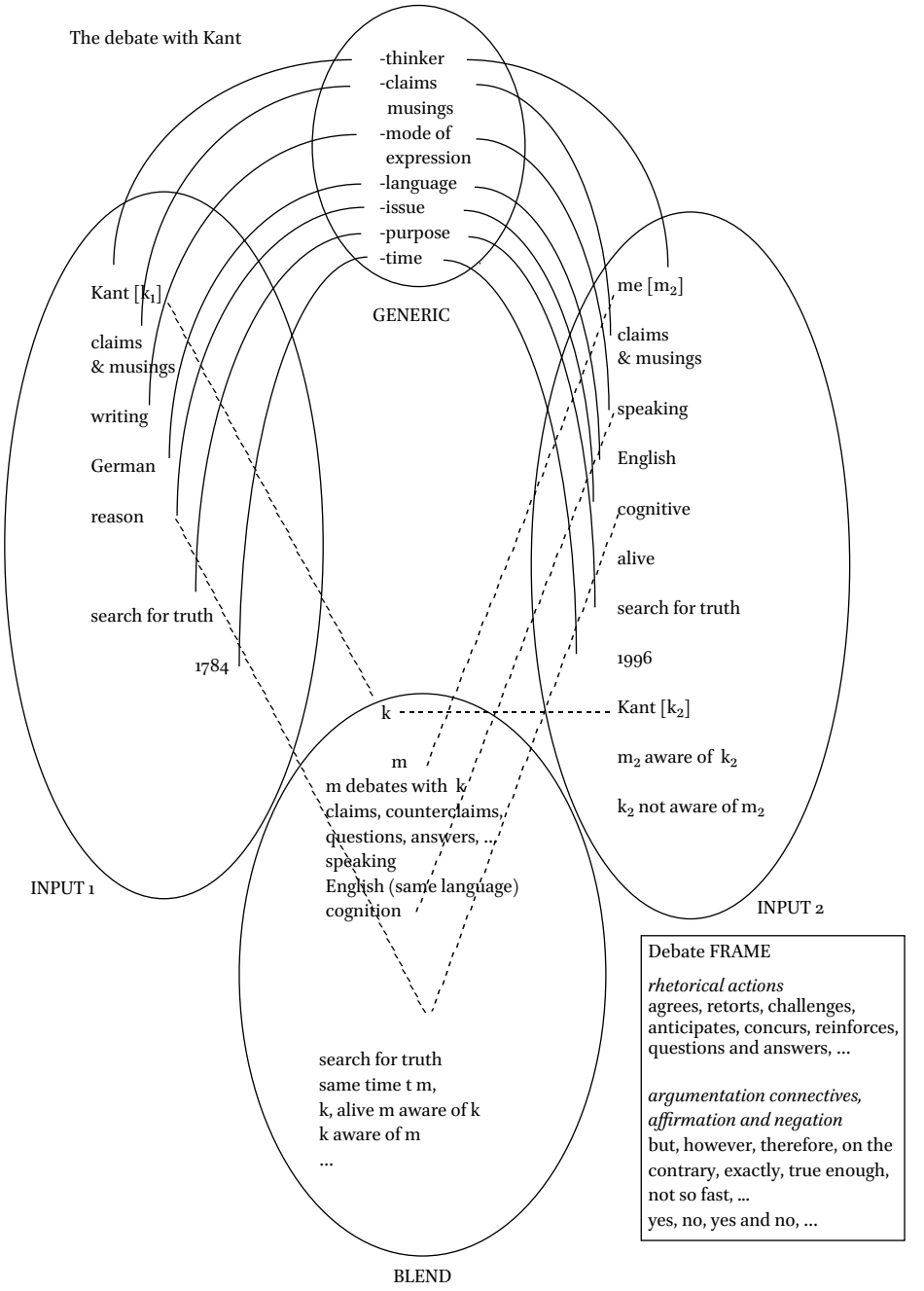
Here is another very classical example of blending. This is the so called *debate with Kant* blending. And it has to do with cases where you have a professor like me. So imagine instead of me, a philosophy professor. And the philosophy professor is by himself. And he is explaining something to you. And he explains in this way: he says "I claim that reason is a self developing capacity. Kant disagrees with me on this point. Kant says blablabla. Kant says this. Kant says that." Now, notice that the description is of course completely false. Kant cannot be here in the room arguing with me. Kant has been dead for many years. So what's happening, just like with the boats, is that a conceptual blend

is created. You bring Kant from one input and you bring the present day situation, the philosophy professor, from the other input. This has a lot of stuff in it. But all you need to remember is there is one common frame. The common frame is the frame of the thinker who expresses ideas in some language, a philosophy thinker for example. That's the generic space up there.

And then you have two inputs that are special cases of that. One is Kant in the late 18th century, 1780 something, maybe. And over here you have the philosophy professor who is speaking. And now you project, and you bring them into a blended space. In that blended space, you've got two people talking. Since they are talking about the same thing, pattern completion will say "Oh, those two people are probably having a conversation". Or even an argument, because they are philosophy academics who like to argue. So pattern completion will take what you have here in the two inputs: the two people are talking, Kant and the philosophy professor. And we will complete that into the debate frame, the argument frame, where there is an argument going on. And then you will run the blend. What's happening in this piece of text is that the speaker is running the blend. He is saying he is having an argument with a ghost, he is having a debate, and of course he is bringing some of what he says here from his own ideas. And other things he is bringing from what he read in Kant, that Kant maybe wrote a long time ago.

Of course, Kant wrote in German, and the philosophy professor is speaking, let's say, English today, or Chinese. But it doesn't matter. In the blended space, they have the same language, English in this case. And they are together and disagreeing. And, notice, the philosophy professor wins the argument against Kant. He says "ah, I say this and Kant has no answer." So in this case, the advantage of constructing a blend is a rhetorical advantage, because in the blended space, you argue against somebody, a philosopher who is very prestigious, and yet you win the argument against that philosopher. So your ideas must be very powerful.

Are you with me on that? Of course in reality, Kant cannot answer really. He is not here, he is dead and so can't rebuke the philosophy professor. But in the blended space, the philosophy professor is free to take from the Kant input whatever he wants and then to have his own ideas and to present this as a debate. This is very frequent; this is almost a conventional way of presenting certain ideas: to invoke people from the past and talk about them as if they were right here in the room with you and you were having a debate with them. But to do that, you have to have a conceptual blend. And again, if you think of comparison with other species, with even a very intelligent primate, you can see how it's going to be very unlikely that even the intelligent primate could build this kind of very elaborate construction that relies on memory, projection, many mappings, and so on.

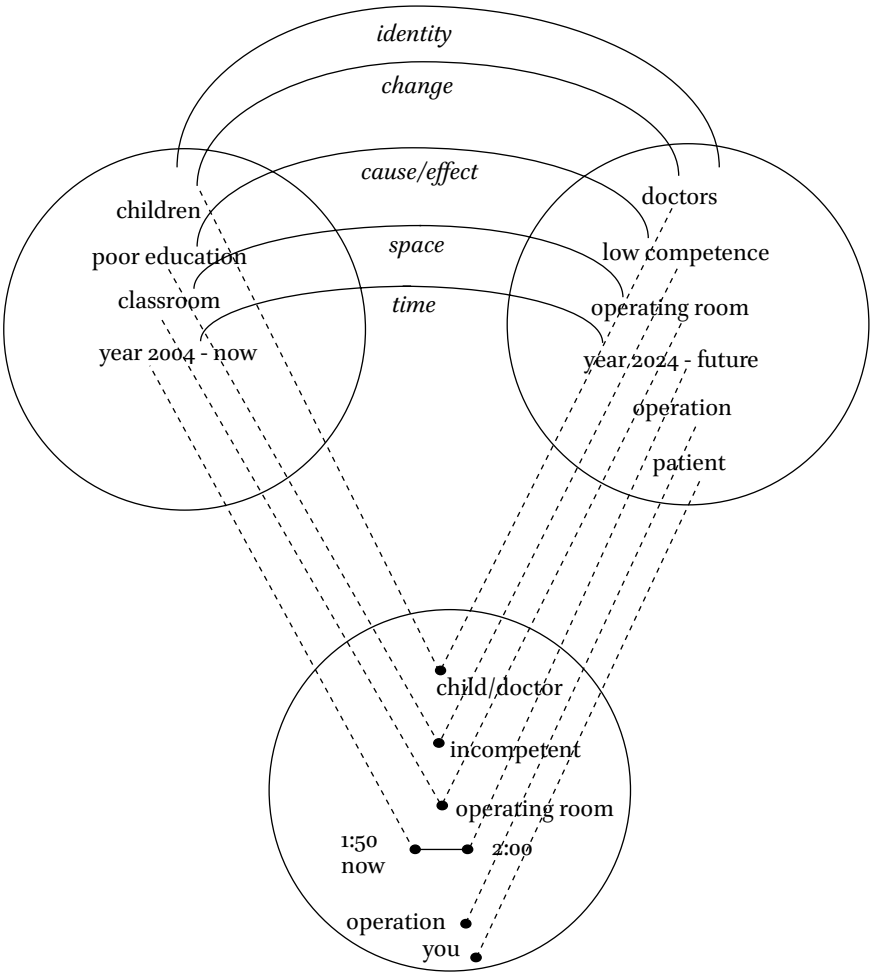

The debate with Kant
-thinker
-claims
musings
-mode of
expression
-language
-issue
-purpose
-time
GENERIC
Kant [k1]
claims
& musings
writing
German
reason
search for truth
1784
me [m2]
claims
& musings
speaking
English
cognitive
alive
search for truth
1996
Kant [k2]
m2 aware of k2
k2 not aware of m2
k
m
m debates with k
claims, counterclaims,
questions, answers, ...
speaking
English (same language)
cognition
INPUT 1
INPUT 2
search for truth
same time t m,
k, alive m aware of k
k aware of m
...
BLEND
Debate FRAME
rhetorical actions
agrees, retorts, challenges,
anticipates, concurs, reinforces,
questions and answers, ...
argumentation connectives,
affirmation and negation
but, however, therefore, on the
contrary, exactly, true enough,
not so fast, ...
yes, no, yes and no, ...

More examples: I will give you a certain number of examples here, because if you come to future lectures, it will be useful to really know how conceptual blending works, because I will be using it pretty often. This afternoon, I make a special effort to make sure that we are on the same wavelength, that we understand this idea of conceptual blending in the same way. And in the question period, you'll have many opportunities to clarify this even more.

Now this is another example that is partly linguistic and partly visual. It's an advertisement. It's a commercial advertisement. And on the advertisement, you see three little children. They are very cute. It's Joe, Katie, and Todd, very cute children. On your handout, you can read the text that corresponds, you have the text that is below the picture in the ad here. And then you have an operating table. This is a hospital and there is somebody on this operating table who is being operated. And guess who it is? It's you. You are the person looking at the picture. They will be performing your bypass. What does that mean? It seems incoherent at first. Little children do not perform operations. You are in good health. There is no reason you should need a bypass and if you need a bypass, you are not going to have little children perform it. So why? Why this ad? Well, this ad was an ad for education. Saying that in America, education was very poor, not good enough, and that we need money to make education better. And so the ad is soliciting donations. It's saying: "pick up your telephone and give money to the cause of education." And the idea here is if you don't do that, if you leave education as bad as it is, then the children with bad education today will become bad professionals twenty years from now.

So, for example, they will become bad doctors. And then in twenty years, you are the one who will need a bypass. You'll need the operation and you'll have these doctors who are incompetent. Of course the doctors in twenty years

will not be children. They will be adults like you and me. So you can see how this is a blend of children today with a bad education but very cute, and the adults that they will become tomorrow, the bad doctors who will be performing your operation. The power of this blend is that when you see the blend, instead of saying "oh, it's going to happen in the future, in twenty years, and who knows what'll happen in twenty years," suddenly, the blend makes the urgency of the situation immediate. You see yourself on the operating table and you understand that the children are incompetent, because children don't know how to operate. So it's a powerful ad in that sense. And from the way that it is constructed by the reader who reads the ad, but also, of course, by the people who devise the ad.



The way it is constructed is this. Let's do it first with the circles again. You have these diagrams on your handout, on page 16 of the book (page 5 of the current handout). And (here's) what you see when you decompress this. This is the blended space with the children doing your operation and over here you have the two inputs. One input is the children with bad education and the other input is later, twenty years later, they become doctors and they are incompetent and they don't know how to operate. So on this slide, you can see the correspondence between the two inputs. Poor education for the child corresponds to low competence later, twenty years later when they become doctors for example. The child of course changes into an adult doctor. So there is an identity connection as we saw this morning, but no similarity. The child is very different from the adult. And then we have CHANGE and PHYSICAL SPACE relations.

The year I put here, 2004, is when the ad was (supposedly)[1] published. You look at the ad in 2004 and then, of course later, when you have the operation, it's going to be 2024. So all of this is compressed into the blended space. And when you process the blended space, notice you do this very fast. Humans don't have to think about this. You don't have to think: "oh where is the input?, where is the projection?, and so on." We understand the ad instantly. We were leafing through the magazine and probably in ten seconds we can understand the point. Why? Because we are automatically doing the decompression of the blended space into the inputs, the generic and so on.

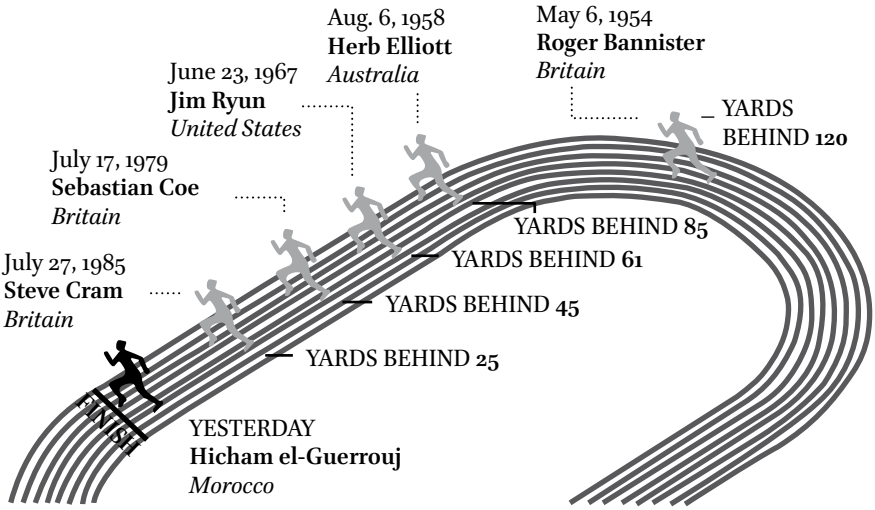
So this is in diagram mode. This is what you end up with: an input with children, another input with the same children who have become adult doctors, and then the blended space where you have children doctors botching up your operations, not succeeding in operating you, even though they are cute. And so you die. That's the consequence in the blended space, which is supposed to make you pick up your telephone and pledge money, give money, for education.

Here is another interesting example. This was published in the newspaper, the *New York Times*, in 1999, when el-Guerrouj, who is a runner … (these are runners; they are specialists of running the mile, the mile race) … has just broken the record, the world record of the mile. And so the newspaper published this picture where they put all the champions on the same track.
They put el-Guerrouj reaching the finish line. The blending puts in all the previous champions, the champion Cram from 1985 and the champion Coe from 1979 and so on, all the way back to Roger Bannister over here. So now, what

1 Ad was actually first published earlier.

happens is that you have a number of inputs which are all the races in which these six runners, the six phenomenal champions, won the race and broke the world record.

So this is six input spaces now. In each one of the races, they were phenomenal. When Roger Bannister over here broke the record, I was already alive then, not like most of you, and this was 1954, and he was the first person on earth to run under four minutes for that distance, for the mile. So this was considered a phenomenal achievement. And then of course other runners did even better in the years that followed, when the record was broken. But now in the blended space here, you put them all on the same track. You leave out all the runners that they beat. In the inputs they were of course the winners and other runners were behind. Here you leave out the other runners, you just put them, the champions, on the track.



World Record in the Mile

So that now, by pattern completion again, we look at the track, we see all the runners on the track and we say "oh they are racing against each other." So we have Bannister, Cram and el-Guerrouj all in the same race, like the boats [a little bit]. And, of course, in that race which is unreal, in that race which is in the blended space, you can see el-Guerrouj over here beating everybody and poor Bannister is left way way behind. The power of the blended space

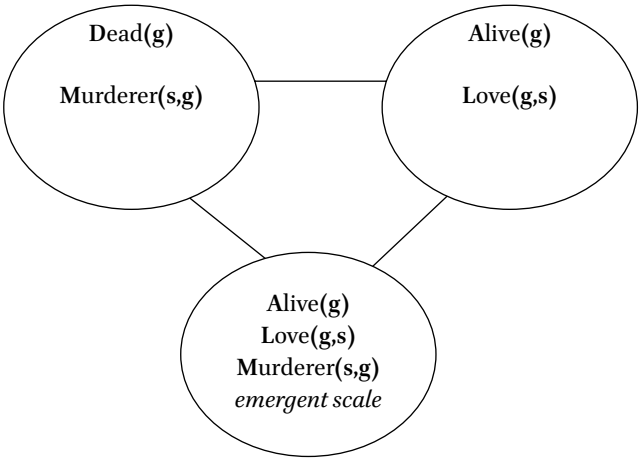
here is the following: if you just describe: "this guy ran in 3 minutes 55 seconds and this other one ran in 3 minutes 59 seconds," there will be a long list of figures; here, in the blended space, it's compressed into a human scale dynamic scene that we can apprehend directly. And that's because humans are good at blending and compression, but they also like to have things compressed into a human scale scene. The dinosaur, that one single motion to catch the bird, and here one single race even though these people of course could not have raced against each other because there was a big difference in time. So for the reader, this brings immediately, in a very vivid way, the realization that el-Guerrouj is much better than the other champions.

So we see this mixed race. That is the result of blending. You need the human capacity of conceptual blending here in order to understand that. Even if you had an organism that could read the picture, the literal meaning would come in and you would understand that as, "well, there are six runners on the track," and so on. So to understand it, you have to take this and you have to decompress it into all the different inputs, the six races, and understand that in each race, each one of these guys was actually the winner and a big hero. But in the blended space, they are not heroes; they've all been beaten by el-Guerrouj.

Now this morning we saw a few examples of counterfactuals, mental spaces where you build up something that is contrary to reality. For example, this morning, we had the Triple-A example: *If you had had Triple-A then you could have gone to a phone and found some help*. Conceptual blending allows you to build very diverse counterfactual spaces. Counterfactual spaces are in fact very different from the ones logicians considered with possible worlds. There was a good question this morning about possible worlds and whether mental spaces were like possible worlds. In looking at this kind of counterfactual you will see that the counterfactuals are not possible worlds at all and yet we have no trouble understanding them and processing them. Why? Because we can decompress them.

So here is the example you have on the screen and also on the handout on page 6, (that is 17 of the book). The background for understanding this piece of language, *If they were still alive, they would also plead for mercy for their grandson*, is a story of a teenager who killed his grandparents. He murdered his grandparents and he was found guilty by the trial jury. And now he is being sentenced. He is going to get a sentence of so many years in jail or worse. And the father of the boy is pleading with the judge and saying "please, please, judge, don't give him a harsh sentence, don't give him too harsh a sentence." And in order to make his plea, he says: "In fact the grandparents, if they were alive today, they love their grandson very much, and if they were alive today they would also plead for mercy for their grandson."

So you can see this is not a possible world, because the grandparents either are alive and then there is no murder and there is no sentencing, or they are dead, murdered by their grandson and in that case they cannot be pleading mercy for him. Right? But in the blended space no problem. In the blended space, you can bring in the grandparents from one input and you can bring in the murder from the other input. So here are schematically the two inputs. In one input, you have *g*, the grandparents, here and *s* the son, the teenage boy who killed the grandparents. So in that input you have the dead grandparents and the son who murdered the grandparents. The other input over here is the counterfactual input. This is the input where there was no murder. The grandparents are still alive and they love their grandson. In the blended space now, you use the counterfactual. You say: "if they were still alive," and then you bring in everything else that happens from the other input. So you bring in the fact that they were murdered and the fact that the teenager boy is about to be sentenced.



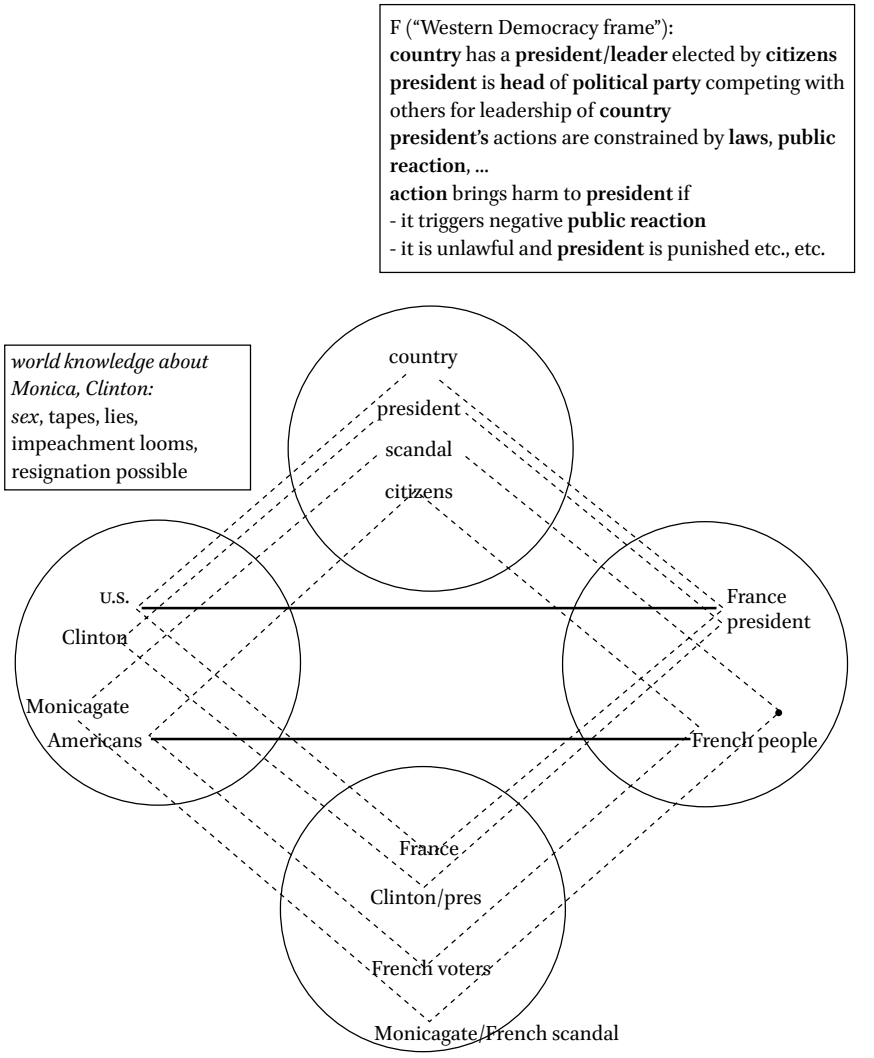
This was called the Zoloft murder case, by the way, because the attorney, the defense attorney for the boy, pleaded that the reason that he murdered his grandparents is because he was under the influence of the drug Zoloft. Zoloft is an antidepressant. So it was called the Zoloft murder. Now, we see in the blended space, the grandparents are alive and they love their grandson, but at the same time they are also murdered and we have an emergent structure where they are victims of the crime and yet willing to plead for mercy. Now the victim, in a way, has the most influence. The victim for any given crime is supposed to be the most angry. The victim would be the one who would demand

the harshest punishment for the criminal. So you bring in the grandparents. They are now at the top of scale. They are victims and therefore they would demand the harshest sentence and yet you run the blend and in the blend the grandparents plead for mercy. So the victim demands mercy which means that anybody else on the scale should of course also demand mercy, not be harsher than the victim themselves. You can see again the rhetorical power of the blended space. In the blended space the grandparents appear. They defend their grandson and their opinion is extremely important because they are the victims. But at the same time, of course, the blended space is impossible in reality because the grandparents are in fact not alive.

This is not an exceptional case at all. We can construct this kind of counterfactual blend all the time. Here is an example from abortion cases where abortion is discussed. And it's about a particular individual and it says here there was no freedom of choice for him as to whether he should be aborted or allowed to live. Had there been, he would have chosen, and he would not have chosen to be aborted. So you build a blended space in which even though at the time that the abortion might take place you have a small embryo or even a few cells or small fetus, you combine that with another input with a child who exists many years later. And then in the blended space the child can decide whether to be aborted or not. Again, as previously, you can see this is of course an impossible scene and yet we find it very persuasive. We say 'oh this individual was certainly not a child to be aborted'. Therefore, this is against abortion. You can use similar counterfactuals, of course, to militate in favor of abortion. It' not a matter of what side of the argument you are on. It's a matter of what kind of blend you can construct. My colleague Seana Coulson has studied the rhetoric of abortion, looking in detail at actual pieces of exchanges on radio, pieces of text, and so on. Regardless of whether people are arguing for abortion or against abortion, they use similar techniques. They use a lot of conceptual blending in order to make things more vivid.

Here is another case I'm going to show you, where you create a counterfactual that is very bizarre, but in fact you simply want to point to a disanalogy. So here is a sentence. *In France, Monicagate would not have done Clinton any harm.* Monicagate refers to the sexual scandal with president Clinton, Lewinsky and so on. You know, at the time, in the United States, there was a lot of political action, including the impeachment of president Clinton, who was actually impeached by the House of Representatives and the Senate saved him. So this kind of sentence is saying that (what it means to say is): "Oh, the French system and the American system are similar. They have a president. They have voters and everything. But the impact of a sex scandal would not be the same in one country and then in the other country. That is the intent of this particular

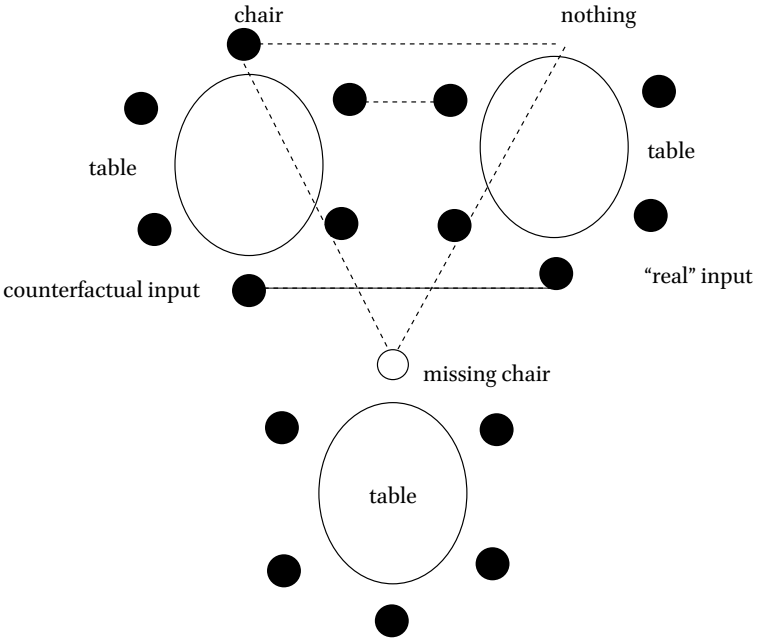
sentence. Well, how is that constructed? If we take it literally, it's meaningless. Because literally, of course, if Clinton had been in France, he would not be president of the US. And he would not be president of the French because he is American and couldn't be president of France. If Monicagate were happening to some other American president and Clinton was in France, then of course, it would not do him any harm.



So all that is beside the point of this particular sentence, right? The point of this particular sentence is actually (and again, I am sorry, the diagram is a little compressed, but I will give you a quick idea of what it's trying to say): In one input you have the US political system. And in the other input, you have the French political system. Lots of correspondence between the two. The generic space is the frame of a political system with a president, with people in the country, and with possible scandals and so on. Now, in order to construct the actual sentence *In France, Monicagate would not have done Clinton any harm*, you project from one input aspects of the Monica Lewinsky scandal. So you project Clinton and you project Monica Lewinsky, and you project the American people and so on. They all get projected here. But from the other input, you project France. You project the French mentality and the French kind of scandal. And so what you end up with is a blend of the two. This is now happening in France, but the president is very much like Clinton and he did things like Clinton. There may be a woman like Monica and so on. Right? And then you run the blend. You do the elaboration. Now in the blend, what happens is: in this French Monicagate nobody cares. Nobody cares about the sex life of the president and so there is no consequence. I am not saying that would be true by the way. I don't know what happens in France in this particular case. But someone who says that sentence says: "Well the Americans are more concerned about the sex life of their politicians than, let's say, the people in France. Not totally true, but maybe a little bit true.

Now, there are grammatical elements and morphemes inside languages and they are different from one language to the other. They build up some of these counterfactuals automatically so that you don't even think about it, but you are actually building a counterfactual. So here is an example, a very simple example of a linguistic way of making something out of nothing. The circles here are not mental spaces, they are tables. So you have a table and there are chairs around the table. If you think of a typical situation, you have a table and you have all the chairs around the table. Now you look at the particular table that you are interested in, the table in your dining room. And you say something like: *Put some flowers in front of the missing chair*.

Why? Because around that table you have five chairs and nothing at the top. There is no chair up on the top. So you are describing the position that's up there and you are describing it as "the missing chair." How can you do that? How can you call *a chair* something that is actually nothing? The reason is a very systematic way for language to build in the notion of zero. Actually this was a discovery in mathematics much much later. And here is how it works. You take the real situation like the table here with some chairs around the table. And then you have a norm active in your mind. You have a normative frame that is shared culturally. For example, the frame of a table with chairs



disposed at regular intervals around the table. Now, that input is counterfactual, because that's not how your table is. The table in your dining room is like this and not like that.

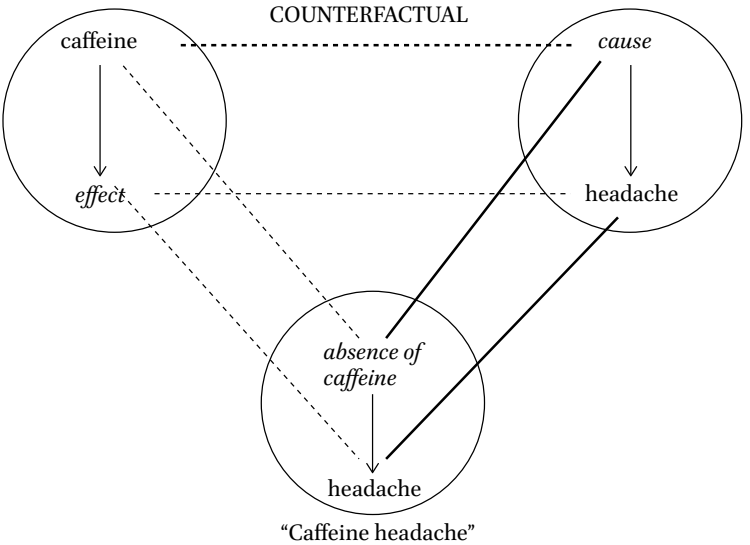
But this is the standard frame for a table and chairs. So you take both of them as inputs and you can put them into correspondence. You can do the matching of the tables, including the matching of the chair in the normative input and the position with nothing in the other input. And you bring that into a novel space, the blended space. You have all the actual chairs projected from here. From here you have the fact that there is nothing, but from the normative input you have the idea that there should be a chair there and that's why it gets called a chair. And the word *missing* serves explicitly to indicate this.

Notice that there are two readings for this particular sentence. "*There is the missing chair. Put flowers in front of the missing chair*." It could be that you really have a chair that goes there and that chair is in your closet. Or it could be is that you never had a chair there, but you would still call it a missing chair because of the normative comparison with the standard table with chairs all around. All these words in language, words like *nothing, absence, nobody, missing chair*, notice that they are all noun phrases. They all function as if they were something. Because the language does the integration and it's able to manipulate the absence as if it were something. So I can talk to you. I can look over here in the room and I can say: "Oh, here are all the missing students." And I can say:

"Well, you missing students, you must come tomorrow." I can say that, looking at the empty chairs. Of course, they won't hear me, but you will hear me. I could also do it if this is a regular classroom and I know who usually sits there. Then I know that Bob should be in that chair and Mary in the other chair. And I can say: "The absent students, Bob and Mary over there." I can point to them. And I can say: "they will have some kind of punishment for missing class."

And the notion of *zero* in mathematics is the same. You have numbers *one, two, three* and it took very long for the idea of creating an additional number *zero* that would represent absence. Now, language, furthermore, has interesting systematic ways of producing absence. So here, just by putting two nouns together, you create a blend that entails, that means, that something is not there. A caffeine headache can mean you have a strong headache. It can mean that because you have caffeine, because you drink too much coffee you have a headache. That is a possible reading. But it can also mean, for somebody who's used to drinking coffee all the time and suddenly you deprive the person of coffee, that they have no coffee and that creates a headache. And they say: "oh I have a caffeine headache."

So *caffeine headache* can be a headache because of absence of caffeine. And in the same way, a *money problem* is usually not a problem of having too much money. It's a problem of having no money. And a nicotine fit is a fit because you don't have your smoke and so on. A food emergency is an emergency because there is no food. So we can very systematically, with a very simple grammatical construction like that, create this kind of blend, the one I showed you with the missing chair. Namely (let's see if I have it here on the slide. Yes, here it is.):



"Caffeine headache"

So, for example with the caffeine headache, in one input you have the caffeine producing the effect of feeling good and being full of energy and so on. In the other input over here it's like the chair you didn't have. This is the real input. You didn't have the coffee, so there is nothing here, but there is a headache. So what's the cause of the headache? It's not something concrete, because you know you didn't drink something that gives you a headache. Actually, of course, the reason you have the headache is because normally you have coffee and this time you had nothing. So in the blend here we put the two together, the normal situation, which didn't happen this time, which is counterfactual but normal, and the actual situation. We bring them together and we find that the headache actually has a cause, absence of coffee. And the grammatical way of doing that is to call it a *caffeine headache* by putting the two together.

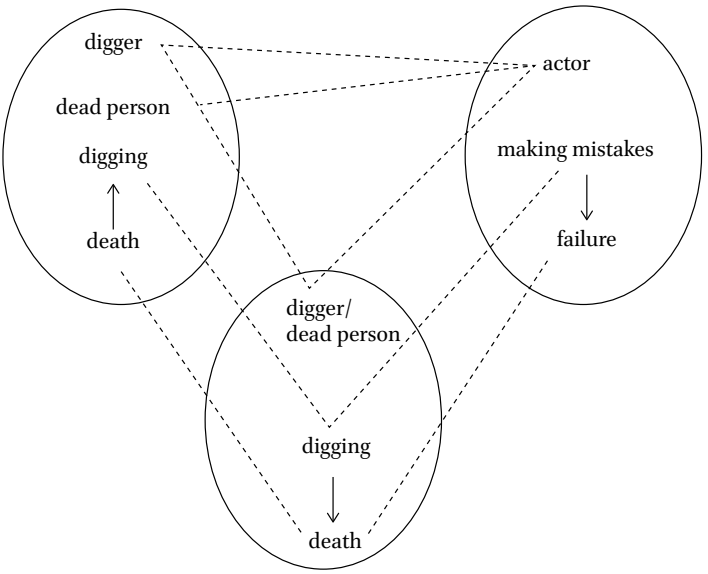
These are things you can see easily, but actually, conceptually, they are very complex, because when you put two things together, usually you expect to have some combination of the two. So you expect, you know, caffeine headache to be, well, coffee producing the headache. But in fact as in this case or *money problem*, it's the absence that produces them. And the only way we can think of absence as a real thing, as a real cause is because we can do the conceptual blending making nothing into something.

Now page 7, 18 of your handout, we go on to metaphor. And if you've studied metaphor in cognitive linguistics, I am sure you know that the initial description of metaphor was that you have projection from a source to a target domain. So for example, if you say *Love is a journey* as a metaphor and you say that *they were on the same path together* and suddenly they find themselves *on the rocks, hitting the rocks*, the journey has a sad ending. From the source domain of the metaphor, you have this idea of a real journey of a vehicle or a boat, people traveling together, and then that projects to the more abstract notion of love. And if, for example, the vehicle is damaged, or if the people leave the vehicle, they *go out* of the marriage. Then it projects to the abstract idea that they are not in love any more. So the fundamental view of metaphor was that you have a source domain that is usually pretty concrete like a *journey* and then you have a more abstract target domain like *love*, or *anger*, something that's harder to put your finger on. But when we look more, again in terms of these notions of mapping and integration, we find that actually things are more complex, that metaphors are usually conceptual blends. So they have more than just source and target. They also include a novel blended space with emergent structure.

Let me show you a couple of examples of that and we'll be close to the end. This is the example of *digging your own grave*. And you know that expression. "*You're digging your own grave*" means you are making a lot of mistakes; you are not aware of these mistakes, but in fact if you keep on acting the way you do,

making all these mistakes, you will fail or you will die. So it looks like there is a source domain of digging graves and dying, and then there is a target domain of making mistakes and failing. And that's partly true. But if we look at the actual inferential structure, we see that there isn't a transfer of the structure from the source to the target, because the causal structure and the frame structure, and the intentional structure are not the same. Why? Because in the domain of digging graves, what happens is first you die and then somebody else digs the grave, and puts you in the grave. The grave is not causing your death. It's your death that causes somebody to dig the grave.

If you are dead, you are not aware, you are not doing anything, you are not digging anything. And the person who is digging the grave is very much aware of digging the grave, so that person is not unaware of what they are doing. Also the order of the events are different, and the intentional structure, being aware and not being aware is different. So in fact they don't map onto each other. But if you think of it in terms of conceptual blending, then you can see that what's really happening is that you have part of the structure from digging graves being projected into the blended space, but the intentional and causal structure and frame structure are being projected from the other input. So in the blended space you end up with, actually, a very strange world, a world where you can dig graves without being aware, and if you dig your grave very deeply, you fall into the grave and you die. If you think about it, that is a strange world. But we build it with a blended space by projecting from both inputs, and the metaphor is totally easy to understand. Nobody says: "hey, that's illogical, that's not how you dig graves." Why? Because, again, it's happening in the blended space.

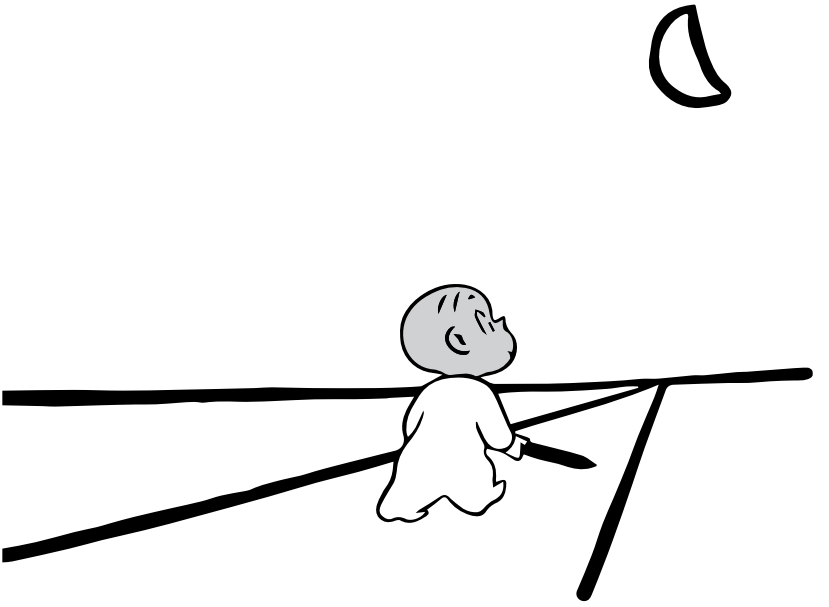


Another example with Clinton, the same Monica Lewinsky scandal. Clinton was actually getting more popular even though there was a big scandal. Everybody liked Clinton. And so people said: "*If Clinton were the Titanic, the iceberg would sink*." And what they meant by that, of course, was that Clinton was so strong that if you imagine Clinton as Titanic, then even the iceberg would sink. He can overcome anything. Well, again, this is a metaphor, because it's a metaphor based on the Titanic and the iceberg. But, of course, it's not projecting the structure of the Titanic and the iceberg, it's building a novel structure, a structure where the iceberg sinks, contrary to the logical physics event. And so what's happening is you build a blended space, you project the Titanic and the iceberg from this input over here; you project that into the blend. But the actual events—who is stronger—you project from the other input, so you end up in the blend with a Titanic that goes into the iceberg and sinks the iceberg. Again, very important to see is that even though it's a metaphor, it's not using the inferential structure of the metaphorical source in order to produce meaning, it's actually using inferences from the other input the "target" to produce meaning, but it's using the frame structure at human scale, {Titanic, iceberg, two objects}, in order to produce meaning.

This brings us back to the dinosaurs that I talked about at the beginning and the fact that there is a lot of compression going on and I will save that for tomorrow. The compression of the dinosaurs: what I will emphasize on that score is that you have very systematic compressions. Some relations get compressed into others in a systematic fashion. And furthermore, language does that routinely. We don't pay attention, but language has a built-in mechanism for doing this compression. So if I say: "my tax bill gets longer every year," or "gets bigger every year," I don't mean that there is a single piece of paper that magically stretches year after year. What I mean is that I have several tax bills and the one for each year is longer, bigger than the one before. Those tax bills are analogous to the dinosaurs. And they are compressed into a single tax bill.

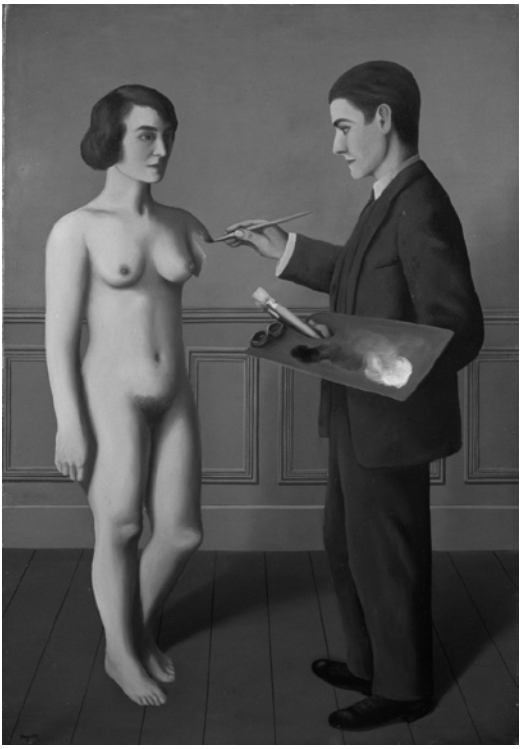
So the changes are exactly like the dinosaurs. Many many dinosaurs over evolution: we compress to a single changing dinosaur. And in this case, we compress all the many tax bills that I get into a single tax bill that changes through time. And language does this routinely. We learn that as children, and we don't even think twice about it. So that's the important message. Tomorrow I will elaborate greatly by talking to you (tomorrow morning) about causal compressions and the way that we have huge causal compressions that we're not even aware of at all. Language gives us a few little clues to do these compressions.

Here are just a couple more examples of compression and blending. This is a book for children also, and is called *Harold and the Purple Crayon*, and when the children see the book, Harold, the hero of the book (the character in the book) can draw in the book. But the important thing is he can draw whatever he wants to do. So for example, he wants to go for a walk, he draws a path and then he starts to walk on that path in the book. Here he is walking on the path that he draws himself.



And he set off on his walk, taking his bag
purple crayon with him

There is a compression between the representation on the one hand, and reality on the other. And they get compressed and in the book, two-year old, three-year old children can read that. And they have a lot of fun reading it. In other words, children, very young children, are able to do these compressions. Here is an example from art:



This is Magritte, and you can see it's called the *Attempt of the Impossible*. And this morning I was using examples of models and painters. And this is the case where the model and the representation have been compressed together. So the artist is simultaneously creating the model and creating the painting. Very acrobatic to do mentally, but completely impossible of course to do in terms of painting and art.

I will stop here and again have some questions if you are still awake.

LECTURE 3

Causal Compressions in Language and Thought

Good morning!

Thank you for coming this morning. I hope you had a good night's rest.

The topic this morning is causal compressions, and on your handout, that should be on page 20. Now take a look at the handout, and what you'll see in the abstract is that compression turns out to be a vital property of thinking. And language, for us linguists, turns out to be a fantastic instrument of compression. Now what does that mean? It's not compression as in let's say computer file compression, it's something a little bit different. It's a compression that takes advantage of the richness of our unconscious brain. And what language is able to do is to give us very structured forms, but that are very economical, that are very short, and yet are able to trigger in our minds vast expanses of causal reasoning, unconscious casual reasoning. We don't have to go through all the logical steps of the reasoning: they happen automatically in our minds and we just get the result. And so, we get the meaning of the corresponding language form.

If we think about it, this is a phenomenal property, the capacity for this compression, because the forms that are being used by language are actually very standard, very ordinary forms, and yet they can adapt to very specific situations and our minds can use the form in order to expand and create these vast networks of meaning that I have started talking to you about yesterday. So, today we'll delve more into this issue of causal compressions which I think is one of the most fascinating things that we've discovered. Not just causal compressions but actually compressions of other kinds as well.

I will start with an example for you. The first section is about long causal chains that get compressed, and I will start with an interesting example that

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 | DOI:10.1163/9789004360716_004

I heard myself. This is real data. This is not invented data, this is data that happens in the world, and it's very ordinary data, it has nothing fancy about it, nothing exotic about it.

So this particular sentence is the one I heard on the radio. And as you see, it says, *Martina is 3 points away from the airport*. Now if you try to get a literal reading of this in isolation, not knowing anything about the context, the sentence does not make any sense, because in English points are not a way to measure distance. You could be three miles from the airport, you could be three inches from the airport, but you can't be three points from the airport. And yet in the context where this sentence appeared on the radio, it was a perfectly idiomatic, unproblematic statement that everybody could understand. Well the context was actually a tennis match, and Martina is the famous tennis player, Martina Navratilova, and she was playing in the tennis match. And at that point in the sport broadcast, this is an announcer on the radio and he is telling us about the tennis match that's going on. This is a broadcast on the radio, so that we can follow the tennis match and the sportscaster is informing us that Martina is actually losing at that point, and that if she loses three more points in the tennis match, she is going to lose the match, and as a result of losing the match she is going to be eliminated from the tournament, and therefore she is going to have to go home. Because in the tennis tournament, when you lose the match it's finished. You are out of the competition. So if Martina loses, then she will have to go home. If she goes home, she is going to have to take the plane, so she is going to have to go to the airport.

So you understand now the meaning of the sentence in that particular context. It was saying that Martina was on the verge of losing, and that if she lost three more points, she would have to go home and go to the airport. Notice how compressed this sentence is. It doesn't tell you anything about tennis in itself, you don't know that it is about tennis. It doesn't tell you all the intermediate stages that you need to know. To understand this you need to know that when you are eliminated from the tournament, you have to go home—a lot of information that's in your brain. So what language does, not just in this example but in every sentence that you can imagine, is it takes advantage of all the very highly structured information that is already in your brain, because you are a human being with a very sophisticated brain and also you belong to a particular culture, where you know many thing unconsciously, many frames, many models, many idealized cognitive models And the language takes advantage of that, so that with this minimum number of words it can create in your mind a decompression when you reconstruct the entire causal chains.

Of course in order to do that you have to have the background information. If you know nothing about games and competitions and tennis, this will

make no sense. You hear it on the radio and you have no idea what it means. You might look for some other interpretation. You may think that this is funny, maybe they measure the distances in points. But if you are listening to the tennis match, then of course, you are knowledgeable about tennis, and you know a lot of things about competitions and being eliminated and so on. And therefore your mind automatically reconstructs everything that missing. And that's a big mystery when you think about it. Because you don't have explicit words to tell you to build this or that frame.

So let's look in a little more detail at what is going on when this happens. A literal reading would be a literal sentence. A different sentence from the one we started with would be something like *Martina is 3 feet away from the precipice*. A precipice is a big ravine, a cliff you can fall off of. Now if you are three feet away from the precipice, it doesn't mean you are going to fall, but it does mean that if you move three feet in that direction, then you will fall. So it can be a warning. You can say: "*Hey watch out Martina you are three feet from the precipice*." You know you are going to fall. That is purely a spatial interpretation, it's an interpretation in physical space. You are measuring the distance in feet, and you are pointing out the danger of falling over the cliff.

Now in the second sentence *Martina is 3 points away from the end of the match*, we see a metaphor of event structure. Yesterday, one of the participants brought out the issue of event structure, and here is a case where metaphor is used to inform us about the event structure. The events of: Martina plays this game, Martina plays this point and then Martina loses. All those are possible events in the tennis match, and they are structured with a source domain, a metaphorical source domain of space, so the events are along a line and they follow each other. There is one after the other, they are ordered events in physical space but of course that's a metaphor.

So losing a match turns out to be the event that would follow if Martina lost the next three points: then she would lose the match. There would be: she loses one point, she loses the second point, she loses the third point, she loses the match. That's the chain of the events. But then if she loses the match, because of the rules of the tennis tournament, she will be eliminated from the tournament. That's not necessary, that depends on the rules. With other rules, it might be a round robin competition, where you will not be eliminated, where you have another chance to catch up. But in this standard tennis tournament format, she would be eliminated. And so this is what we find as a metaphorical structure of events. In order to understand it, we have to know the tennis ICM. What is an ICM? An ICM is what George Lakoff introduced in his book *Women, Fire, and Dangerous Things*, Idealized Cognitive Models. These are like what we talked about a little bit yesterday: they are like frames, but they have

additional inferential structure, in addition to frames. And they fit cultural models in a certain way.

They are very simple, so here the tennis model contains a lot of information about tennis. And in particular, it allows us, this tennis Idealized Cognitive Model allows us, to understand the causal chain: if you lose three points, you'll lose the second set, and in women's matches there are only three sets. If you lose the second set, you lose the match. If you lose the match, then you'll be eliminated from the tournament. So here is the causal chain that is not mentioned in the initial sentence when it says: "she is three points from the airport." It doesn't tell you all that. All that is information structure that you retrieve from your brain, because you've already got it, because you've already learned very complex things, fairly complex things let's say, about tennis.

So, you need the tennis ICM. But the tennis ICM does not contain the airport, the airport is not a part of playing tennis, you don't play tennis in the airport. So, how do you get the airport in the sentence? Well, you need some more ICMs. So, you need a general competition ICM. Even if you don't know much about tennis, even if you don't know anything about tennis, you might have the sport competition ICM, where you know that if you win, and if you continue winning, and then if you win the very last match, then you are the champion, then you get the congratulations, the prize money, the award, whatever. This is knowledge that you have about many sports competitions structured by that ICM, and tennis is just a sub-case of that.

And then the ICM introduces two alternative paths, two alternative situations. Either you win, win, win, and then you are the champion, or you lose at some point, and then whatever the point, even if it's the semi-final, you are out of the tournament, and you have to go home. You don't really have to go home; you might stay and watch the others, but very often, you are really dejected at having lost, you just go home. So, in the simplified model, you go home, because you have been eliminated. This provides the causal compression for *Martina is three points away from going home*, because now we have three points, and then she loses the set, she loses the match, and therefore she is out of the tournament, and therefore she goes home, because we have the two ICMs.

Still, there is still no airport in there. So, how do we get the airport? Well, using another ICM that has nothing to with tennis, with competition, it's a very common ICM, but still one we have to know, that one way to get home, if you are far from home, is to fly in an airplane. Very simple, but again we know that as humans, but a snake, a lizard, a mouse, or a chimpanzee, does not know that. We know that, so we have the ICM of going home. And here, it is one scenario, of course. There are many ways of going home, but one very typical

standard scenario is you leave by plane. Now that's the event here: going to the airport and flying. But in the sentence that we had, it didn't say she is three points away from flying, it said she is three points away from the airport, which is a physical spot, a physical place. So, how do we go from the event to the place? Well, you are all cognitive linguists, so you know that's metonymy.

You can have a place stand for the event. And in fact, in the same book, George Lakoff has a chapter, (I think it's chapter seven I'm not sure, six or seven, of the book *Women, Fire and Dangerous Things*), he has a nice chapter on metonymic models. And he points out that in metonymic models, you can often use the initial part of the traveling scenario, in order to evoke the entire travel scenario. So, for example, if somebody says: *How did you get to Beijing?* And if you answer: *I took my car*, it means you have a car, but it also just takes the initial part of the scenario when you took your car. It doesn't mention all the rest: turning the key, pressing the accelerator, driving off, driving on the road, stopping for lunch, and all that. It doesn't mention it, it just says: *I took my car*. And then, because of our cultural knowledge of the metonymic model, from "I took my car," we reconstruct the entire travel scenario of how you drove. You can even trigger the scenario with just the pre-condition. *How did you get to Beijing? Oh, I have a car*. Then people assume, if you answer that, that you mean that you have a car and you used the car in order to get to Beijing. Of course, that could be wrong, you could be saying that, "I have a car, but in fact, I took the plane." So it doesn't have to be like that, but if you just say "I have a car," then the brain will reconstruct the entire scenario, because we already know that it is just a standard scenario. Now when George Lakoff pointed it out in that chapter, on metonymical models, he pointed out an interesting feature: that you can use the beginning parts of the scenario, but not the end part. So, if somebody says: *How did you get to Beijing?* And you say: *Oh, I parked in front of the lecture hall*. That's that's not a good answer. And yet in: *How did you get to Beijing? Oh, I parked in front of the lecture hall*, from the information "I parked," people can deduce that you had a car and then you drove by car. So it would be easy to deduce that you have a car, and yet this is not a normal way of answering the question, because it would answer using only the very last part of the travel scenario.

So there is an additional principle here that Lakoff points out, which is that in order to trigger the entire metonymic model, you have to use early parts of the scenario, not the latter part, even though logically either one would give you the information that you need. So here we can apply Lakoff's idea to the example with Martina. Because there is now a scenario of going home, there is another ICM of going home which is also a metonymic model in the sense of Lakoff. Namely, you go to the airport, and then you get into the line, you show your boarding pass, and there are many events that we know if we reconstruct

all the events: you go through customs, maybe you show your boarding pass, you get onto the airplane, and you sit in your seat, and then you put on your seat-belt, many very boring events. If I start telling you all of them, you will fall asleep immediately, because, why? Because you already know the scenario. In this case then, by saying "go to the airport," we trigger the entire metonymic model of flying home. Because we take the early part of the scenario, namely the airport. And then the place where we go, the airport, becomes itself a metonymy for the event of going to the airport. So, instead of "going to the airport," we can just say "the airport." Just as you could say in very similar circumstances, if you are leaving by bus, and you are ready to go home, leaving from this conference, for example, you will start walking and you would say: *Oh, I am close to the bus station now*. And people would understand that that means you are close to your point of departure, therefore you are close to the event of departure, because the bus station is not far.

So now we are using the metonymic model, and using the conceptual metonymy of "the airport" standing for "going to the airport." We have: "Martina at the airport" entails, implies, "Martina is going home." So, we have the complete chain of the events. For the entire sentence, the one we started out with: *Martina is 3 points away from the airport*. Notice everything our mind had to do in order to retrieve the right meaning. It had to access all the ICMs, the idealized cognitive models of tennis, of competition, of going home, of traveling by plane. All those were accessed, they were put together, they were used with metonymy, double metonymy, and they produced this very long causal chain. The crucial thing to remember here is something traditional linguistics has never even noticed, really. And of course it's something people don't know, everyday people in the street. They think that language contains all the information about meaning that you need. They think that if you say something, it has the meaning, and that's how you know how to interpret it. But in fact, most of the meaning is really already in your brain, and what language is really doing is not so much giving you a meaning in a package, but it's triggering the right operations in your brain that will produce this very expansive meaning, expansive with an 'a', in the sense of large.

So, this is what you see in this short example: the successive mental leaps are not coded in the output signal. The output signal that we get, *Martina is 3 points away from the airport*, tells us nothing about the ICM's. And indeed if we don't have these ICM's, if we know the language, but we live in a totally different culture, that doesn't have the airport, doesn't have competitions, then we won't understand the sentence. There was tennis already in 1880, but when people started playing tennis in 1880, you couldn't have used this kind of sentence, you couldn't have said "Martina is 3 points from the airport." There was also the airport, let's say in the 1900s, when they had their first plane. They had

airports, they had tennis, but they were not related at all, because tennis players did not fly home in an airplane, because there were no passenger airplanes at the time. So, somebody at that time could not in any way have understood this particular sentence.

We understand it because we have the particular ICM. That's not a surprise. We all know that we need context and background information in order to make sense of language. What is a surprise however is how economical the sentence itself is, the fact that it does not itself contain all this rich frame and ICM information. That is, language is extremely well designed, not by any special designer, but it turns out to be extremely well designed in being able, in this very compressed form, to trigger this long causal chain. I am sorry to insist so much on this point, but I insist on it because it's not something, unfortunately, that's recognized by traditional linguistics at all. And yet it's extremely important.

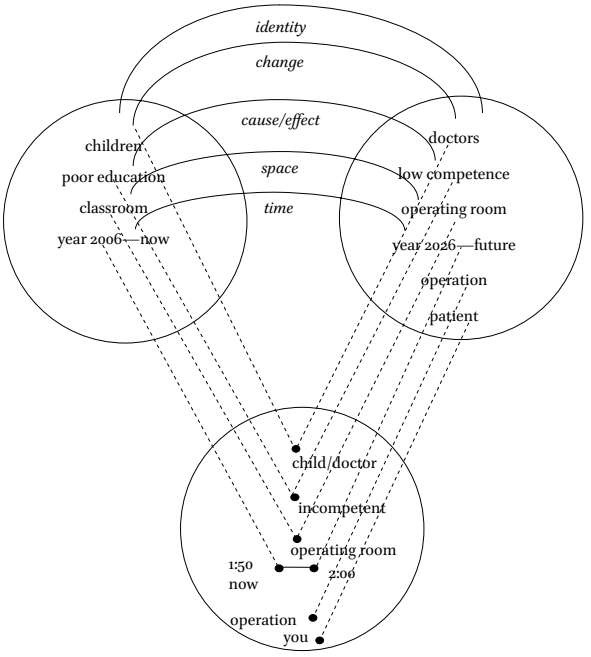
Again, a last remark on this particular piece of data, this particular example. There is no cognitive effort involved in understanding this in context. So, you are listening to the radio, and the sportscaster says: *Martina is 3 points away from the airport*. Then he goes on, he says other things about the tennis match. This goes by very fast, eight words. It takes, maybe a few seconds, maximum, for this to be processed in our head, which means no effort. We don't say: "Oh, what is the ICM that I need to understand this?" We have no conscious effort; it's very easy.

So, again this is a very important feature of language and thought. Most of our thought involves actually very elaborate reconstructions, but they are not complex at the conscious level. They do not trigger cognitive effort. Now those of you who do psycholinguistics should bear that in mind, because when you study psycholinguistics, you study usually behavior that is related to explicit words in the sentence. And then you could measure cognitive effort, for example with reaction time or with evoked potentials, (event related potentials—you put electrodes on the head, and then you see the brain waves). Now typically those brain waves will measure in an interesting way what happens when you come upon a strange word, an abnormal word, or something. But they will not measure the complexity of something that is going on unconsciously and very easily.

So, the mind does these things very easily. 'Complexity' should not mean that there is any effort on the part of the conscious brain when this goes through the brain. For the same reason that vision does not demand any big effort for us: we open our eyes and we see. In fact, of course, when we see, in our brain there are very complex operations are going on from one part of the brain to the other. But consciously we don't feel it. Well, the same thing is true for language also. At this higher level than vision, we still have effortless complex cognition, backstage cognition as I called it yesterday, backstage cognition that is

responsible for doing all this. Well, in cognitive linguistics it is a challenge, it is a research program to understand how language can do this, how it is possible to have these compressed language forms trigger these very big causal chains.

So, let me go on, there are other examples to compare with, that I will come back to maybe in the question period. But I will move along now to talk to you about causal compressions in blends. Yesterday afternoon we started looking at what we called integration networks, with different inputs, generic spaces, and blended spaces. And these conceptual integrations are part of language and thought, and they are a very powerful tool of compression. So, for example, the picture that we talked about yesterday afternoon, the picture of the children, contains many compressions. And I will just mention causal compression because that's what I am talking about today. It contains many other compressions as well. But it contains a causal compression in the following way. In the inputs—remember those are the inputs, one is education, and a child with poor education, and so on, and then over here, you have the result, much later on, twenty years later: you have bad doctors and incompetent adults. So, there is a cause, way up there. The poor education is the cause of the low competence and it's a cause over a long number of years, over maybe fifteen or twenty years. 'Poor education now' means 'later bad doctor,' and of course it also means, in the picture, he will do your bypass and you will die. That's another effect of this cause.

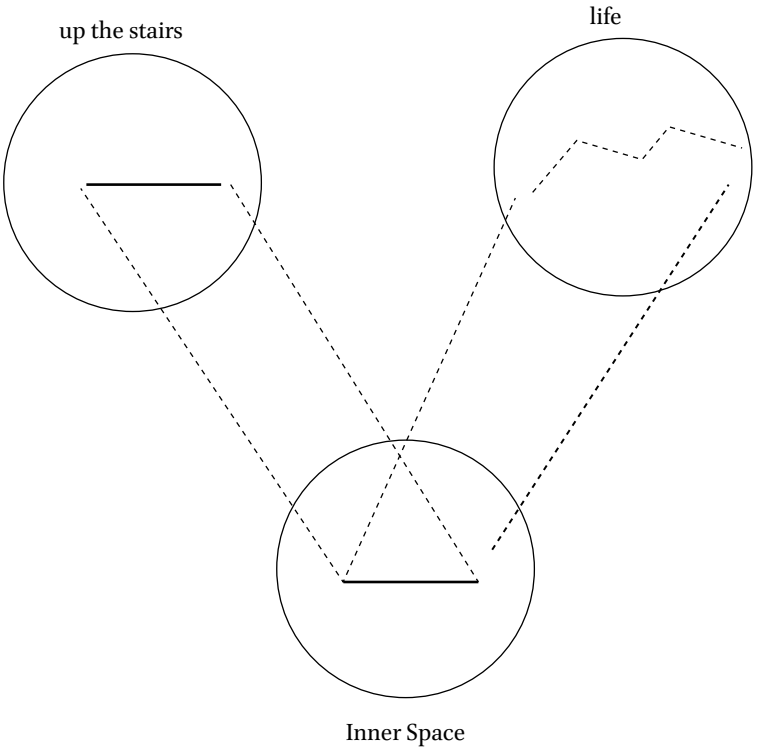


Now in the blend which is represented here in the picture, the cause, bad education, and the effect, bad doctor, have been merged. So, you have now a unique causal effect, which is 'the children have bad education, and they are bad doctors.' So, in the blend it is the same thing to have a bad education, and to have the bad competence as a doctor. Do you see what I am saying? In the blend, time has been compressed: instead of twenty years, you have now zero years; you have the children, and they are operating right away. So, time has been compressed. As a result cause-effect has also been compressed, and so the bad education of the children is directly in the blend their bad performance as doctors.

Let's look at some other kinds of examples. There is a wide diversity of fascinating causal compressions, and I will use an example from Eve Sweetser now. Eve Sweetser analyses some rituals, rituals in life, and we all have many rituals including in universities, in education, for example getting your degree, going up to the stage, and somebody gives you your diploma, and so on. These are all rituals, and of course there is religious ritual, and there are other cultural rituals. Rituals are very important in human life.

So, here is one example of a simple ritual in an Italian town, where the baby is born, and in order for the baby to have a good life, you have the ritual of people getting together, and somebody, maybe the godfather of the baby, takes up the baby, and carries the baby up the stairs from the ground floor to the top floor. And the stairs stand for the child's life. The event of going up the stairs, which takes maybe fifteen or twenty seconds—it's fast (or maybe a little more), that stands for the entire life of the baby. So, the bottom of the stairs is 'the baby is born,' and the top of the stairs is 'the end of the life of the baby.' And when you perform this ritual, you carry the baby up the stairs: it's important, for example, not to fall, or even to stumble. Because that would be a bad omen, right?

I was visiting the Forbidden City and also the Temple of Heaven. They explain some of the rituals, and they have the same comment in the explanation: that if the ritual was performed badly, wrongly, if there were any mistakes in the ritual, that would be a bad omen for the future, a bad harvest. The ritual has to be executed very cleanly. So, in the case of the stairs, this is actually emergent structure in the ritual. Here is how this is organized as a blend. You have one input up here. This is the input of going up the stairs, in general. You go up the stairs many times, maybe two or three times every day or more. And you can carry the baby up the stairs, and even if you stumble, as long as the baby doesn't really fall, if you stumble, if you go too fast, or something, it doesn't matter.



But in the ritual, of course, it does matter. So, the input that you've got here is not the ritual, this is just the input of ordinary climbing stairs. Over here, the other input is in the imagination; this is the input of the life of the baby in the future, what the life is going to be. We don't know, of course, what the life will actually contain, but we know that the baby will have a life. And we can now do the mapping. Remember yesterday: in blends you do a matching across spaces mapping between one input and the other input. So, here you map the bottom of the stairs, and map it onto the beginning of the baby's life, and the top of the stairs is mapped onto the end of the baby's life. Now we project into a new blended space, and the new blended space is the space where you have the ritual, because in that space you climb stairs, but climbing stairs is the baby's life.

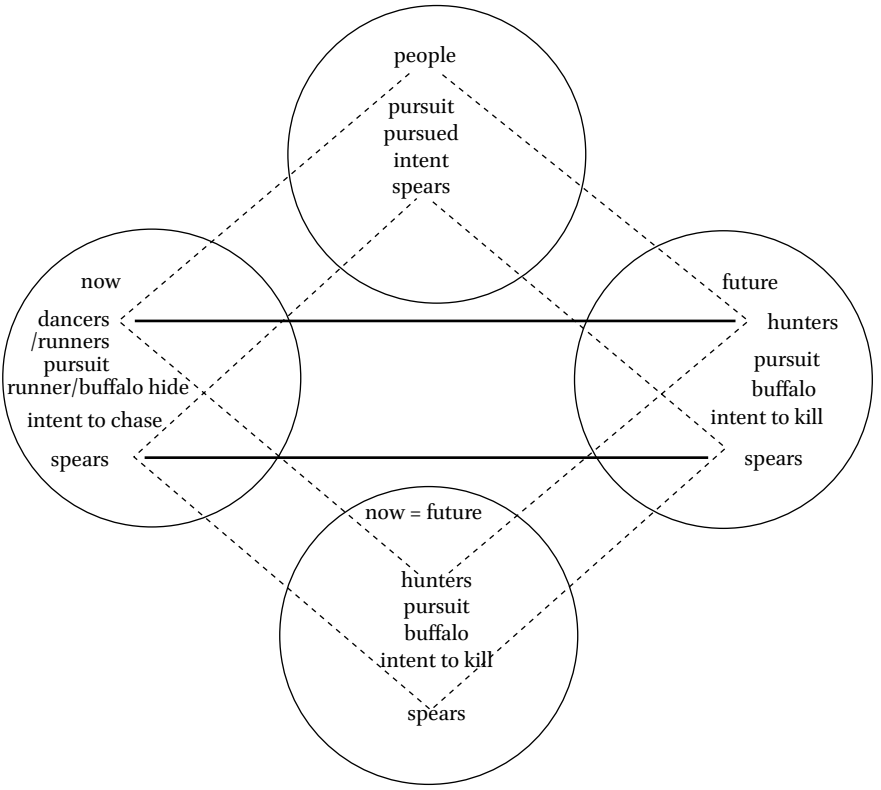
So, now of course, there are very important consequences. For example, if you climb too fast, if you climb the stairs, you know, two steps at a time, very fast, this is bad, because you get to the top early, and the implication is the baby's life is going to be short, right? And the baby is going to die young. So, you have to go up the stairs slowly to ensure that the baby has a long life. In the

same way, as I said before, stumbling is going to be mapped onto difficulties, trouble, in the baby's life. So, to ensure a good life for the baby, you must walk up the stairs in a very secure, conscious, and dignified manner. And so on: you can imagine emergent implications in the ritual. So the ritual's space has the structure of the stairs input, it's the same structure, but it has a lot of the content of the life input, because it represents the life of the baby. And so, again in a case like this, you have the cause and the effect being compressed, because over here you have the climbing of the stairs, that's taking place, and on the other side, you have the life.

So in the time when the ritual is performed, let's say when the baby is born, somebody was climbing the stairs, and then if it was badly done, there would be bad consequences, and if it was well done, there would be good consequences. In other words, there would be a cause-effect relationship between the climbing of the stairs and the baby's life. But again this would be a long term cause-effect relationship. Let's say you stumble on step seven, and maybe that has the consequence that when he or she is a twenty-five-year-old person, then he or she has an illness, for example. So, the cause of the bad performance of the ritual has an effect many years later. But in the ritual space, the effect is immediate: the effect is fused with the cause, because stumbling on the step is the same thing as a bad event in the baby's life. So they've been compressed.

Here is another example from Eve Sweetser. This is a slightly more complex example, but also with rituals, and it has to do with hunting buffalos. This is an ancient custom, but fairly recent in North America. Native Americans, the Indians, they go and hunt buffalos. Now, when they are over here, this input is the actual hunt when you hunt the buffalos, and you have hunters, and they have spears, and they want to kill the buffalos. This is the actual hunting the buffalos. And the ritual takes place before the buffalo hunt, in order to ensure that the hunting is going to be successful, and one of the hunters has a buffalo head, and the other hunters have their spears, and they execute a dance, and the dance mimics the hunt in some way, it has some analogy to the hunt. But of course, it takes place in a very short period. And as before, the hunt has to be executed in the right way in order to ensure that the buffalo hunt is going to be successful.

So, it's very much like the baby in the stairs or like the Temple of Heaven ritual. Namely there is a cause: good execution of the ritual. And there is an effect later which is whether the hunt is going to be successful or not, and in the ritual space those are merged, so that, in the ritual space, there really is a buffalo here: the buffalo over here is the man with the head of a buffalo. Over here, this is the buffalo in the ritual. It represents of course the real buffalo in the hunt. And so if something goes wrong, then that's something that happens



to the hunt, and therefore, the cause-effect here, which is distant, in the ritual has been merged into a single thing. It's a unique thing.

Let's look at some other cases, because there is a variety. They don't look the same, but they all have this very fundamental, very crucial, property, without which we would not have language at all. They have this crucial property of massively compressing causality. So, here is an example about some politician. This is a situation where in congress, or in parliament, in the assembly of representatives or members of parliament, they are voting on a bill, and a politician vetoes the bill. A president, let's say, vetoes the bill. Veto means that even though the bill is voted, he has the right to cancel the bill. Now the bill was a foreign aid bill. It was a bill that would provide some money to give to foreign countries, especially foreign countries that are poor, so that in those countries, the money could help, for example, with problems of food (the food emergency that we talked about yesterday, in the context of counterfactuals). And therefore, that money could be used to help children, who are famished, starving. As a result, in that context, if the politician vetoes the bill, somebody

else—his opponent—can say: "that guy, that horrible guy, is snatching the food out of the mouths of starving children".

This is a perfectly acceptable way, in fact a strong rhetorical way, of attacking the politician. Nobody complains and says: "oh, but he didn't really take the food from the children". Notice also as an important point of linguistics: this is not a metaphor. We are not using another domain to talk about vetoing bills. This is the same domain: the children who are going to maybe starve, not have food. But it's a massive compression. You are taking a long of string of events. And you can look at your handout here. I actually wrote down on page 25 of the handout the long causal sequences. Just like in the Martina example. I won't read them all; you can read them on the handout. And of these long causal sequences, I will read one, "the veto leads to no foreign aid, leads to no money to buy and transport food, leads to food not transported to needy children, leads to children not eating the food, leads to the children starving. So, a long, long causal sequence.

Now that input, the input of the politician doing something that has results, is mapped onto a human scale input, a different input: taking food from children. This is an action with only two participants, not many politicians, many food transports, and many customs officers. Just two people, the child and the nasty person who takes the food from the child. That human scale is something we can all understand. It's bad to take food from children. So, we have a blend now that is based on the cross-space mapping between the simple scenario of taking food from the child and the complex scenario of vetoing the bill that would have given foreign aid, blaa, blaa, blaa…. And of course the politician is mapped onto the bad guy who snatches, the food snatcher. And all the children and all the people who could have been helped by the bill are mapped onto a single child or two children from whom he is taking the food.

This is again a massive causal compression. Instead of giving (what's on the handout) all the consequences and saying: "if you do this, you veto the bill blaa, blaa, blaa … here is what happens, one two three four five six, 265 children don't have food, you compress with the blend into a single scene: snatching food from the child. Now, of course, in the input that you use, a regular scene of somebody taking food from the children has no other implication. But in the blend, taking food from the child is vetoing the bill. So, it's a political action, and of course it's a very bad and reprehensible action, right?

These are fascinating compressions, because if you think about it, they have not been noticed in the past. They are not metaphors, they are not metonymies, they are nothing; nobody has noticed that this was going on. But in fact, they are as powerful as metaphors, or as anything else, in order to give us a very long and detailed meaning in a very short form and a very understandable

form. So the brain has to be able when hearing this, "he is snatching the food," the brain has to be able to say, "oh, this is not a literal interpretation, he is not really taking food, this is a blend, a blended space, I am going to decompress it, and I am going to understand that when I decompress, what I get is a long causal sequence, which leads to a bad result. So, the politician's action leads to a very bad result, therefore the politician is wrong, and should be attacked for vetoing the bill."

The economy of language here is fabulous, but how can language be so economical? Because it's using scenarios that you already have in your brain, that's important, but it's also using your capacity as human beings to do the blending and compression, and then to do the un-blending, the de-compressions. That's how language in cases like that is able to work in this very tight economical and visual way: you can almost see the person taking the food.

Here is one more, it's also on your handout, and it dates back to the second world war in 1942 in England. And notice what it says. It says: "When you ride alone, you ride with Hitler!" And it says: "Join a car-sharing club today!" Now, literally, this is bizarre: there is a kind of phantom, a kind of ghost of Hitler in the car with you. So what could this possibly mean? Why would riding alone mean that Hitler is with you? In fact, if you are alone, there can't be anybody with you, so there can't be Hitler or anybody else, right? So, what does this mean? Well, the context is crucial in order to re-construct the causal chain, but people who saw that poster could immediately reconstruct the causal chain. They had no cognitive effort. Why? Because they knew at the time, during the war, that gas was very precious. Gasoline, you know, petroleum, is a very precious commodity, and therefore you wanted to save the gas as much as you could for the country, for the war effort of the country, in order to be able to fight Germany. In this case, it was England fighting Germany.

So, the logic of the ad was: if you ride alone instead of having other people with you, instead of car pooling or car-sharing, if you are not sharing your car, you are spending too much gas, you are taking that gas away from the war effort, that's an advantage for Germany, automatically it's an advantage for Hitler who is the leader of Germany, right? So, you are helping Hitler. Ok, but helping Hitler is not the same as having Hitler in your car, that's different. But with the blend, what they are able to do here is to take as one input the simple scenario of 'either you ride alone or you help somebody.' If you have somebody in your car, you help them in transportation. And then in the other input, the complex input, you have this long causal sequence of 'you ride alone, you are not saving the gas, the country is spending more gas, and so on; because of people like you, then Hitler is at an advantage.' Notice of course that, it's not a single person who will do that, it's not because one person would ride alone that suddenly Germany would win the war. So, the single person that they are pointing at really stands for all the people in the country who ride alone, because that number of people creates a lack of petroleum or gasoline.

So here are the two inputs for the blend. One is the simple idea, 'either I help somebody, or I don't help, I can help them by giving them a ride in my car.' That's one input. And the other input is the complex input of riding alone and therefore spending too much gas, and therefore hurting the war effort of England, and therefore advantaging Germany, and therefore helping Hitler. Now you map the two onto each other; you have the person helping somebody, and in the other input, it's the driver in the car who is helping Hitler. So, now in the blend, of course, you take the structure from the input of driving cars and giving rides, and in the blend, helping Hitler is having Hitler in your car, and that's why you find Hitler in the car, in the blended space, and you have

a very simple direct visual scenario, which is 'either you help Hitler or you don't.' This is an emergent structure in the blended space: if you have other people in your car with you, then, notice, Hitler cannot get in. There is no room for Hitler any more.

So, in the simple scenario of giving rides and car-sharing there is a logic of its own, which is actually very different from the logic in the other input, the one about saving gas and the war effort. In the blend they have a very nice combination here. That explains why either you help Hitler, he finds, his ghost finds, room in your car, or you have people in the car with you, there is no room for Hitler, and you don't help Hitler.

Now there is, again, no cognitive effort in the right context. People see that, and poof, no problem. I actually learned after finding this ad, that there was a new book out in America, that said: "if you ride alone, you ride with Osama bin Laden." So, they have taken the very same idea, 'save gas or if you don't save gas you are harming the country,' and it's an advantage this time not for Hitler but for Osama bin Laden. So, you can see you can recycle this blend. The first is very inventive, but you can use the same one not so creatively in another context.

That's the chain of the events, that I point to on one screen or the other screen, it doesn't matter, but this is the chain of the events that is getting compressed. It's even more complex than what I just said, because actually in both inputs you have two counterfactuals that are also brought in, the counterfactual of two alternative scenarios: either you ride alone or you don't ride alone, and either you consume gas or you don't consume gas. So, it has an even more complex structure. But I want to emphasize again that what's going on here in the brain, in order to be able to understand in two seconds this kind of ad, is actually extremely elaborate. And it is not indicated—this is important again, for us linguists—it is not indicated explicitly by the language. The language says: "When you ride alone, you ride with Hitler." And that in itself makes no sense at all. So, the only way you can help the complex meaning emerge is to decompress the blends and to retrieve all the other spaces that are missing. And the language is not directly telling you how to do that. This is something that you do with the clue from language, but you do that because you have the blending capacity and you have, of course, the cultural knowledge in order to do it.

Now, I will go on to examples that are equally easy to understand but even more spectacular in a way, in what you have to construct in order to get the right meaning. This is an example I am taking from work by Esther Pascual and Seana Coulson. And I have expanded the blending analysis that they give, but they have the example and they point out that is a very interesting example of complex blending. If you look at the handout, you'll see the context for this. And in a nutshell, the context is that this man Steve who is talking, who says

"Would I kill my daughter so I could walk again?", this man is paralyzed, he cannot walk. If you read that, again it does not make much sense. He cannot walk, he has a daughter, why would killing a daughter, how would killing a daughter, cure his paralysis? It doesn't make sense. But now in order to understand what he is really saying, you have to do a lot of decompressions. First you have to know the background and the context, and the background in this case is about abortion and embryos and stem-cells. And so, the discussion is among people who are asking: "Should we use stem cells in order to cure, for example, some serious illnesses? Stem-cells taken from embryos." Now, of course, there are many positions on this. There are people who say it's not a problem, the embryo is only a few cells, it's not a human being, and there are many embryos that are frozen anyway, and they're going to get thrown away, so we can use them for stem-cells.

Other people have a different view, and Steve is one of those people, who thinks that as soon as you have the embryo, you have a human being, and therefore, you cannot touch that embryo, and you cannot take the stem cells from the embryo. So, his reasoning goes like this: Steve is paralyzed, he cannot walk, but also he did something novel with his wife—they adopted an embryo, which means that there was a frozen embryo: this is a procedure that is apparently possible with some hospitals. You go and they give you an embryo from another couple. Embryos that were saved, that were frozen and were saved for fertility treatments. And so, when they give the embryo, he calls this (we'll see why) 'adopting the embryo,' and the embryo, in this case, was carried to term by his wife, so that they had the child, and, (I think that was the case), the child became a little girl, Zara. And so what he is saying here is: "If I use a stem-cell from an embryo to cure my paralysis, that embryo can no longer be adopted, for example, and become a little girl." So, there is no little girl, and then he makes the analogy of some embryo with his own little girl. And he says: "Well it's the same thing as if I killed my little girl, because I will prevent my little girl from existing."

You understand the logic here that he is using. Notice it's quite complex. So, let's see a little bit how many mental spaces are really being built here. There is a long chain of them. (I've put them on your handout). It starts out in this way. In the first mental space you have the embryo **e** by itself. Of course there is some framing of the embryo, maybe in the hospital and frozen and so on. Then the embryo is given to Steve, S here stands for Steve, so Steve now has the embryo. And then later, another mental space—all of these spaces are connected through time. And so in a later space, the embryo actually becomes a fetus, then the child that is born, and then a little girl, Zara. And this is the time at which the conversation takes place. So Steve has a little girl Zara that

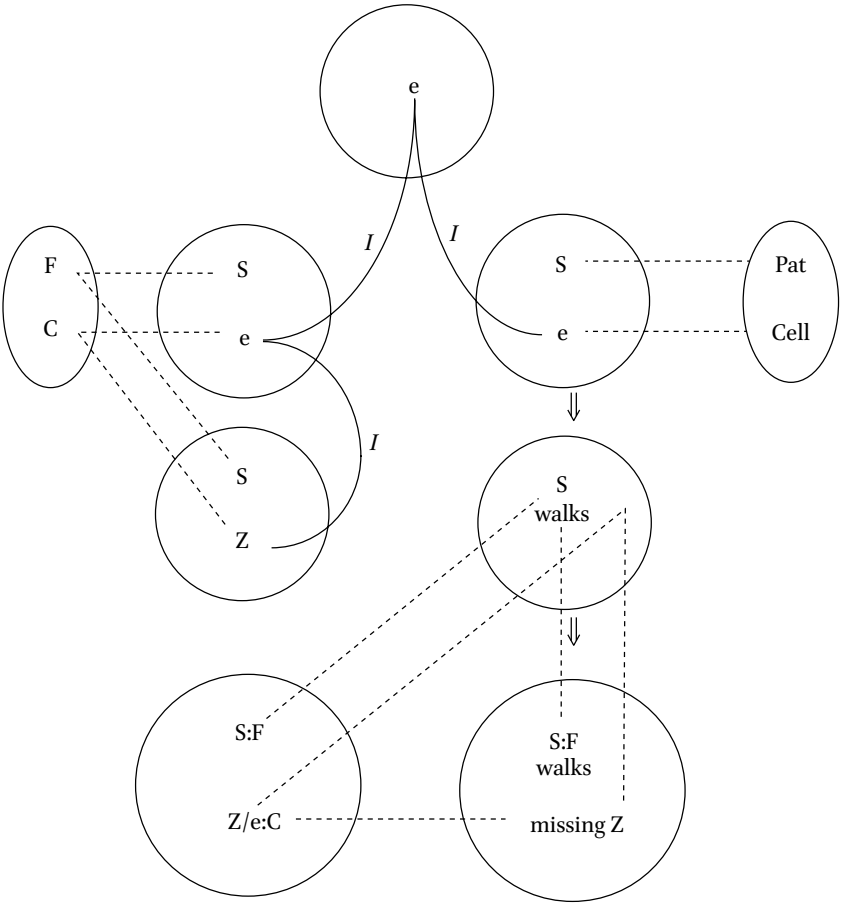
is the result of the embryo, evolving like any little child. In this space there is a father-child relationship between Steve and Zara. This is another general mental space, where you have the father-child relationship. Well, we can of course map the father-child relationship onto Steve and Zara. Because of the adoption not because of biology. Steve is not the biological father of Zara. The embryo is not biologically related to Steve.

So, here is the first mapping: father-child is mapped onto Steve and Zara. Father-child is not mapped onto S-**e** because the embryo is not a child, and up here, same thing. Then we continue, we have again the three spaces I just mentioned up here. In order not to clutter the diagrams, I left out the connections, but it's the same three spaces, the one with **e**, the one with S-**e**, and the one with Steve and Zara, father-child relation. Now, we blend these three spaces together, ok, so they all come in. Those are now the three inputs to give you this blend. The way they blend is very straightforward, very easy. Steve comes in, here is Steve, and Steve comes in and is the father, Steve-father over here, because he has the property father in the space. So, that gets projected into this blend. And then the embryo is connected to Zara causally: there is a causal connection, the embryo becomes Zara, and in the blend, the embryo and Zara are blended into a single individual, Zara, embryo it doesn't matter what stage in time, and of course it has the property 'child.'

So, through these blends, we understand how Steve can adopt an embryo. Because the notion of adoption has to do with a child that's already born, but now in the blend, the embryo is a child as soon as it exists as an embryo. And therefore it can be adopted, and the adoption frame, the adoption scenario, can be applied to the embryo. But that's because of blending embryo and child together. That still doesn't explain by itself the stuff about: "why would I kill my own daughter." So, we have to do a little more work to get to the daughter. What is Steve doing when he says: "Would I kill my own daughter?"? He is also building a counterfactual series of spaces. We have this one, this is the factual one, this is what actually happens, with Zara being the result of the embryo. And then there is a counterfactual, where suppose you take the embryo, and instead of having the embryo becoming a child, you have the embryo used for Steve medically. That is, instead of using the father-child frame now, you use the patient-cell frame. Here is the frame, here is the patient, and here is the cell you can use, something you can use to help the patient get better. And, so now, the embryo is mapped onto the cell, and Steve is mapped onto the patient. As a result, we have, in this space, the medical intervention with the cells, and as a result, Steve can now walk.

This is a counterfactual, because of course in fact Steve did not get a stem cell treatment. But he says that "if I got the stem-cell treatment, that's what

would happen. There would be an embryo, and they would take the stem cell, and then they would apply the medical procedure and I could walk." So he is comparing these two scenarios. And now, we are going to find something that is very much like the example of the missing chair that we studied yesterday, remember, *the missing chair*. Well, in this case, given that you have the counterfactual scenario: the embryo is used to cure Steve, and the actual scenario: the embryo becomes the daughter of Zara, if I look at those two results, this is the counterfactual one, and this is the real one. If I look at these two, in one of them, I have the child Zara, who is the daughter. (I put a D here, it's like a C, I should have put a C here, child, but D for daughter, same thing). Ok, so this is Z, Zara, the daughter, the daughter-embryo (remember in the blend, same thing). And then over here, you have 'Steve walks.' There is no Zara any more. There is no child.

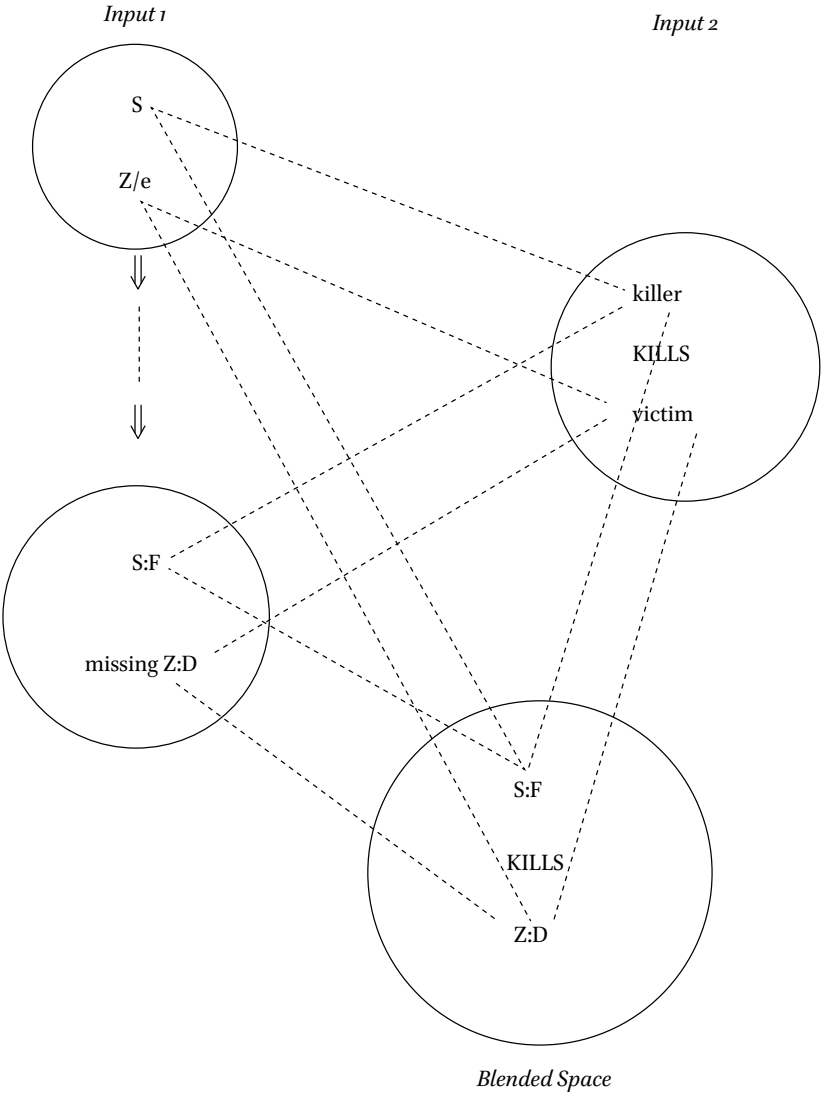


So, if you compare the counterfactual and the other one, and it's exactly like the missing chair example yesterday, in one of them there is nothing, in the other one there is something. And we observed yesterday that in a case like that, the nothingness over here could be created as a missing something. That's over here where Steve walks: there is a missing Zara. And so Steve walks and Zara is missing. In the counterfactual example, Steve walks and Zara is missing. In the real example, Steve does not walk, but Zara is there. Still no killing going on but you can see the contrast going on. Now, of course, in order to perform this operation of the mind, you have to take the embryo for Zara to be the same one that would be used to cure Steve. And of course, there is no reason for that, and there are millions of frozen embryos, and so on. But he is compressing all embryos into one, the one corresponding to his daughter. And so now we have: 'if he walks then Zara is missing.'

So now we have in the counterfactual case, Steve walks and Zara is missing, and Steve is a father with no daughter. Because father was projected from the other space, he is a father with no daughter. And what happens then is another blend comes in. Just like in the case of starving children. You say: "Mmm, he is a father; he used to have a daughter, now the daughter is missing; that's suspicious. And that seems to be connected to what happened to the father that now can walk. The father is responsible in some way for the missing daughter." So we recruit as another input a very familiar input of a killer and a victim: somebody killed a victim, and then a victim is missing, then the victim is no longer around because the victim is dead. And so, we blend the killer frame with the missing daughter frame, and of course as a result we get the fact that Steve killed his daughter. Because she is missing, and because it's his fault that she is missing, and because the embryo was used in order to get the stem cell that will cure Steve. That's the whole logic.

Notice again what happened in order to get this from the very simple sentence that is over here. Steve just said: *Would I kill my daughter so I could walk again*? And everybody understood what he was saying. There is no problem. They would not say: *Hey, you are not killing your daughter now*. Everybody understood. In other words, it was very easy for people, even though the language was literally talking about killing the daughter which would never happen. Everybody understood what he was saying. That means everybody was able to reconstruct these highly complex and organized series of factual and counterfactual mental spaces. So, again, a causal sequence, a very elaborate causal sequence is reconstructed without explicit language instructions.

There are more examples. I will skip them from now. I will note just one thing when we do the section on grammar, and I think that's really in number six, tomorrow afternoon maybe, lecture number six, right? So, when we do the



section on grammar, I will again emphasize very strongly that this is in fact the rule in grammar, and the power of grammar comes from the capacity to do these compressions routinely, automatically. And here is an example, as a preview if you like. The example has a lot of stuff here about how the grammatical construction is actually put together as a blend, I will save that for later, but I will just look with you informally at the sentence, which is *I boiled the pan dry*. Now this is a form in English, it's called the resultative. You can say: "I painted

the wall white," so, the form is Noun Phrase *I*, verb *painted*, Noun Phrase object *the wall*, and then adjective, the result, *white*. *I painted the wall white*, resultative construction. So if you take an example like *I boiled the pan dry*, a very short expression, an example of the resultative construction, what that actually describes is the case where you have your stove, where you do the cooking, and you had your pan, and you put some water or liquid in the pan, you put it on the stove, and it started to boil, and you went away, you went away for a walk, ok, in the park, and when you came home, all the water was gone. So, the result was the pan was dry. In other words, you are not boiling the pan, you are boiling the water, but the sentence tells you 'I boiled the pan dry.' Because it is compressing the object to which something happens and the result, the pan was dry, and it's letting you reconstruct the entire causal sequence. This is the entire causal sequence and I think I've got it also in the handout.

So, this is a huge causal sequence you have to reconstruct in order to understand this very short, very elegant, very simple form *I boiled the pan dry*. And that's a feature of grammar. Again, we are fooled both in everyday life and also often as linguists, into thinking that the words in the language contain all the meaning. Now, the words contain very little of the meaning. In *boil the pan dry*, there is just a word for something, *boil*, and something got *dry*. In order to understand how that could have happened, we have to reconstruct this complex causal sequence.

In later lectures, especially the one on grammar, I will propose an account of how grammar does this by using grammatical constructions which are themselves blends of syntactic form and semantic form. And for this morning, I will stop here, and if professor Li allows me, I will have a few questions. Thank you!

LECTURE 4

Emergent Structure in Conceptual Networks

Thank you. So, for the camera, I'll try to walk on the stage, but it is very dangerous. It's like Martina, falling over the cliff, remember, this morning?

The lecture this afternoon is about emergent structure and you can look at your handout here, page 30. Let's look together at the nature of the problem; the problem is described on the first page of the handout, that's page 30 of the book, page 1 in the handout section. Now we've been talking about linguistic structure on the one hand and the construction of meaning on the other hand. And we saw that, this morning and yesterday. We noticed two aspects that are crucial for meaning construction. On the one hand, compared to what the linguistic structure actually tells you, the meaning you construct is in fact much richer. So, that means that in any particular context where you have linguistic structure that is motivating you, that is prompting you to construct meanings, you are doing creative work, even though it's unconscious, you do not notice it, and other people take it for granted: they find it easy and automatic because all humans do it. But in fact there is a lot of creativity involved in using language at any different moment, because the language you use needs to be adapted to the particular context, in ways that we saw this morning.

So you wind up calling up all kinds of structures, frames, ICMs, and so on, that are different for every context, but that could be paired with the same linguistic structure. A single linguistic structure can produce many, many meanings, but it's not the linguistic structure that produces the meanings, it's you in your mind by using the linguistic structure in a particular context in order to build the corresponding network. So take the last example that we saw this morning for instance, the very complex example, "Should I kill my daughter, in order to walk?" You could see that in that particular context, in order to understand the expression, we have to build a very elaborate network of connected and blended mental spaces. The same sentence in a different context

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 | DOI:10.1163/9789004360716_005

would have, of course, a completely different set of networks associated with it. Therefore in interpreting or in building meaning ourselves, we are always creating new things.

Now in addition to that, there is the issue of creativity in general, that is when humans produce things that are novel, that had not been produced before, and can then be used by other humans and transmitted to later generations, and I'll show you this afternoon that certainly a great part of that creativity is also possible because we have the mapping and blending schemes that we have. So there is creativity in the short term right on the spur of the moment when you are interacting with other people, speaking, talking, thinking, and then there is creativity in the long term where a particular group or a particular culture elaborates very special blends that can be used later, and then can be transmitted. So those two aspects of creativity are important. If you look at page 1, that is page 30 in the book, you see five aspects of the problem of emergent structure that are pointed out: emergent structure in blended spaces is more than the projection of new relations. It is literally the creation of new things in conceptual worlds. So that's problem No. 1. How is it possible, how does it happen?

Problem No. 2: The power of the emergent structure is not just in the blended space. If you have the blended space by itself, that is often a very simple structure like the man snatching food from the children. But the creative emergent structure that you get for the entire integration network is precisely the result of linking the blended spaces with the other spaces, with the other inputs in the network.

Then No. 3: At the same time, blended spaces often have extraordinary properties. We saw that in some of the blended spaces, that we used as examples, children become accomplished surgeons, numbers can suddenly be rotated in space and so on. And so, again, the blended spaces by themselves are easy, it turns out, but how do they fit into the creative nature of integration, thinking, talking, short term, long term?

No. 4: the new things that we create in such surprising ways are generally conceptualized as having always existed. I'll show you this for numbers. That is, instead of considering them as new inventions, after inventing them collectively, we then conceptualize them as something that was already in existence, independent of ourselves and that we discovered. I'll get to that later in the same lecture.

And finally, integration networks allow the proliferation of non-things in our conceptual world, and we saw that with the missing chair, and we saw that with the missing daughter this morning, the daughter Zara, and we saw that with the number zero, so it is an important component of emergent structure

and creativity to be able to manipulate non-things, things that are really not things because they point to absence.

So those are the five mysteries. We will, this afternoon, take a look at some of these mysteries, and see how far we can get.

On page No. 2 on the handout, there is a reminder: the first example of conceptual blending that we studied was called Regatta (and that means the sailboat race). What was the emergent structure in that example, in that piece of data, the sail boat race? Well, remember, the inputs, the factual inputs, what was actually either happening at the time of the magazine article with the catamaran trying to go fast, or whether it happened before, with the clipper Northern Light, the old ship, in the previous century, those were factual events, that happened at different times, and that were remembered by the people either observing them or remembering them. But in the blended space, we have something imaginative, that was not really happening, that was a race between the catamaran on the one hand, and the old ship, the clipper, on the other hand, even described as a ghost. So what was emergent in that blended space was the notion of a race; now the race itself was taken from familiar frames. We know about races, we didn't have to invent racing, of course, to get that particular emergent structure, but what was emergent was the idea that those two boats, who actually existed many, many dozens of years apart, were actually racing together, competing, that the captain of one was watching the other boat and, making sure that he was ahead and feeling emotions.

So, very often, as a result of building blended spaces, we have emergent logical structure, but we also have emergent emotional structure. Why? because the emotions are tied to the new frame that is in the blended space. In the case of the boats racing, we had emotions: we had a race competition, trying to win, trying to stay in front, and so on. In the example of this morning, remember the politician vetoing the bill that would have given foreign aid to poor countries and allowed feeding children. In the blended space, we had this bad, nasty politician snatching food from the children. That was what we called human scale, a much more directly apprehendable scenario for us. We can see the bad person taking food. But these human scale scenarios are typically associated, for humans, with basic emotions, with fundamental emotions. When we see somebody snatching food from a child, we are angry. When we just hear a report in the newspaper of a bill limiting transportation of goods and all that, it's not something that triggers emotions. So one of the functions of blending is actually to reinforce the emotional reaction to some events or some news, or some reports, that are going on.

Well, that emotion is also, of course, part of the emergent structure that is created. The emotion was not present by itself, in the input of the man

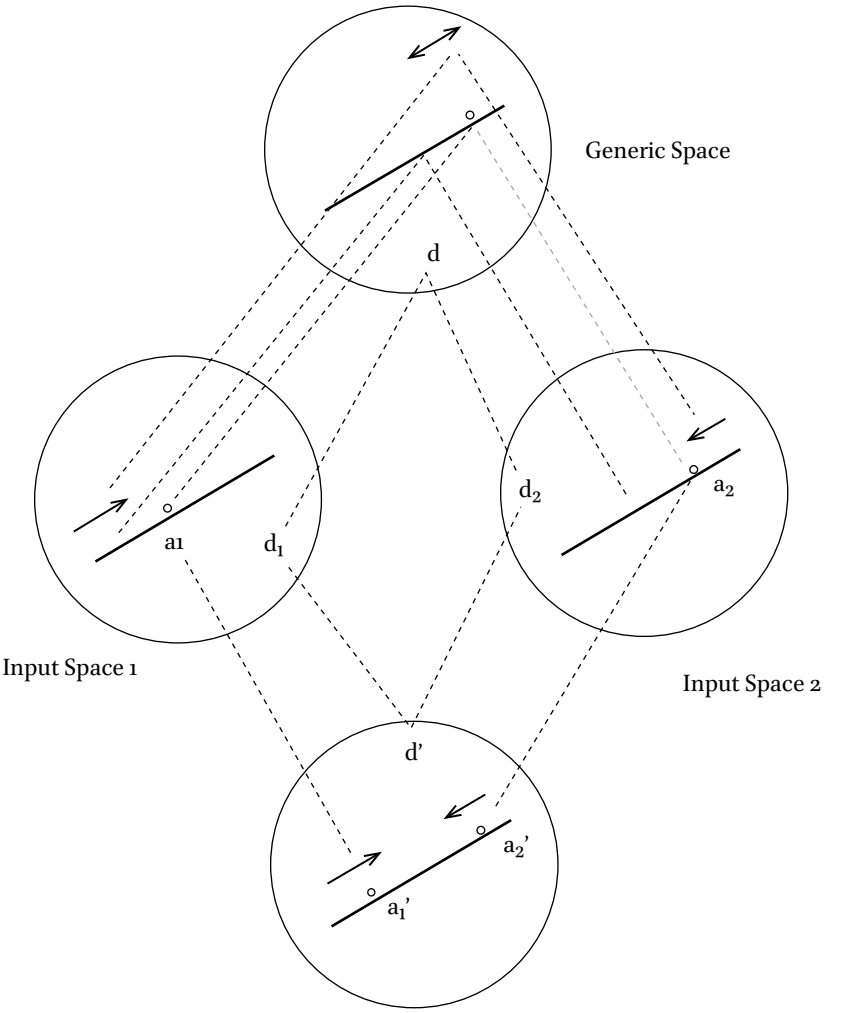
snatching food from the child; it's present if somebody is there watching it, but we have it only as a frame. And in the other input, the politician, the politics, the voting, many intrigues and so on, again, we do not have strong emotions, but when we build the blended space and the person is actually seen snatching the food, then there is an emergent emotion. So in the case of the boat or in the case of the snatched food or in the case of the man riding with Hitler, all these cases that we saw, the emotions are emergent in the blended space.

We have both logical and emergent structure, with the man riding with Hitler. You say: "How can that guy be giving a ride to Hitler? He's a traitor". In a more diffused input where he's just using a little too much gas you do not feel the same emotion, but with the blend, you manage to make his relatively insignificant action of using a little too much gas, not sharing his car, into a treacherous act where he is giving the enemy Hitler a ride in his car. So you can see all of this created emergent structure that is happening. And again, you can see that one of the ways that this happens is because instead of just combining the inputs, we are bringing in other frames, we are using pattern completion to end up with a richer blended space.

To look in some more detail at the notion of emergent structure, I will return to an example that's in your handout and also in chapter 3 of the book *The Way We Think*. It's the example of the riddle of the Buddhist Monk. And this riddle was actually cited by Arthur Koestler. Arthur Koestler is a famous American writer who has written about many things, but one of his books is called *The Art of Creation*, a very interesting book. And one thing that author Koestler noticed is precisely that many acts of creation consist in bringing together things that seem incompatible. You bring them together and somehow out of the incompatible emerges something new and interesting. Now Koestler did not know how this happened. He just made that very interesting observation, but now, with blending theory (conceptual integration), we can actually give a more scientific, precise account of how this is possible, and in particular, of how double scope blending is the key to a lot of human creativity.

So here's the example from Koestler, the riddle of the Buddhist Monk and it's just a puzzle. You are asked the following question: you are told that a Buddhist Monk begins walking at dawn and goes up to the top of the mountain and he stays at the top and then maybe two weeks later, he goes down the mountain, again he starts at sunrise, and he gets there at sunset. And the question in the riddle is: given the journey going up and the journey going down, is there a point on the path where the Buddhist Monk is at the same time (like maybe 3 o'clock in the afternoon) on the way up and on the way down? And this is not a hard puzzle mathematically: you can write two little equations and you can find the answer. But there is also a more direct way of finding the answer,

which is this: instead of imagining the two separate journeys, you blend them into a single journey, you bring the monk going up and the monk going down into a single blended space, and then one of them is going up the mountain and the other one is going down the mountain. And then, you see, you have the insight immediately, that of course, these two monks are going to meet. There has to be a meeting point and that meeting point, if you project it back to the separate journeys, that meeting point is necessarily the point where the monk is at the same time going up, going down. Because, let's say it's 3 o'clock pm: the monk going up meets the monk going down at 3 pm, so they are in the same position. Going up and going down.



So the way this looks in terms of blending is you have two input spaces, one going up and schematically, this is the monk here going up, and over here you have the monk going down, right? And that's what's happening in the two inputs. It's easy to match the two inputs. There's a monk, there's a mountain, there's a day, there's a sunrise, there's a sunset. So it's easy to find the correspondence between the two and, the generic space, what is common to these two inputs, is the idea of a journey on the mountain path either up or down—in any direction. That's what's common. But now the blended space is obtained by projecting this input: so here's monk position a1 being projected here to position a'1, and the monk going down over here a2 is projected to the monk going down a'2. In the blended space, you can see the two monks going towards each other. Now this is when pattern completion operates, because you have two people walking towards each other. This is a schema that is very familiar in your mind, because you are human being, a complex schema, but it's one that's very familiar to you. You've often seen people walk towards each other. You've often, yourself, walked towards other people. So it's not hard at all. In fact, it's automatic to use pattern completion here and say: "Hey, that's the encounter schema. This is two monks coming towards each other." Now, once you have the pattern completion, you can then use the blended space dynamic structure in order to run the blend, to see what is happening in the blend. And of course, what happens in the blend is the two monks walk towards each other and will end up meeting each other. So running the blend will produce the meeting point and the meeting point, of course, projects back to the two inputs and gives you the solution. It's necessarily the same point in the two inputs. So the answer to the riddle is "yes," the answer is positive, the answer is "indeed, there is such a point." There is a point where the monk will be at the same time going up, going down.

Now the virtue of this example is to illustrate blending on the one hand, but also emergent structure. Notice that in English, we can use the reflexive pronoun here, we can say: "The place we are looking for is the place where the monk meets himself." We can use *himself*. Now, in fact, in the blended space, it looks like there are two monks, but we also know that, in these input mental spaces, there is an identity between this monk and that monk. It's the same one. So, in the blended space, it's the same monk going up, going down. Now, that looks like an impossible situation, but it poses no problem here. And it has a linguistic reflection namely that we can use a reflexive pronoun. We can say: "the monk meets himself at point a'1, a'2".

So, what we see here, again, is a pretty straightforward case of novel emergent structure being built. And with linguistic consequences, because now the linguistic forms, the grammatical form, *the monk meets himself*, is perfectly

appropriate to describe that blended space. In other circumstances, you might be told: "Hey, that's a non-grammatical sentence. It's impossible to meet yourself, you can't meet yourself. You can't be in two places at the same time. So this must be an ungrammatical sentence." But in fact, it's a perfectly good sentence and describes the emergent structure of this puzzle.

Now, look at your handout, and let's talk about a couple of non-linguistic examples. It's very important to remember what I said at the beginning, in the very first lecture. I said: "in cognitive linguistics, the goal, is to connect operations that construct meaning for language, or by means of language, and relate them to cognitive operations that we find elsewhere in other human activities." Here's one example, the one on page 4 in the handout, which happened to me. This is a personal experience. I was learning to ski in Utah in the United States and there was a ski instructor trying to teach me to ski. And I was not very good, so he was trying to help me. And one mistake I was making was this: when you are a novice, when you learn to ski, you tend to keep the same kind of positions as when you walk. Now when you walk, you walk in the same direction as your feet. That's pretty straightforward. You don't typically, you don't walk like this. Very few people walk like this or you don't walk backwards, except in special circumstances.

But in skiing, it's different. In skiing, you are going down the slope, and you want to keep your head looking in the direction of the slope, but the skis, you don't want to go down directly, otherwise, you will just go too fast. So the skis must go in sideways and your body must be like this. So you ski like that and you turn the skis, but your body still stays in the same position. Now that's hard to do, because our instinct is to do it differently. As a novice, I would do this in the direction of the skis and then I would turn and I would do that, right? So, the ski instructor was trying to make me invent the right movement.

He noticed that I was French. He said: "Oh, you are French, so here's what you need to do." I had my ski poles for skiing, like this. He said: "Pretend that you are a waiter, in a Parisian café, in a café in Paris." (You know, the waiters who bring champagne and croissants and everything). So the ski instructor said: "Take your ski poles and pretend that this is a tray, and on the tray, you have the champagne and you have the croissants and you have other good things. Now, start going down the slope." Holding the tray now, I was forced to have the right position because if I made a mistake, you can see the champagne would fall this way, and if I made a mistake like that, the champagne would fall the other way. So the only way to hold the champagne on the tray was to keep my body in the right direction and my feet like this.

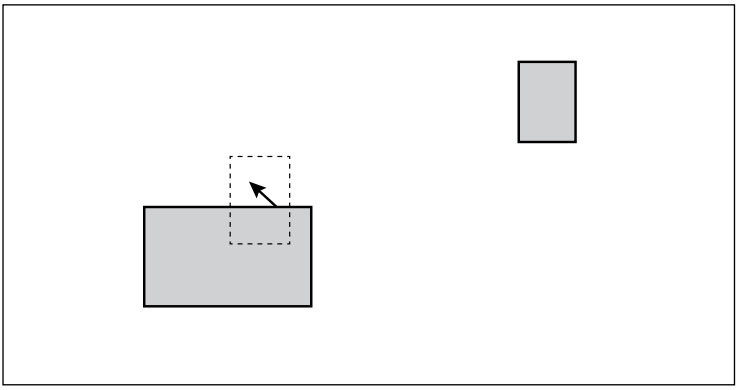
So, it was a very good coaching instruction from the instructor. But it was using a very clever blend. He was blending the situation on the ski slope, the

person learning to ski, with the waiter in the Parisian café. So I had a counterpart in an imaginary mental space with the waiter in the café, and my poles had a counterpart that was the tray of the waiter, and so on. And what I was doing, was constructing a blended space, in which I was a skier going down the slope, but also carrying champagne on the tray. And of course, this was through imagination, because I didn't have the real tray or real bottle.

So here's a case where by using a clever blend, the instructor made the right emergent structure happen. And this confirms how embodied these mental constructions are. They can create emergent structure in our bodies in the way that we move and the way that we deal, that we interact, with the rest of the world.

Another nice example, non-linguistic, but related to language, is an example from technology and it's actually an example from computer technology. It's the invention of the desktop. Now, before there were computers like this, with windows and files and folders that you can just transport on your screen, we had to type everything. We had the UNIX system and we had to type all kinds of very abstract instructions in order to move files and to print files and so on. The invention was before, but the commercial production of Macintosh computers with this window system was in the mid 80s and suddenly we had a completely different interaction with the computer. Now this is the interaction that has windows and things on the screen. And, if you think about it, (you can read more about it), this is a very elaborate blend, because it takes, as one input, the familiar world of grasping objects, moving objects, putting them in containers, putting one object inside another. This is the thing that we do in the three dimensional ordinary everyday world and the other input is the abstract world of computers, where things are going on in the computer that you and I don't even understand. You blend the computer commands with the ordinary actions in order to create this desktop where you do things like "move this." "Move this file, or this folder, whatever it is," and you are not really moving anything, you are clicking and then you are holding the click and then you are doing something that is the movement with your mouse. On the screen, there are just different pixels that appear. There are not really objects here; there is just something that lights up. Then you can link to the input of moving objects and in the same way, clicking, which is just clicking the mouse, will have the effect of doing something on the screen, and we interpret that as grasping the object. So with clicking, it's like taking the object. And then, this is a typical motion of the object. We don't even notice it on the screen.

I have colleagues who were computer experts and they had never even consciously noticed what happens when you move a file on the screen. They had not noticed (on most computer windows, you can check on yours), the way



that we move something. First, there is a kind of phantom of the thing that moves, the original thing stays in the same place. We click on this and then we move and this is the phantom that moves, the dotted-line rectangle, and then we unclick. Suddenly, this one disappears and it appears in this position instead. So, it's nothing like really moving objects in real life. When you move something in real life, if I move this bottle, for example, I don't have the bottle staying on the table, a phantom of the bottle moving, and then, when I stop, boom, the bottle appears in my hand. In other words, the structure on the screen in really quite different from the input structure of moving objects. And it is also, of course, very different from the Unix structure of typing instructions to computers. So it is an emergent structure in itself, a very interesting emergent structure, which is very complex technologically to invent. Engineers who invented it were ingenious. But once you have it, it's a very simple structure to learn. In fact, that's why it's so useful and you can teach children very fast and children can learn it, and can transmit it to their own children when they grow up. So this is typically what humans do. They will invent, they will come up with, what is actually, technologically difficult emergent structure, but then once they have it, it will be easy to transmit. In lecture No.8, I will talk a lot more about this. I'll talk about the work done by anthropologists and cognitive scientists that shows the connection between building meaning in language and building meaning in other aspects of creative technology, creative invention and so forth. So, for the time being, I'll just leave it at the computer desktop case.

When you use the desktop, here's another case of this object over here going into that one. So this is a file and it's going into that folder on your computer desktop. Again, it's the invisible phantom that goes in. But it doesn't really go in, because there is no real container there. It just superposes as an image over the image of the other and that counts as "be in," and then once it is completely

covered by this shape, then it disappears over here when you unclick. Another funny property of the computer objects is that when you open them like you open this one (this is a folder), and you double click on the folder, you open it up and what you see suddenly is a much bigger object with files and everything quoted inside. So another property here is that when you open objects on a computer, they become big. This is again not a typical property of ordinary human objects. We have no trouble building this new emergent structure. And that again is an important lesson, it's like the metaphor example of digging graves that I showed you. We have no trouble building a blended space where you dig a grave and that triggers the death of the person digging the grave even though it is not at all the usual scenario that we have in the case of funerals and dying and so on. The mistake of metaphor theory was to think that you always transfer structure from the source to the target. But in fact, all these examples show you don't transfer structure from the source to the target, you actually create new emergent structure in a blended space. And very often, that new emergent structure is very different from the structure that you had in the source. In this case, for example, it is a container-like structure with motion, that is completely different from the source domain of objects that we manipulate in everyday life. At the same time, it is structured by the frame of ordinary objects and that's what makes it very easy for us to learn this new computer structure.

On to more abstract examples. I'm going to go on to the examples from mathematics. Now you don't have to know any mathematics to understand this example even though it happens to be a case where very brilliant mathematicians could not find the answer. So I'm going to show you the blend that actually was the answer to a very important mathematical question. And we are going to discuss a little bit together why the top mathematicians like Newton, Descartes, Euler, Bombelli, and Cardan, all these mathematicians who knew the need for the notion, could not come up with it. But once we have it, it seems like a very simple notion.

And, again, you might say, well, what does mathematics have to do with linguistics? And of course, my answer, as on the first day, as on Friday, is going to be: mathematics, like technology or poetry has everything to do with linguistics because the very same cognitive operations are at work in creating new concepts of number in enabling humans to understand mathematical complexity, or to understand meaning complexity in general. Now, this is not just my strange idea. This is a fundamental discovery of cognitive linguistics generally, and the book by George Lakoff and Rafael Núñez (the book is called *Where Does Mathematics Come From*), is a brilliant illustration of how you can build mathematics with successive blends, blend after blend after blend, which are exactly of the same nature as the blends you need for language and grammar.

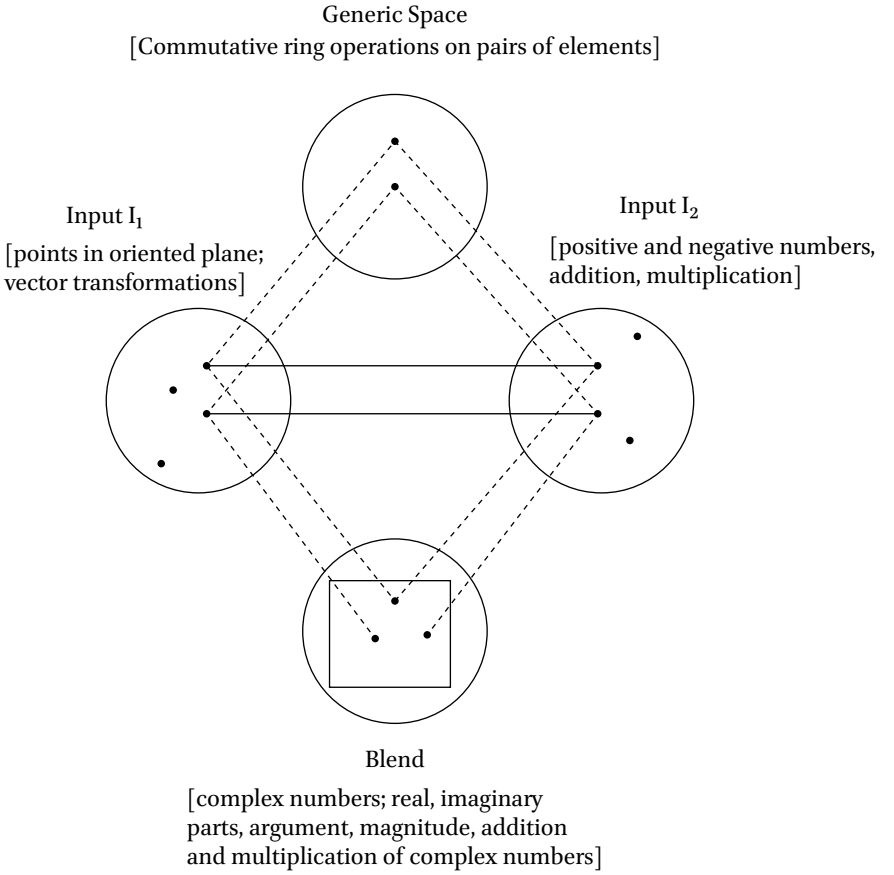
In fact they are the same, because mathematics is just one area of meaning. Of course, it is not the area of meaning that most of us manipulate all the time and that's why, for some of us, it's going to be an unusual area or exotic area that we don't understand. But it is structured, in fact, ultimately, in ways that are very, very relevant to language.

So let's look at the mathematical example, and I need to give you a kind of very short version of what the mathematical problem was. The mathematical problem was this: it appeared in the 16th century that to write the solution of certain equations, the so called cubic equations: $x^3 + px + q = 0$, the only way (and the best way therefore, because it is the only way, a very elegant way), was to use square roots of negative numbers. Things like square root of minus five, square root of minus one. And this was a big problem, because negative numbers do not have square roots. There is no number that multiplied by itself will give you minus one or minus five, because if you take any number and you multiply it by itself, either the number is positive, two times two is four, or the number is negative, minus two times minus two equals four, also plus four. So any number multiplied by itself gives you a positive number and yet here was the paradox that in the mathematical system, you somehow had to imagine the existence of something impossible. The mathematicians decided that they would use this in their formalism, they would use this in writing the equation because it was convenient and then the funny square roots would cancel each other out at the end. But they also decided that this was an impossible concept. So they said: "these are not real numbers, this is just a notation." Some called them impossible numbers and others called them imaginary numbers because there was no way that they could exist in mathematics.

And yet, you have this very strange situation that these numbers were, in fact, very useful, so they were impossible, but useful. And believe it or not, it took almost three centuries to find the right conceptual system where these numbers could fit in, because in fact these are useful as numbers When the right conceptual system was found, the name of the numbers was changed: instead of calling them imaginary, they were now called complex numbers. Now, the solution was, when you look at it after the fact, actually a pretty simple one, it was a blend. You took numbers in the old-fashioned way, numbers like -1, -2 and also fractions, $-2/3$ for instance and so on, on the line. You took that as an input. And then, as another input, you took two-dimensional space, a space with points on it, like the screen. The screen is a two-dimensional space and it has points on it. And then you do a mapping of the numbers here onto the line of the two dimensional space. And then you project over here into a blended space. Now, in the blended space, you have the line, but you also have all these other points. And these points are now also numbers. So the emergent structure that you get is that you don't just have numbers on the line, but you also

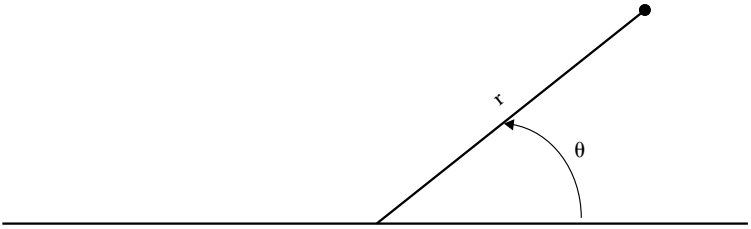
have numbers all over the place. So this is a number and here are the old numbers, numbers like one, two three, one third, zero and so on. And then other numbers are over here in space and every number now has a distance from the origin, that's called the magnitude and it also has a rotation and an angle from the horizontal, so every number now has both a magnitude and an angle.

The Invention of Complex Numbers

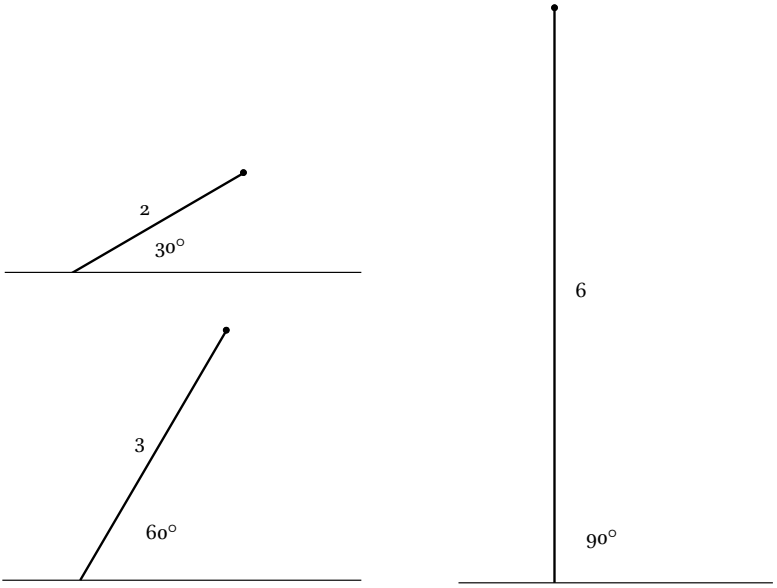


Now, the numbers on this line have either a zero angle or they have a one-eighty angle. And what happens in this new space is that you have a completely emergent notion of multiplication, and it's a very simple action. To multiply two numbers: here are two numbers, a number that has a sixty degree angle and magnitude three, and this other number that has a thirty degree angle,

and magnitude two. You want to multiply them. What you do is you add the angles, sixty plus thirty and that gives you ninety and you multiply the two magnitudes, two times three equals six. So, here is the number you get as a result. Now it's easy to see that, for example, minus one in this blended space does have a square root. Because if you take minus one (I should have made the schema), if you take minus one here, and if you look for the number, multiplied by itself, that will give you minus one, all you need is to take the number right here perpendicular (ninety degrees) and magnitude one, and then you multiply by itself: ninety plus ninety is one eighty, you find this position, one times one is one, you'll find minus one. So in this new system of numbers where numbers are points in space instead of being just on the line, you have square roots for every possible number: the complex numbers, the negative numbers, the positive numbers.



Complex number (r, θ)



multiplication of numbers (2, 30°) and (3, 60°) = (6, 90°)

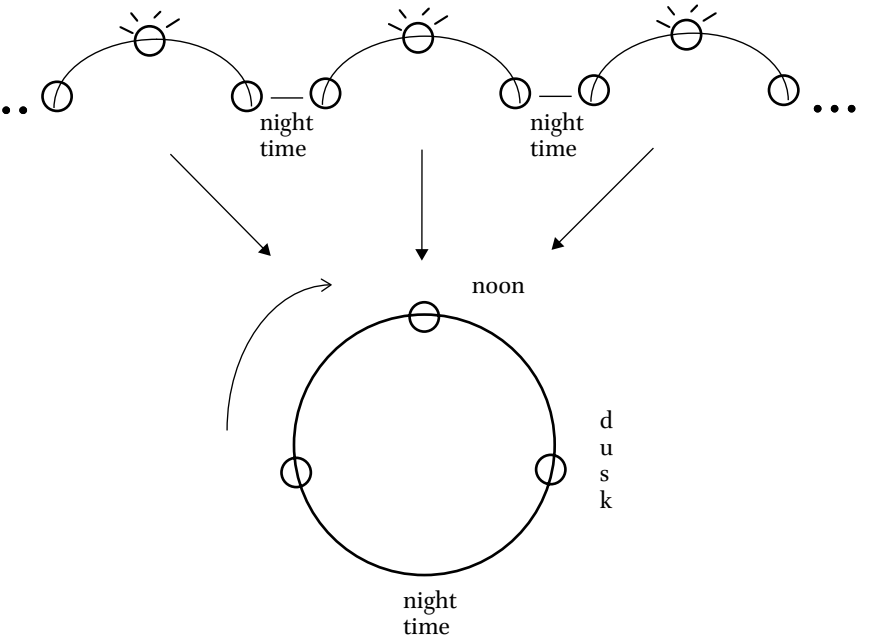
Everything has a square root. In other words, what we have here is a very different notion of number than the previous one. So this is a case of a concept evolving; the concept of number has changed. It's not different from the way concepts change in other areas of language and thought. We change our concepts all the time. A concept can evolve. You can have one example we cited in the book (and there are just many, many such examples): in American society, you can go from one conception of marriage to another conception of marriage that include same sex marriage, for example. And then you get a number of key features that will change. Or if you take Lakoff's work on radial categories and cluster concepts, things like *mother* and so on, you'll find changes in the meaning of words like *mother* depending on how you blend them with something else. *Mother* as in "necessity is the mother of invention," or *mother* as in "this person took care of me, she was a mother for me."

So, this is a very general phenomenon, but the mathematical case is excellent to illustrate it precisely because what we see in the mathematical case is that the solution is simple, the emergent system is a simple one. You can teach it to a five-year-old child. All you need is the notion of rotation for numbers, and the notion that you can stretch the number. So if you want to tell the child: "number two with angle sixty degrees," you show a number 'one,' you stretch to 'two,' and you do sixty degrees and you've got it right here. At the end, you've got your new number. And so the child can learn that. And then you say that to multiply, (the thing I showed you) {two, thirty degrees} and {three, sixty degrees}, first do the rotation for {two, thirty degrees}, then multiply by three by stretching and then do the next rotation sixty degrees and there you are. You find your number six perpendicular. So the child can learn the blended space easily. And yet, these great mathematicians, Euler, Descartes, and so on, they were not able to find that. (Mathematics is interesting, don't fall asleep; I know after lunch, it's not easy; at least I'm running around on the stage, but you poor people have to sit, maybe you had some really good food).

You have, on your handout the explanation here of how the emergent structure is created in this interesting case of mathematics and again, the fact that what you end up with in the blended space is a simple structure. But interestingly, the reason it's a useful simple structure is because it is now connected to the other, notions of number. The notions of number that you had before.

On your handout now, moving along on page 37, page 8 of the emergent structure handout, you'll find the example of time. The example of time is going to be very important for us when we study metaphor tomorrow morning. The construction of time in language, as you'll see, is a very elaborate and complex construction. And it has many blends that contribute to build the notion of time.

In order for these blends to operate, you need to have an emergent structure that actually comes from human experience. And this is a little bit like the dinosaurs, again. So here is roughly how it works. The initial notions of time are presumably built for human beings on successive days. The fact is that we can see there's a day, sunrise, sunset, we sleep and then the next day, the same thing happens, the sun comes up and the sun goes down. And that gets repeated over and over and over again. So you have analogy connecting these different days.



the day runs its course, going through ***the*** *day, when the day starts again*

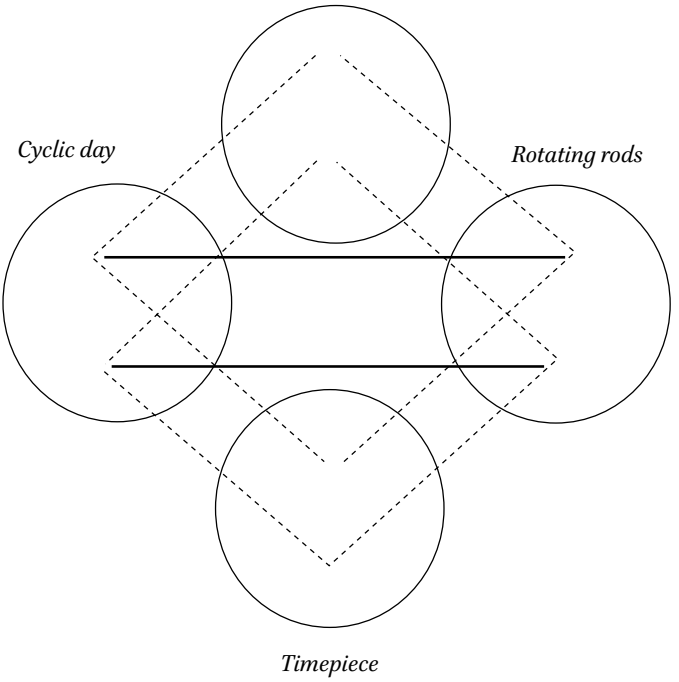
Now, analogy can be systematically compressed. In many blends, we find analogy compressed into identity, and, in fact, into uniqueness. So in this case, the analogous days get compressed into a single cyclic day. And it's like the tax bill, remember the tax bill example? *My tax bill gets longer every year*. In fact, you have many different tax bills, and you compress them into a single tax bill that changed size. For the days, we do the same thing, we talk about a single day coming back and starting all over again. So we say things like *the day* as if it were a single day: *the day runs its course, we go through the day and then the day starts again, the day starts again tomorrow*. So the day is now compressed

into something cyclic and that is an emergent mental structure because there is nothing in the world out there that shows you a single cyclic day. That's a human conception that is created by compressing the analogy of all the successive days into one single cyclic day.

Now, later, as people made more and more observations about the day, about the events, about the things they do over and over again, they needed what we now call today a system for tracking time: timepieces, watches and so on. I went to the Forbidden City, and they have this wonderful hall of clocks, how many of you have been to the Hall of Clocks? Raise your hands, oh, not many. If you are visiting Beijing, well of course, do not skip my lecture, but go and visit the Hall of Clocks in the Forbidden City, where they show you all kinds of wonderful clocks from all over the world. And in particular, these water clocks, clepsydrae and other kinds.

Well, the invention of time, timepieces starting with sun dials, is again a wonderful human invention. If we look at the modern watch or clock, (there's a clock way back at the back of the room there) the idea of the clock is also simple. Take the one, not the digital, the one that has rotating hands, for example. So that's going to be one input: it's a mechanism that has rotating hands that go around and around. The genius of clock making and engineers who devise clocks, is that they are able to make clocks that will be synchronized, so they will move at exactly the same rate. The hand on my watch will move at the same rate as the hand on your watch. Now, this is the engineering feat, of course. Once you have this kind of mechanism, you can take that as one input for a blend, and for the other input, you can take the cyclic day that I talked about, the day that starts over and over again. And you can map the parts of the cyclic day, noon, sunrise and so on onto the mechanism in various ways.

In the history of the world, there have been many different mappings. There are clocks that had hours that differ in length, hours that are different in summer and winter and on and on. But here's my main point: the day that you observe in nature does not contain units of measurement, it does not contain seconds and minutes and hours and things like that. The way that we get the units of measurement is by mapping the day itself onto these mechanisms that are synchronized. And then you project into a blended space and in the blended space, you can now have emergent, new notions of time, because, on the dials of your clock or your watch, you can now put little marks exactly at the same distance of each other and you can have the big hand and small hand that move at different rates. And that will automatically produce a number of positions here on the watch and those positions are purely mechanical in the input but in the emergent structure of the time piece, those positions now become parts of time itself.



Emergent: **nk** intervals of time (n = 2, 24, 1440, k = 1, 12, 60)

Now, this is magic, in fact, because by doing this kind of blending and of course by doing the engineering of building watches or sun dials or clepsydras or whatever, people are then able to create new units of time that did not exist: hours, seconds and so on. But notice what happens when this is done. I'll go back a little bit (I think I put this on your handout). The important aspect is that you divide your dial into a number of intervals, and if the number of intervals,—here it's two, and the other number, here is one,—we have the division of the day from midnight to noon and noon to midnight. But on the watches that we use, the number is usually two: it takes two rotations of the watch to get the complete day. And the big hand is twelve: there are twelve intervals on the clock. Then of course there are some more intervals for seconds and so on.

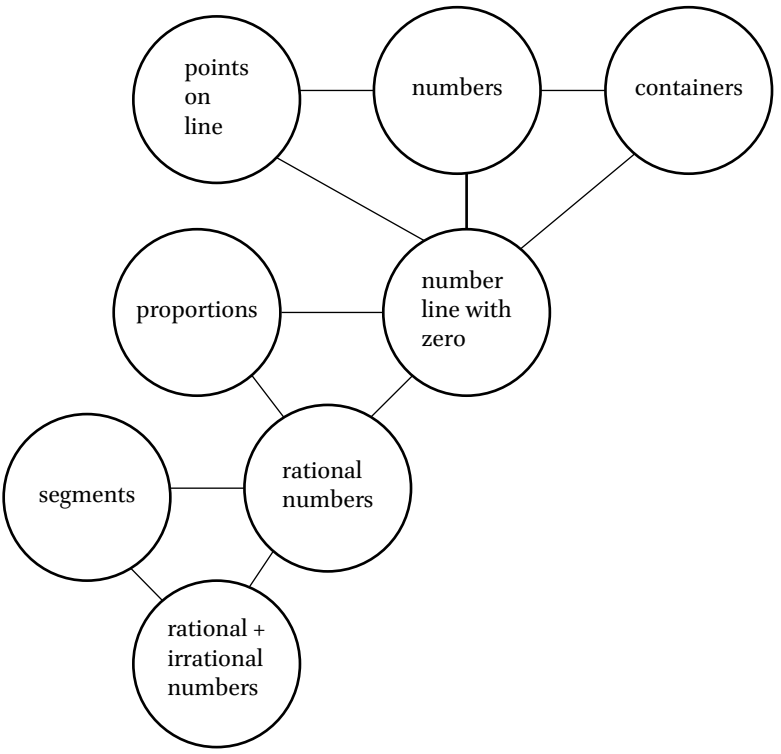
So you end up with n equal fourteen hundred and forty, and k equal sixty, you end up with 86440 seconds in the day. This is all created by human conceptual blending and of course, human engineering. Once you've got it, you've got these units of time. And this brings me back to point number four on page 30 of the handout: the new things that we create are generally conceptualized

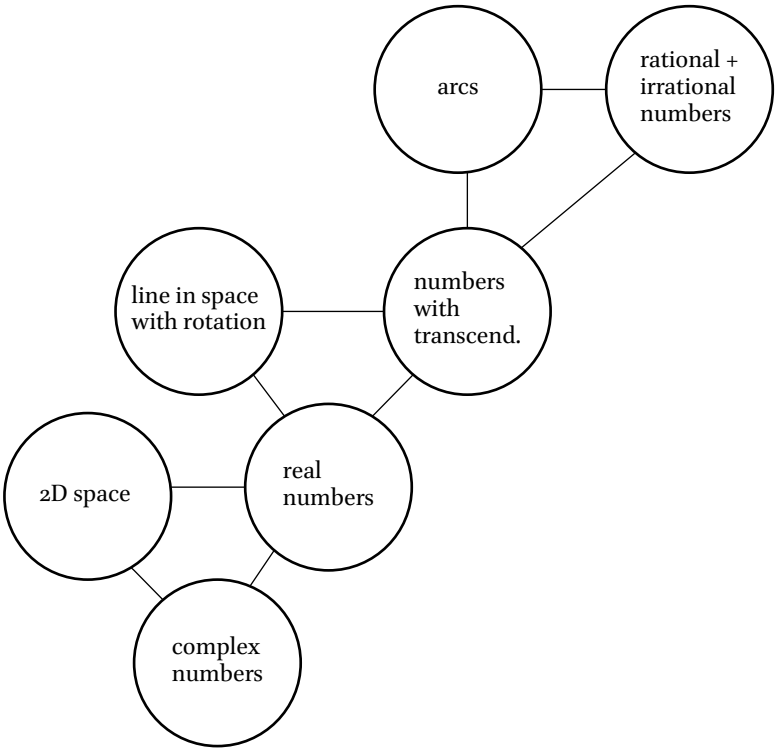
as having always existed. So we talk about time, eternal time, as if there had always been seconds and minutes and hours and everything, as if time was made up of these things. But, in fact, time is created by human engineering.

Let's see the next part that I want to show you. There is one more thing about numbers. I showed you how the complex numbers were created, and we could show, (I won't do it today, because after lunch, too much mathematics will kill us), but the evolution of the notion of the number is systematically more and more blending. So you start with notions like points on the line, and the numbers one, two, three, four, five, rhythmically counting, and the containers, things like baskets, that have one egg, two eggs, three eggs and so on, and you can map those onto each other. Then you get the number line with zero, zero is an emergent area because when you count, you don't start with zero. You count your friends, you say: "one, two, three." You don't say: "zero, one, two, three." But zero is emergent in the new notion of number, the number line. And the same thing happened in order to get rational numbers. You had to add fractions but you don't just add fractions. You actually create a completely new notion of number. You use proportions, (like 'something is in the proportion of three to four'), and you make that into a number also. So now that you have the numbers on all of the line. Before, you just had one, two, three; now you've got the line covered with numbers.

Now, you have the fractions and rational numbers, and the same thing happens for the irrational numbers and the story here is actually an interesting funny story. It's due to the Pythagoras. You know who Pythagoras is, P-Y-T-H-A-G-O-R-A-S, a great, a great mathematician, Pythagoras. And you probably know the theorem of Pythagoras, right? The square of the hypotenuse is the sum of the squares of the two sides of the triangle, you learn that in school. Well, Pythagoras had a group of mathematicians and it was also a kind of religious group at the same time because they had an interesting belief that the universe was governed by numbers, and by proportions of numbers, and therefore everything in the universe had to be a number or a fraction. And then one of the group of Pythagoras showed very simply that because of the Pythagoras theorem, there were segments that could not have a rational length, that could not measured by means of fraction. Square root of two, for example: you have a triangle that has one and one, the hypotenuse is an irrational number, square root of two. But in those days, there was no such thing as an irrational number. All the numbers were fractions. And so, when they found that out, that some segments did not have a measure, this was considered blasphemy, and they were all in the boat together when one of them discovered this, the others were furious and they threw him out of the boat. They threw him out of the boat because discovering a segment that had no measure was a blasphemy.

Well, of course, what happened later was that the rational numbers were blended with segments of geometry and they gave you a new notion of number that contains things like square root of two and so on: irrational numbers. And this goes on and on and on in the history of mathematics, so that then you get transcendental numbers and then you get the real numbers, then you get the complex numbers that I talked about before. Why is this interesting, from a linguistic point of view? Because at every stage, the interpretation is: "oh, there were numbers out there we had not seen, and now we've discovered them." But that's not what's happening. What's happening is people are using blending to invent a new, more interesting mathematical system, and when you reach the end, of course, and that's not the end, you can go further, but when you reach these stages, you suddenly have a richer system, and people think: "oh, we just added more numbers." But in fact, the whole concept of number has been completely modified using blending, so this is not a special case for mathematics, this is what happens all over, but in the case of mathematics we can really see it extremely clearly.





Let me see if I have a few more examples. Well, that's about it for this afternoon. I can stop here. I did want (maybe it's on the handout) to point something out or to reemphasize it actually. This is on page 36, page 7 of the handout. There is one line here (it is really a reminder). It says "emergent structure and causal compressions," because all the causal compressions that we saw this morning have emergent structure: the one with the food-snatcher, the one with Hitler, and finally the one with Toblerone, that I did not have time to discuss, but that you can look at. All those, of course, had rich emergent structure and I pointed it out this morning and reminded you this afternoon.

So the final word for today about emergent structure is that it appears in many, many different areas. It appears in mathematics, it appears, of course, in creative poetry, it appears in everyday language, it appears in jokes and humor, it appears in advertising, the case of the children doing the bypass, the case of Hitler and riding alone, and it appears in rhetoric when you argue and when, for example, you call the politician a food snatcher. Again, you are using emergent structure you are creating in the blend, so it's a key human capacity and it's one, of course, that language is using all the time, all the time, all the time! So I'll stop and maybe we can have a few questions. Thank you!

LECTURE 5

Metaphor and Conceptual Blending

Thank you! Good morning! We have an important day ahead of us, if you follow me all the way to the other university. Because today we study two central aspects of cognitive linguistics, namely, metaphor on the one hand, and grammatical constructions on the other. And of course, that is the heart and soul of cognitive linguistics, grammar and metaphor. And you've heard a lot about these topics if you came to the previous forums, by Ron Langacker on grammar and George Lakoff, very famous for his work on conceptual metaphor theory, and Leonard Talmy, also notable for his work both on grammar and the psychological underpinnings of grammar, and mappings and metaphor, things like fictive motion, for instance. I didn't bring that up, but I must bring it up. Again if you came to the Forum in October, you certainly heard about fictive motion from Leonard Talmy. And we will try to discuss that again, because there is an aspect in fictive motion of mapping and integration, that's also very interesting and that's been pointed out by my colleague Ed. Hutchins.

So let's get moving this morning! And let's start the lecture on metaphor! Now we've already approached the topic of metaphor in previous lectures at various points. And if you look at the handout, there is a very short recapitulation, starting on page 40 of your book, page 1 of the metaphor handout. There are a few reminders from lecture 2 about the interaction of conceptual blending and metaphor. And you might remember them from yesterday and Friday. It's only on your handout, it's not on my slides. One of the things that we discussed in the two or three previous lectures (the lecture on conceptual integration and the lecture on emergent structure) was the fact that conceptual metaphor theory was too simple. It was on the right track. It was breaking new ground and very important. So I'm not underrating metaphor theory at all. It's one of the very top, very important contributions, not only to linguistics, but to cognitive science in general. But we noted that the schema of source to target projection was too simple, because in many cases, and perhaps actually all

All original audio-recordings and other supplementary material, such as any hand-outs and powerpoint presentations for the lecture series, have been made available online and are referenced via unique DOI numbers on the website www.figshare.com. They may be accessed via this QR code and the following dynamic link: https://doi.org/10.6084/m9.figshare.5831163.

 | DOI:10.1163/9789004360716_006

cases of metaphor to some extent, there is not just projection from the source to the target, but there is actually development of novel emergent structure in what we've been calling a blended space, connected to the rest of the network.

So on page 40 of the handout, you have the reminder of the "digging the grave" example, which requires the blended space in addition to the two inputs. The two inputs are sort of the old source and target of standard metaphor theory, but you need the blended space in order to account for the novel emergent structure. The fact that when you dig graves, if you dig long enough, you end up dying in your own grave: that's not a feature of either one of the inputs. But it's a crucial feature in order to get this human scale that we've talked about many times, the human scale aspect of the blend. Instead of the diffused input of "*making a lot of financial mistakes and you don't know what's happening and so on*", you have this human scale idea of "*you dig a hole*". You dig a hole, and of course if you dig a hole that's very deep, you end up in a very deep hole. You cannot get out and that hole becomes your grave. So that's another input that I did not even explicitly put into the diagram. But that's another important input that explains the emergent structure that we get in the blended space, and that accounts for the compression, in order to explain to somebody that they are making mistakes, and that they are not even aware, and those mistakes are going to make them fail. You use this very powerful compression of "*digging themselves into a hole.*" But you make it even more powerful by making that hole a grave, so that they know they will die in that grave.

We had also noted (on page 40, example 3) that you could have metaphorical counterfactuals. That was the example of Clinton and the Titanic. And it said "if Clinton were the Titanic." Notice that has a counterfactual structure. But it's not building a counterfactual world where the person Clinton suddenly becomes a boat. That's not the idea. It's building a counterfactual that's metaphorical. It's building a blended space in which Clinton is linked to the Titanic and the iceberg is linked to all the opposing forces that are trying to impeach Clinton and make him resign, and make him leave the presidency. And what was important, what I pointed out, was that in the blended space you did not have the structure of the source domain, Titanic, iceberg where the Titanic sinks. You had a novel structure, that was actually set up deliberately, where the Titanic does not sink and the iceberg sinks, and the whole point of that particular counterfactual metaphor is precisely to explore the novel structure, to highlight the strength of Clinton. So you cannot do these things with the simple source-target theory of standard metaphor theory. You need the addition of blended spaces.

But now this morning I am going to talk about further complications, because it turns out that it's not enough to have just one blended space. If you

look in great detail at a given metaphor, you will find an even more elaborate structure with a succession of blends, blend after blend, after blend, accounting for the total metaphor.

And the example that I am going to discuss with you this morning is the example of the metaphors for time. And those are well-known metaphors: talking of time in terms of space. So in simple standard metaphor theory, you have a source domain of space, and it projects onto time. What we are going to see this morning is that the real picture is actually more elaborate. There is a lot more going on in that metaphor than the simple projection from space to time. Now as we go along, let me issue a warning. You might say: "Well, isn't all this getting too abstract or too complex?" And remember that in fact, all of this is happening, not in our conscious manipulation of words, it's happening in this unconscious backstage cognition, where the brain of the young child, like the brain of the adult, is capable of doing amazingly complex hidden unconscious operations. So it's no surprise that in the construction of meaning, you would actually have a hidden structure that is more complex than what you experience consciously. Now it's the role of the cognitive scientist—you and me—it's the role of the cognitive scientist, cognitive linguist, to actually delve into the hidden structures, into the backstage cognition that we can't see. And one of the ways we do that is by interpreting linguistic data. I had a very good question on the first day about the role of experiments here. And experiments can indeed complete the picture, so you can also do psychological experiments to corroborate, to confirm, the backstage cognition that is going on. So let's see how that works.

Let's start with a little bit of psychology, and psychological experimentation. The first thing I want to show is a slide from one of my colleague in the cognitive science department at UCSD, University of California, San Diego. His name is Emo Todorov, and what he studies is locomotion, how people move their arms and legs and so on. And how you could build robots that could do the same thing. Now it turns out that understanding locomotion is extremely hard, again because there are very complex brain patterns. And there is a very complex muscular structure. We have thousands of muscles that we never think about.

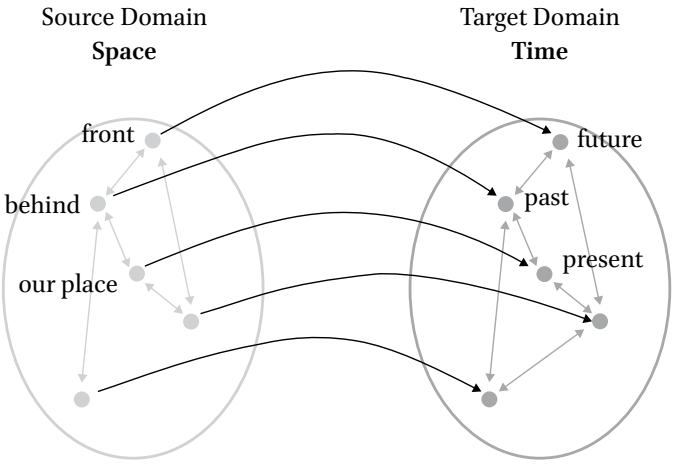
And so when you try to simulate locomotion, both in terms of the brain and the muscles, you really have a very hard problem. Now Todorov points out the reason we have brains as organisms. We, and lizards, and mice, and fish have brains, because we move. The brain is crucial for moving. And there are other organisms that are equally complex. They have very complex genome structure, like trees (for example). But they don't have brains, because they don't need to move. So the need for a brain is tightly linked to the need for moving. And the reason I bring that up is because many of the fundamental metaphors

are actually taking as their source domain motion in space. Motion in space for us is extremely crucial, extremely fundamental.

So as you well know, time is often talked about using spatial words. You can say "Christmas is not far away" or "getting close to Christmas", motion towards a particular time, Christmas. "Time flies" and so on. There are just countless examples. It's not one isolated metaphor, it's a very coherent metaphorical system. And again the importance of this was pointed out very, very vividly by Lakoff and Johnson in their book *Metaphors We Live By*. And it gave rise to a fantastic amount of work on metaphor across the world. Metaphor viewed not as a literary phenomenon, not as a kind of special abnormal figurative speech. But rather metaphors viewed as a fundamental, central, aspect of linguistics. That was the Lakoff revolution, shifting the notion of metaphor from something exotic and literary, and not central, to something that is central for language, and even more central (if you will) for thought, (language reflecting thought). So that's what we know.

Now here's a diagram taken from another one of my colleagues, Rafael Núñez, who also studies time:

Time As Unidimensional Space



And on that diagram you see the source. This is the simple view of time with the source target correspondence. Things like "in front" correspond to the future in many, many languages. And "behind" corresponds to the past. And "where we are now" corresponds to the present. So there is this systematic

correspondence of past, present, future with *in front, behind* and *here*. Consider one of the very important pieces of work, that Núñez has been working on (he wrote an article with Eve Sweetser, in the *Journal of Cognitive Science* on this). He studies the Aymara Indians in Chile. And in the language of the Aymara Indians, there is actually a different organization, which is corroborated by gesture and by grammar, where the future tends to be behind and the past is in front. The possible motivation for that is something like this: the past is something that we know. So given SEEING IS KNOWING as a metaphor, the past is something that we can know, and therefore metaphorically the past is something that we can see, whereas the future is unknown to us. And so it's like things behind us, things we cannot see. This is a different organization from, let's say, English. The majority of languages tend to have the future in front. And this is presumably linked more to the experiential schema that if I walk, I walk in the forward direction. And so things that happen to me will happen in front of me, and not behind me. You can see that there is room for different kinds of correspondences and, therefore, different metaphorical systems.

Now it's also well-known—(and this was again pointed out in the early book, *Metaphors We Live By*, but it has been studied over and over again in many contexts)—it's well-known that there are at least (in fact there are more than that) two central metaphors for motion and time. One in which it is the *ego*, meaning the person, that is moving, and the times are stationary, so "we move through time", "we approach Christmas", "we get closer to the end of the Beijing Forum lectures". This is ego moving in time, and time being a place that does not move. But there is another metaphor where the ego is stationary. The ego does not move. And the times are moving towards the ego, coming in front and then they move behind. The kind of linguistic data that constitute evidence for these metaphors are things like for the ego-moving, "we are coming up on Christmas", and for the time-moving, it's "the end of the quarter is getting close", "the end of the quarter is moving fast towards us", or "Christmas is coming up" where Christmas is moving. Now psychologists ask the following questions. They say: "There are these interesting metaphorical systems. But are they actually active in people's minds, or are they only dead metaphors that reflect the etymology of the words, that reflect the change, the historical linguistic change, so that words like *before*, at one point, could mean 'in front,' and then later change their meaning to mean "order in time" in a certain way.

So the psychologist doing experiments will ask whether there is evidence that the metaphor is actually psychologically active when people use it. And here is a very clever way of experimenting on this. It's been done by Lera Boroditsky and a number of her colleagues. She has done maybe the most

work on devising clever experiments. And some of these experiments use the following data.

You have the English sentence "Wednesday's meeting has been moved forward two days". And then you ask people: "What day is it on?" Now given the two metaphorical systems that you have in English, this is an ambiguous temporal statement. There are two ways to understand "moving forward", depending on whether you are using the ego-moving metaphor, or using the time-moving metaphor. If you are using the ego-moving metaphor, then the times are things like: here is Monday, here is Tuesday, here is Wednesday, Thursday and Friday. So with the ego-moving metaphor, if the meeting has been moved forward, then 'forward' is the direction in which ego moves, so two days from Wednesday to Friday, will be the date of the meeting. The meeting will be on Friday according to the ego-moving metaphor.

On the other hand, in the time-moving metaphor, it's the days that are moving. So you have Monday, and Tuesday, and Wednesday, and so on. And they are moving towards you. So you can think of the days as being bicycle runners, for example. They are all in a row. Monday is in front. Monday comes first, and then Tuesday comes afterwards, and then Wednesday, and then Thursday, and then Friday. So with the time-moving metaphor, if you move Wednesday, the Wednesday meeting, if you move it forward, you move it to the front of the line of the bicycle runners. So you move it to Monday. If you move two days, you move it first to Tuesday in front, and then to Monday in front. So the answer using the time-moving metaphor is going to be Monday.

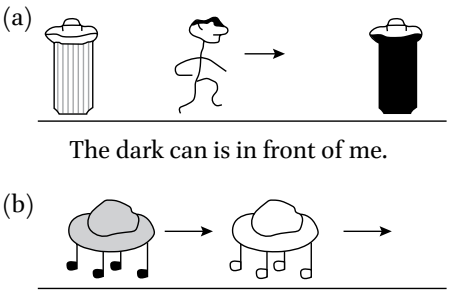
In other words, there are two possible answers. If you are using one metaphor, the ego-moving, you are going to answer Friday; if you happen to be using the time-moving metaphor, then you will answer Monday. Now notice that it's not the case that one of those is more correct than the other. They are equally correct. It is just an ambiguous statement. And people, when they answer the question, because all this is unconscious, are not aware of which metaphor they are using. They don't stop and think, what metaphor am I going to use today? Will I use the time-moving metaphor or the ego-moving? Because it's happening unconsciously, one of them will dominate over the other. And the answer will come to them automatically. They'll say Friday, or they'll say Monday.

Now what the psychologists did was clever. They asked people this question, but putting them in different circumstances. So in one case, they would have the person actually moving or imagining they're moving. I'll show you different scenarios. And if the person is in circumstances where they are moving, then there is priming for the idea that ego moves, and sure enough, there is a statistically significant number of answers "Friday," much greater than the Monday

answers. So the fact that the person is moving, or thinking of moving will actually favor the Friday answer. That proves, or at least strongly corroborates, the idea that in using the ego-moving metaphor, the person is also activating it in a real psychological sense. The person is activating the motion of the ego, their own motion, in order to think of the abstract question about time.

On the other hand, if, experimentally, they place the person in a stationary position, sitting down, and they have objects move towards the person, then the Monday answer dominates. Then the person tends to answer Monday. In other words, now you have the priming going in the other direction. The time-moving is primed. So that's pretty interesting. And in fact, here are some of the cases. In this case, the subject is moving between two garbage cans. But in this other case, the subject is watching objects move. Here are the results: in the first case, you get about seventy-three percent Friday answers, in the other case, you get about seventy percent Monday answers. So there is a difference, not a hundred percent. But there is a significant effect.

Metaphoric Structuring

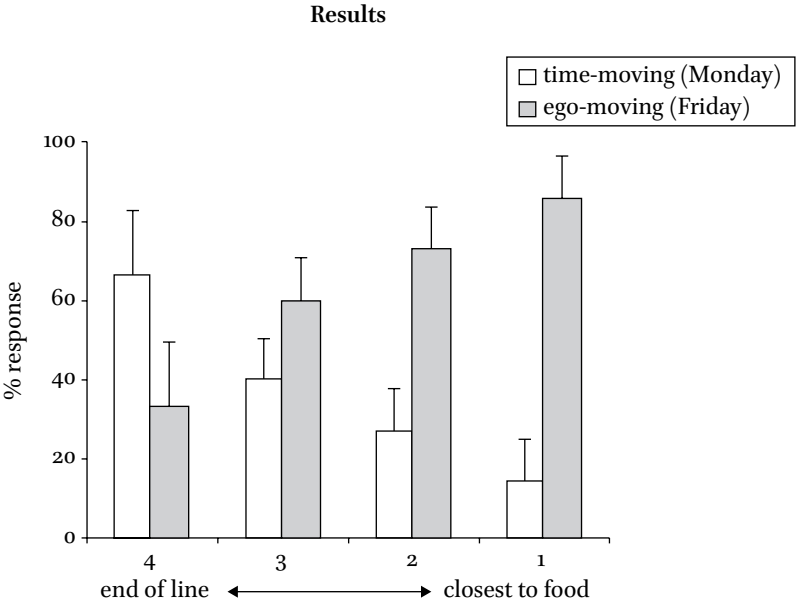


- Wednesday's meeting has been moved forward 2 days. What day is the meeting on?
- Ego-Moving
  - 73.3% Friday
  - 26.7% Monday
- Object-Moving
  - 30.8% Friday
  - 69.2% Monday

(Boroditsky, 2000)

These (*pointing to another slide*) are cases where they just imagine the motion. They get the same result with slightly weaker statistics. And here are some other examples that are really fun. You put people in a lunch line. They are just waiting for lunch, and you ask that same question, "the meeting has

been moved two days, the Wednesday meeting, when is the meeting, is it Friday, is it Monday?" And people who are at the front of the lunch line favor the Friday answer. Why? Because they are almost at the lunch table, so they really see themselves as moving. The poor people who are at the end of the line feel themselves as not moving at all, and the lunch is very far. They tend to answer the Monday answer. So they are primed for not moving, not ego-moving, and the other ones are primed for ego-moving. So these are the results (*pointing to slide*).



(Boroditsky & Ramscar, 2002)

And they found the same results when they went to airports or train stations. So they would go to the airport, and they would interview passengers getting off the plane. And those passengers would give the Friday answer, because those passengers were moving. And then they would interview people waiting for the passengers, people who have been waiting maybe two hours for somebody to arrive. And then those people would give the Monday answer, because they were primed for not moving. So these are really pretty amazing results. It shows that people have been depending on context that's 'going on.' They

will have a stronger activation for themselves moving or for some other things moving. But in addition, that stronger activation will then intervene, will play a role in the choice of the metaphor. So that is considered pretty strong evidence that the metaphor has psychological reality, is not just a kind of linguistic remnant of something. So same thing in train stations, same result. That's the first part, an obvious very important role of motion in space in order to conceive of time, number one, and number two, the psychological reality tested by psychological experiments.

Now we come to complications. What I am going to talk about now is taken from joint work by myself and Mark Turner. And it's not in the book *The Way We Think*. It's in a more recent article that I put on the website. So if you want to read the complete article, it's a chapter, actually, in the book published by Ray Gibbs on metaphor. This book is just about to come out—a useful book for you to get hold of. Because basically it's going to have all sorts of major views on metaphor in that book. And Ray Gibbs, who himself is a psychologist who works on metaphor, may be the very next speaker at the Beijing Forum. So that Ray Gibbs, maybe in October, will be at this very same place. And what you will get from Ray Gibbs will be the point of view of psychologists. From people like me and Lakoff and Langacker you will get the point of view of linguists. But from Ray Gibbs, you will get the point of view of psychologists. And I am sure you will get a lot of contributions from Ray Gibbs to show what kind of psychology experiments one can do in order to advance cognitive linguistics. That is an important part of the general answer to the excellent question that was raised in the first lecture about "what is the role of psychological experimentation?"

So in this article, it's called *Rethinking Metaphor*, by Mark Turner and myself, what we do is we study in more detail the metaphor of time, and what we find is there is not just a simple idea of objects moving in a uniform way, or ego moving in a uniform way through time. But rather there is a notion of fast or slow motion through time. Or fast or slow motion of time itself. So what could that mean? Take the example, "three hours went by". You have the times going by, the hours going by. Notice that even though this is a spatial metaphor, you have units of time, and they are moving. But with units of space you don't have the same kind of sentence (that star, the asterisk there, says that this is an ungrammatical sentence, the second one). You cannot say "three feet went by, and he was at the door". In other words, suppose the door is here, and I am moving towards the door. I cannot say three feet went by. But with the metaphorical use of time, suppose there is an event now, and three hours later there is lunch. Then I can say there are three hours separating me from lunch. And

when I get to lunch I can say "three hours went by". So the time system doesn't work exactly like the spatial system.

Then if you look at no. 3, "Minutes are quick but hours are slow", we all understand that, right? The minute goes by really fast, the hour takes longer. But in the metaphorical system that should not be the case. Because the times all move at the same rate in the simple standard metaphor of Lakoff and Johnson. All the times move at the same rate. It doesn't matter if it's a small minute or a big hour. They all move exactly at the same rate. And in fact the minutes are contained in the hours, so the minutes have to move at the same rate as the hours. Like people in a train if you like: If the train moves at a certain speed, then everybody in the train is moving at the same speed. And yet we say minutes are quick and hours are slow. So again this is not accounted for by the standard metaphor.

I'll skip some examples. But now look at No. 5 (No. 8 in the handout) "those three hours went by slowly for me, but quickly for him". Now if the times are moving uniformly, how could the times move differently for me and for you? It's the same time. It's the same hours on the watch. Again this is not explained by standard metaphor theory. Same thing for these examples, like six and seven.

1. Three hours went by, and then he had dinner.
2. *Three feet went by, and he was at the door.
3. Minutes are quick but hours are slow.
4. *Inches go by faster than feet.
5. Those three hours went by slowly for me, but the same three hours went by quickly for him.
6. For me, the hours were minutes but for her the minutes were hours.
7. At the end of the three hours, you will have solved the problem, but at the end of the same three hours, he will have solved it and five more.
8. Time came to a halt.
9. Sure, it's Friday afternoon, but Monday morning is already staring us in the face.
10. Next week was an eternity away.
11. For me, the three hours were forever, but for her, they did not exist.
12. It'll go by faster if you stop thinking about it.

Things can be even more extreme. You can say "time came to a halt". What could that possibly mean? In the standard metaphor theory, if time comes to a halt, it's the end of the world. Because normally time just keeps moving at

the same rate all the time, so to speak. But in fact we say "time came to a halt", "time froze". When do we say that? We say that, for example, when there is something very difficult to do and that we want to be over quickly and in fact it looks like time is not moving. So these are all subjective notions. We have subjective experience of time as moving faster or slower, and at different speed for different people. This is not explained by standard metaphor theory which has all the times moving the same way for everybody.

And then you've got examples like this, "Sure, it's Friday afternoon, but Monday morning is already staring us in the face." That corresponds to the case where this is the weekend. It's Friday. (Today is Sunday, so don't worry about that) But if you have a weekend, not like this weekend, but a normal weekend, where Friday is the last day of work and Monday is the next day of work, then the problem for somebody on Friday is that they don't want to go back to work. But they already can see the weekend is going to feel very short. They are not going to have time to do everything they want … And it's like Monday is already here. "How sad. Monday is staring us in the face." So Monday feels very close, because of the weekend, whereas in the other direction, if you are on, let's say, Wednesday, then Friday seems very far, not close. Because you are waiting impatiently for the weekend, and so it seems far. Same thing for all of these examples. And you can have things like: "It will go by faster." Something painful is going on: well, it will go by faster if you don't think about it. Or if you are asleep of course. So all of this suggests a more complex organization of time than standard metaphor theory would suggest.

What is actually going on? I will give you an outline of the analysis that Turner and I propose in order to account for what is actually a very wide range of facts.

So here is what we do. We look (in the same spirit as in the last lectures on Saturday and Friday) for inputs to various integrations.

The first input that we take is the input of events, and we've talked before about just regular event structure. Human beings consciously divide the world up into events. I am not trying here to find out what events really are, either metaphysically or neurobiologically. I am just stopping at the level of the way that we consciously divide up the world. And we can say: "Well, this morning I had breakfast, and after breakfast I walked to the lecture hall. And then I listened to this long lecture." So there are three events. You've divided the morning into three events. There was breakfast, and then there was walking, and then there was the lecture.

Of course, you can find sub-events within the big events, and on and on. And you can find overlapping events, all kinds of things. That's how humans have memory in order to be able to do this with events. They have to have memory

and in fact they have to share memory. Because if we have breakfast together, we will remember breakfast as being the same event, even though each of us may have had different things to eat for breakfast. So it was a different event in one sense, but it was also the same event of having breakfast together. This lecture is the same event for all of us. But we are all experiencing the event in very different ways, obviously.

I am experiencing it as "what should I say?", "what should I not say?", "are they listening?", "are they asleep", and so on. That's my experience of the lecture. Your experience of the lecture is, for some of you: "How fascinating, how exciting, tremendous." For others: "How boring. I hope this lecture is going to be over soon." So you can have different experiences of the lecture. I hope there were no people of the second category. I was just inventing that. Only people of the first category! In any event, we understand event shape. We take as an input, the human psychological capacity to understand events, to have categories of events, and to remember events, That's the input E. I call that input E.

Now, event spaces can include subjective experience of those events as I just outlined. The lecture can be painful for one, pleasant for another. Yet, it is the same event. Now here is another input. This input, I call X, and this is the input of motion through space. Motion through space is also a series of events. For example, I stand still. That's one event. I stand still for, you know, a certain amount of time. And then I start to walk. And that's another event. And then I fall down. And that's another event. All of these are, of course, motion through space. So the input X here is the set of 'motion through space' events. Notice that it is part of E, that is the input E of all events, contained as a subgroup. E contains the events of moving through space. The events of moving through space are very directly accessible for us. They are human scale, precisely. They are events that we can see; we can experience them in our body; we can experience them in another. There has been a lot of talk recently in cognitive science about mirror neurons. Neurons that have been discovered in monkeys, and that certainly exist in humans, probably even more. And these mirror neurons 'mirror' like a mirror you look at yourself in. The mirror neurons have a property of firing, both when you are doing a certain action of grasping, and when you see somebody doing the same action of grasping. So they are sensitive to your own actions and to somebody else's actions, similar actions, of course. That means that we have a neural system that, among other things, is very sensitive to motion in space, both our own experience, embodied motion, and the motion of others that we perceive, that we see, or that we feel.

Now that's of course totally in keeping with the comment by Todorov about why trees don't have brains and animals do have brains. Because one of the specialties of the brain is actually to control motion, and to imagine motion,

to perceive motion, and to understand that the motion of another is the same as my motion.

That makes the space of events, X, which is a subgroup of E. The space of 'motion in physical space' events. It's a very important subgroup for us. And what happens in the event structure blend is that we can match X to E. We can blend X with E. What does that mean, blending X with E? (*aside, pointing to slide*: I'll come back to this. Let's see. I'll come back to the other part that's important.)

Blending X with E means taking all the events E in general, all events, and matching them to events of motion in space. And then blending, so that in the blend, every event, not just motion, but every event, like listening to the lecture or having breakfast, becomes motion through space, because it's been blended with a 'motion through space' event. Now this is of course nothing else than the very well-known event-structure metaphor. This is a metaphor that was studied by Jane Espenson in Berkley. And it is reported on and analyzed also in the work of Lakoff, in particular the book *Philosophy in the Flesh*, that I'm sure you know about. There is a detailed analysis of the event structure metaphor. Now the event structure metaphor is a blend, because metaphors are often blends. What it does is it blends the general space E of events with the spatial events X of motion events, motion events in space.

So let's go back a little bit, and talk about the properties of X. As we experience them psychologically, the properties of motion through space. And here two properties that are going to be important for understanding the metaphor. The first property is a very obvious one. If we travel from A to B, and then from B to C, we know that the event of traveling from A to B is over, is finished, before the event of traveling from A to C, the complete event. So if the path is a subpart of the complete journey, then we know that the event, corresponding to that path, is going to be also finished before the entire event. It's very common sense, right? But it's a key to mapping the spatial distances to the event of moving through those spatial distances. So that's point No. 1.

Point number 2 is: if you travel from A to B, and then from B to C, then AB is shorter than AC. No surprise, regardless of what path you choose. This is a very general, topological property of moving. A very simple one, one that we find obvious.

But now look at this, what about the notion of fast and slow? In English we say that going from A to B is faster than going from A to C, even if our speed is actually the same. Now this is tricky. We suppose you are traveling at exactly the same speed, uniform speed. You go from A to B, and then from B to C. Now A to B is a shorter distance than A to C, right? If you are traveling at uniform speed, you are not faster on the first part than on the whole part. You

are exactly the same in terms of technical speed. But actually that's not what the word *fast* means. The word *fast* says that A to B is faster. That is it's faster to get to, let's say, the hotel next door. It's faster than to go to the other end of campus, even if you are going at the same speed. So what "fast" and "slow" in English are really singling out is not speed in a technical sense of the speed of a bicycle or car. What they are looking at is actually the distance covered. So fast and slow really refer to what distance you are covering. That's going to be important in what comes along later.

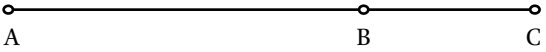
So now we blend events in general with special events that are motion events. And this allows us to use spatial vocabulary. We can say: "We can go through the lecture," just like "We can go through the park." We go through the park: that's real physical motion. But all of us are now going through this lecture. I am moving a little bit, and you are moving almost not at all. But in the blend we are all moving through the lecture event. So that's the important thing: in the blend, we are now all moving through the lecture. Because, in the blend, everything is motion through space, any event, like the lecture, the breakfast, or whatever, has a certain length. It has a certain distance corresponding to them. And it also has this notion of fast and slow.

So you can say: "The lecture yesterday was fast, but the lecture today is slow." You don't mean that they took a different amount of time. You could mean that they both took, let's say, one hour maybe. But your feeling was that yesterday went along, fast. And today, maybe, your feeling is it doesn't go along so fast. Even though in fact we are covering exactly the same distance. So that's an important subjective feeling. It may be fast for one of you, and slow for another. So the feeling of speed depends on the person experiencing the event, even though the event is going by for all of us in the same way. We are not traveling in time. This is not science fiction. This is the first step: we are able to build a blend E/X.

Now, this notion of fast and slow applies to ordinary motion. And this could be considered a case of metonymy if you like. But more insightfully, it's a case where we transfer one aspect of motion to other aspects. So the motion always corresponds to the path. So we can now point to a road. And we can say: "That stretch of road is faster than the other stretch of road." We don't mean that it's longer. Or we don't mean, of course, that the road itself is moving. No, the road is not moving. What we mean is that somebody who moves on that road, on the first stretch, will move faster than on the other one. Why? Because maybe on one stretch of road, it's full of holes or something. Or maybe because one stretch of road is winding and the other one is straight, even though they have the same distance. So we can apply the words *fast* and *slow*, not just

to moving objects, but to the corresponding non-moving path that the object goes through.

In the blended space, you go from A to B, and the event is going from A to B. But because this is motion through space, there are different roads to go from A to B, in the blended space of course. So one of you may choose a fast road, and another one may choose a slow road. And let's see if we have the diagram for that. Here is the diagram. So in the first one, you go from A to B, and from B to C in a straight line and that is a faster road, and a faster event. And the second one uses a zigzag, A to B, and B to C, and this is slower and longer, of course. It's a longer stretch of path.



Now, the way the metaphorical blend is working is very interesting. Because it takes the event itself, the shared event that we have together in the blended space where every event is motion. The event that we share together is going from A to B. So here is the start of the lecture; here is the end of the lecture. And we all go from A to B. And in real time, the time of the watch, it takes the same real time for all of us to get from A to B. But in subjective time of how we feel, then some of us may take a straight path, and others, for the same events, may take a crooked path. And that corresponds to the idea that when you experience the event, you may, for example, be doing a lot of things at the same time. And another person may be doing nothing. And so there are all kind of things that happen. You have expectations. You may wish for the event to end, and therefore the road in the blended space, the path corresponding to the event will seem like a long path, that's when you feel that the lecture is long, or the event is long.

So here is the crucial thing. Because we are now in a blend where everything is motion and space, we can look at the path, and we can see that for the same event AB, people can have different paths in the blended space. And therefore, one of the paths may be long, the other short. One of the paths may be fast, and the other slow. This explains the words we use in English. The fact that we can say "this was a fast lecture, a slow lecture, and so on". And it explains the fact that this can be different for different people, because they can be using different psychological paths in order to experience the same event. So this is the dimension of subjective experience of time, which is reflected here as different kinds of paths to go from one point to the other point.

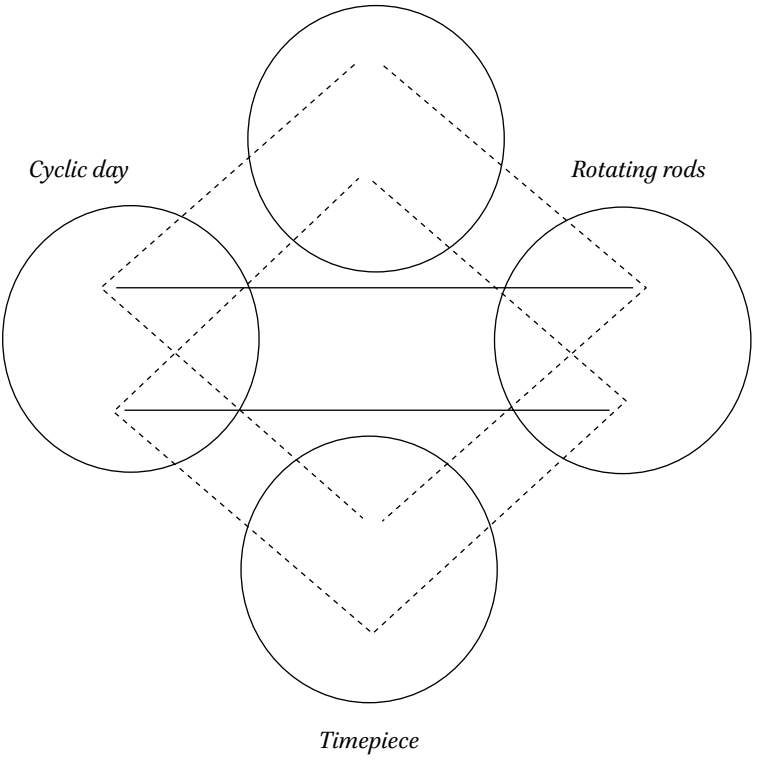
Now comes another input. That's one that we mentioned yesterday, when we talked about the emergent structure of time. And the emergent structure of time is the time of the clocks. Remember, yesterday, we showed how there was this experience of days and then there was a compression into the cyclic day that starts over and over again. And then, there was a great blend with engineering devices, namely clocks and watches and sundials and clepsydrae, and so on. And that blend gave us the notion of timepiece. Now, the notion of timepiece depends not on subjective time, but on objective time. It depends on the fact that the mechanical device is operating in synchrony with all the other mechanical devices at the same rate, no matter what the individual feels.

So the mechanical device has a single path to go through the event. Whereas people have a lot of different paths. What we find here, then, is the notion of another input, M, which is the notion of the shared universal events. Now this is something we take for granted. But it's actually a very interesting human conception. Once we have the clocks and watches that we showed yesterday, we can then take the event of, let's say, the hand of the clock, going from ten to eleven. We can take that event. And each one of us experiences that event, but it's a universal event, because it's the same on clocks for everybody, because of the engineering feat of being able to synchronize all the clocks.

So instead of saying "one hour on this clock, one hour on that clock, or one hour at the other clock," we can just say "one hour" in general. We can compress, and this is a massive compression. We can compress all the watches and clocks into one single universal timepiece, as if there was only one time piece. Of course sometimes there is one time piece that serves as the reference for everybody else. The Greenwich time used to be, maybe the time on the clock Big Ben. And that was a reference. Now, you have very complex atomic clocks that depend on the movement of atoms, and maybe the decomposition of atoms or something. They are considered the norms for everybody else's time. What's important? We don't care which one is the absolute reference.

What we care about is that as human-beings, we can compress them into the notion of the same hour for everybody. So now we have this event, the hour. These are invented human events, remember? They don't exist in the world until humans come along and build watches. And now we have the event of the hour, ten to eleven, shared by everybody.

So this is a universal event that we all share. The lecture is an event that some of us share, all the ones here, but not everybody else in the world. But the hour, ten to eleven, is shared by everybody in the world. So we've been able to create an event that everybody in the world shares. And so these universal events are crucial. This is the timepiece that we talked about yesterday. And the integration network consists in, on the one hand, the conceptual cyclic day here; and over here the mechanical device that is linked to the cyclic day with rods that turn. Over here we end up with M, which is the space of universal events, where we have hours and seconds, the universal timepiece.

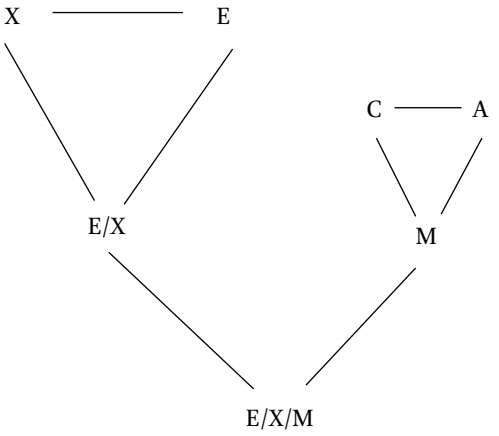


Emergent: **nk** intervals of time (n = 2, 24, 1440, k = 1, 12, 60)

Now crucially, in order to have this, we have to have two very important things, the capacity of people in the world for compression, and of course the capacity for engineering these fabulous time keeping devices (which I remind you, are in the Hall of the Clocks, in the Forbidden City, so don't miss that if you haven't seen them yet). We then have one ideal timepiece. And we can now talk about the hour, because the event, the *hour*, is now an event that everybody shares.

In the blend of E/X, we can talk about going through the hour. Just like we go through the lecture, we go through the hour. So the hour has now become, in the blended space, something that is spatial, that we can move through. In order to do that, you have to blend the space that we had before. This was the blend E/X, remember, events in general as events of motion through space. This gives us a blend, where every event is motion in space.

Now we blend that with M. This is the universal events, the hours, the seconds, that everybody shares. And we get a new blend, E/X/M, where now all events can be compared to the universal events. That's why we can time any events. We can say: "This event, this lecture lasts one hour and half." "This motion that I am doing with my figures lasts, you know, one second." And we can do that by virtue of this blend. We can now go through any of these spatial creations, the hours, the minutes and so on. In the blended space, they become part of the physical space that we can move through, or that can move towards us.



Incidentally, this is a spectacular construction of the human mind, but also human culture. It's not constructed by the human mind in one single blend. It's constructed over a long cultural period where people devise different kinds of timepieces, different kinds of ways to ensure synchrony. And we end up today

with something we find completely obvious. We say, well, there is time out there in the universe. And we have instruments that measure time out there in the universe. That's not what's going on. We are the ones who invented time. Of course, you can then ask the real physics questions, "what is the human notion of time that I'm explaining here?" "How does that influence a specific theory in physics, for example, Newton's theory, or Einstein's theory, where time can vary depending on speed of motion. That's a very, very fancy kind of question. But it's important to realize that time, both in its event shape, and also mechanical instantiation, is a fantastic invention of the human species.

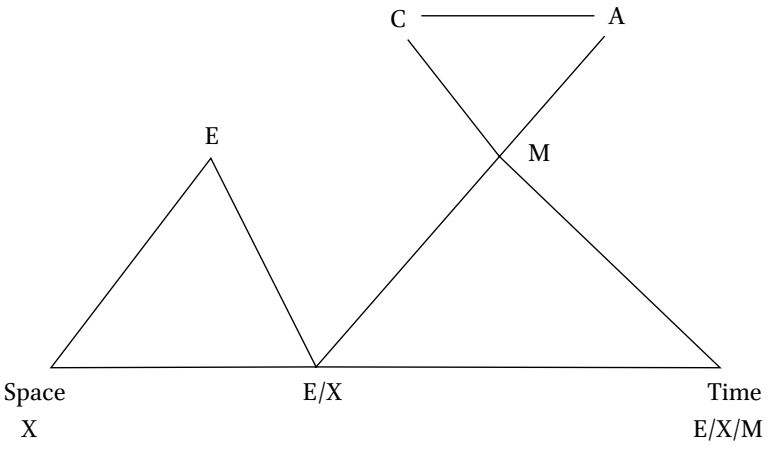
As a result, then, because of this super blend, E/X/M, every event has a measure, hours, minutes, and seconds, not surprising to us. But if you think about it, children take a long time to learn this. It's not something obvious at all. It takes several years, and the children usually will not know it well until six or seven years old at least, will not master instantly this complex conceptual system of time with the clocks and watches, and the events in everyday life. So it's a non-trivial system. Later as adults, we find it as obvious as the language we speak. But remember the language we speak is very hard to learn. So, same cause, same effect.

Now, because, (remember), there are several paths we can go through, this means we can go through the same universal event, the hour. Somebody can go through the hour faster than somebody else. And if I give the lecture and it lasts two hours, I can say "Hey, I went through the first hour much faster than the second hour." And what I mean, probably, there, is something like: "Oh, I covered more distance because I covered more topics." So more topics become more events. More events become a longer distance. If I covered a longer distance in the first hour, then since it was the same amount of time I must have been going on a lot faster, right? And that explains the subjective structure of these funny sentences.

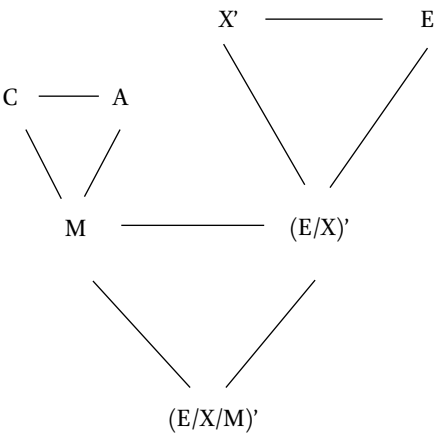
Mapping between the events, we have the blends here. And we have two ways of blending, one where we project from the universal events and one where we project from the subjective events. Now if we project from the subjective events (and I've called this E/X/M, because you project from E to the blend) then you can have things like: "Visiting your parents goes faster for me than it does for you." Or "goes slower for me than it does for you." In that case, the same event has different speeds, even though it has the same length for the reasons we explained before, because of these different paths.

On the other hand, if you project from M, you project from the universal event. Then you can say: "Visiting your parents will take an hour." and 'take an hour' cannot be two hours for you, and one hour for me. No, one hour, that's the universal event. This is the way the network looks at that point.

And here is a funny little trick. Remember that in the original simple metaphor theory, you have space mapped directly onto time. Now what we've shown with this network here is that motion in space, and then space itself, the corresponding path actually, could correspond to time. Because, over here, this is the notion of objective and subjective time that we talked about. Now we can reorder this very same schema. I drew it in the order that it was composed. But I could just draw with a different orientation, and then I would get this. This is the very same schema, but just with the lines in a different position. If I draw it like that, I find space X over here, and then I find all these other blends. And then I finally find time, as we conceive of time as hours and minutes and so on. Time is at this end. So now you can see that in the complex network, we actually do have a mapping from space to time. So Lakoff and Johnson are right. There is a mapping from space to time. But that mapping is actually the result of the construction of this complex network. And we need the rest of the network in order to account for all the differences between subjective and objective time that we talked about.



Now the next point is that there is a dual to this network. This network that I showed you was an ego-moving network of ego moving through time, either subjectively fast or slowly. Of course you can have the time moving network. And in that case, they are called X', and so on. You have examples like "the two hours went by", "the two hours went by painfully", "the lecture went by painfully". It's the lecture now that's moving, or the two hours that are moving. So it's the dual of the other one. And the structure that we get is the same as the other one, but with different spaces now, (E/X)' and X'. Because X' is the



space of objects moving, whereas X was a space of me, ego, moving through objects.

Now in addition to that, we have to bring in memory, and this is another part of the network where we bring in another kind of metaphorical blend, which is that we conceive our memory as being organized spatially. And in the spatial organization of our memory, here is the kind of thing that happens. We have "the years race past", the years go past very fast. Remember how the older you are, and the more you feel: "how can the years go by so fast?" If you are a young child, the year seems to go by very slowly. If you are an old man like me, the year seems to go by very fast.

Now what is happening here? Why do we say: "the years go by very fast"? Well, in our memory, we have events and we have time separating these events. Measured in years, measured in hours, according to other networks that we talked about before. So if you say something like "the years go by fast," it's because in terms of the universal event, it looks like there are many years, maybe twenty years, but in your memory, there are events like 1980, or your wedding: "my wedding feels like yesterday." It feels very close. And there are many other events that I've forgotten. But I remember my wedding really well. And it feels like it was a short time ago.

So in the metaphorical system, my memory is also a physical space. And you look at the two events. My wedding and today, and you say, well, that's funny, because, I know, in universal event terms. I know they are very far apart, if my wedding was even before 1980, a long time ago. Suppose your wedding was in 1980. And you say, "oh, 1980, feels like yesterday." So in your memory, 1980 is very close to 2008, but how can it be close? Because you know by universal events that it's really 28 years, it's a long distance away. Well, therefore, if in

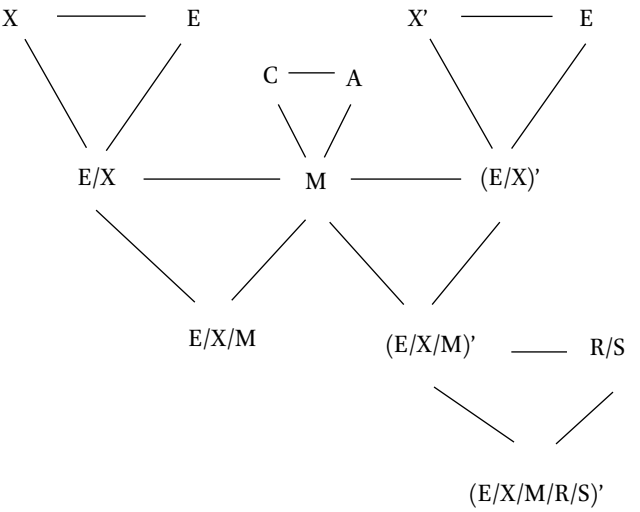
fact, it's a long distance away, but if it seems close in your memory, then it's because you must have traveled very fast.

And this is true. Let me persuade you of this if I can, and this will be it. We are almost getting to the end. So this is true in ordinary real motion through space. Suppose you are in a train, and suppose you are traveling between two cities. Now you travel in the train, let's say from Beijing to Shanghai. Now suppose it turns out here that you go to sleep, and you wake up, and you are already in Shanghai. And so subjectively, it feels like this was a very short trip. But then people tell you, "oh, there are, I don't know how many miles, but there are hundreds of miles between Beijing and Shanghai." Then, the logic is "well if there are so many miles, if it's such a long distance, but if it felt very short to me, then the train must have traveled very fast.

And this is the same logic that we used in the metaphorical blend: we have the year 1980 and today that seem very close to me, you know, like Beijing and Shanghai. Because it looks like the trip happened very fast, therefore as the train must have traveled very fast, the years here must have traveled very fast.

So there are very many interesting linguistic examples of counterfactuals and subjective time. You can say, "where have all those years disappeared?" In the objective universal space, you know that there are all those years, twenty years, in your memory. It's like you remember 1980, and then for the other years you don't have much memory. So they must have disappeared: in your memory, they've disappeared. But you know in reality, they haven't disappeared. So you ask the question. They must have disappeared, because in my mind, 2008 and 1980 are now next to each other. The other years, I know they were there, I've been told that there were 28 years. So they must have disappeared somewhere. In other words, when you say "where have all those years disappeared?", you give primacy to your memory over objective time. You say, well, what's true for me is what's in my memory. Those years are gone. So if those are the years are gone, they must have disappeared someplace.

So this is the network that you end up with. You can see how it's much richer, it's much more involved, than a simple space-to-time correspondence. You can also see that it is motivated. If you had just a space-to-time correspondence. you could say, "Well, why should space correspond to time?" Space is different from time. Why would we use a correspondence between space and time to conceive time? Well, here, of course, it makes a lot of sense. Because it's not really space itself. It's motion through space here. But motion through space is a subset of ordered events. And ordered events are what give us humans the actual understanding of time. So that's why the source domain (what was called the source domain in standard metaphor theory), X, ends up giving us this very rich conception of time with subjective feeling and memory and



so on. It's because it's a subset of the events. And it's a very important subset, because we are human beings, and we are not trees. So we have brains that are extremely adapted to motion through space, and so the events of motion through space become a way for us to think of the more abstract events, that we do not experience in a human scale way. So even though this looks like a more complex picture, it's actually in a way a much more motivated picture. It explains why we have all these correspondences. It's also, of course, a much more explanatory model. Because it explains all this other data about "time freezes", and "time goes slowly", and "the lecture goes fast", and so on, that the other theory cannot explain. So that's the bottom line of this new way to view metaphor.

I put at the end of the handout this section, where you have a literary passage that uses other metaphors for time. I will not talk about it, but I encourage you to read it, and to see that the additional metaphors that are brought in, are actually further blends. So what happens in the literary text is that you use the architecture of the basic time metaphor network. And then you blend it further with other inputs that you have. For example, here, you have motion of the autumn sunlight, from one wall to another wall. Or look at this example: perhaps the mass of the past gathered there is pulling time out of the future. You bring in another frame where you pull something out, but the future is where it is. You pull out of the future and it comes into the present. All of these are just using the basic architecture, but then they are adding more inputs. Input of pulling things out, input of sunlight moving, input of the years of unreeling.

Unreeling means 'like a fisherman', where you have a fishing line. And the reel is the thing that you turn, and the fishing line unreels. It expands and you can see what a horrible thing it must be to grow older and 'find that ever decreasing number of years hurrying you faster and faster toward your grave.'

> *Remarkable—when I am sitting on a cushion on the floor, busy with scissors and glue pot, the time just vanishes. Before I know it the latticed rectangle of pale autumn sunlight has moved from the left wall across the floor to the other wall and Mrs. O'Carolan is calling me for supper. Perhaps time is flowing faster up there in the attic. Perhaps the accumulated mass of the past gathered there is pulling time out of the future faster, like a weight on a line. Or perhaps, more mundanely, it is only that I am getting older every year and that it is the accumulated weight of time behind me that is unreeling the years with ever-increasing speed. What a horrible thing it must be to grow older and find that ever-decreasing number of years hurrying you faster, faster toward your grave, as if time were impatient to be rid of you.*

So we are back to the grave, always back to the grave. The years: because they seem to move faster when you are old, and because the end point that you seem close to is the grave, you bring in an additional input; since the years are moving and you are moving, then the years are the things carrying you, and pushing you, and they are pushing you towards the grave. My God, how sad!

What I've said here about time is true of metaphorical systems in general. You need to study not just the superficial mapping, but the underlying networks that really are responsible for these metaphors. So we can have a few questions maybe. And then we'll move through space to the other university.

LECTURE 6

Integration and Grammatical Constructions

Let me first thank the dean for his very warm and very kind introduction. And of course let me thank this university for inviting me and for being part of the Beijing Forum on Cognitive Linguistics, which professor Li from Beihang University has organized, giving us an opportunity to see, to visit and to interact with many of the universities in Beijing. So I am very honored and very pleased to be here.

And I will pursue the lectures that we've already started now for three or four days. Some of you have attended some of these lectures, and for them, what I will say today will be in continuity of what I've been talking about. Others of course, will join us for the first time. And for them, I would like to quickly, not recapitulate everything we did before, because we actually covered a variety of topics, but bring back for a few minutes some examples that we had in previous lectures that are actually relevant to grammar, today's topic, and that are relevant to cognitive linguistics in general. What is the aim, what is the goal of cognitive linguistics? And how is it a part of cognitive science, how and in what ways does it differ from other kinds of linguistics, for example, and in what ways does it pursue goals that go beyond the study of language, and that include the study of cognition, in general.

So I started my first lecture on Friday with this very same little picture. The important thing here is that a lot goes on in our heads, that is in our brains, in our mind-brains, and most of it, we are not conscious about, whether it's vision, where we see that the brain is doing a maximum of computational work in order to give us ultimately the sensation of image, or whether it's language, where vast networks are hidden behind the simple words of everyday language—that we find simple, that everybody around us can do, as humans and part of the human species, different therefore from other species on earth. We have behind the simple words vast conceptual networks that operate

All original audio-recordings and other supplementary material, such as any hand-outs and powerpoint presentations for the lecture series, have been made available online and are referenced via unique DOI numbers on the website www.figshare.com. They may be accessed via this QR code and the following dynamic link: https://doi.org/10.6084/m9.figshare.5831166.

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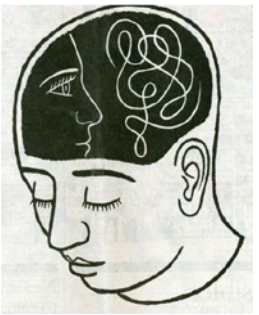


completely unconsciously through the activation of powerful neural circuits. Now it is one of the essential aspects of cognitive linguistics that it is interested not only in surface organization of language as we consciously perceive it, but it's also deeply interested in the hidden, so-called backstage cognition that goes on unconsciously when we use language, and in fact, much more generally when we interact humanly in all kinds of activities that go beyond language itself and don't always require language. So the basic, fundamental background for the Beijing lectures is what you see on this slide:

Beijing Lectures
- language is only the tip of the iceberg of meaning construction
- meaning construction operates in many areas of human activity: art, mathematics, religion, technology, poetry,…
- conceptual mappings are the same for all these superficially different areas of human thought and action
- therefore linguistics sheds light on general human thinking, and conversely, the study of meaning construction in other areas sheds light on linguistics

Number one, language is only the tip of the iceberg of meaning construction, it does not correspond directly to meaning. Meaning is much richer than the few words that we see in a sentence.

Number two, meaning construction does not operate just in the realm of language and talk. Meaning construction operates in all kinds of areas of human activity, such as mathematics, art, religion, technology, poetry.

Number three, the conceptual mappings that are studied by cognitive linguists are the same for all these very superficially different areas of human thought, so that's a key point, a very fascinating point: we use the same cognitive operations in order to do things that look to us humans extremely different from each other, but below the surface of the differences of these activities,

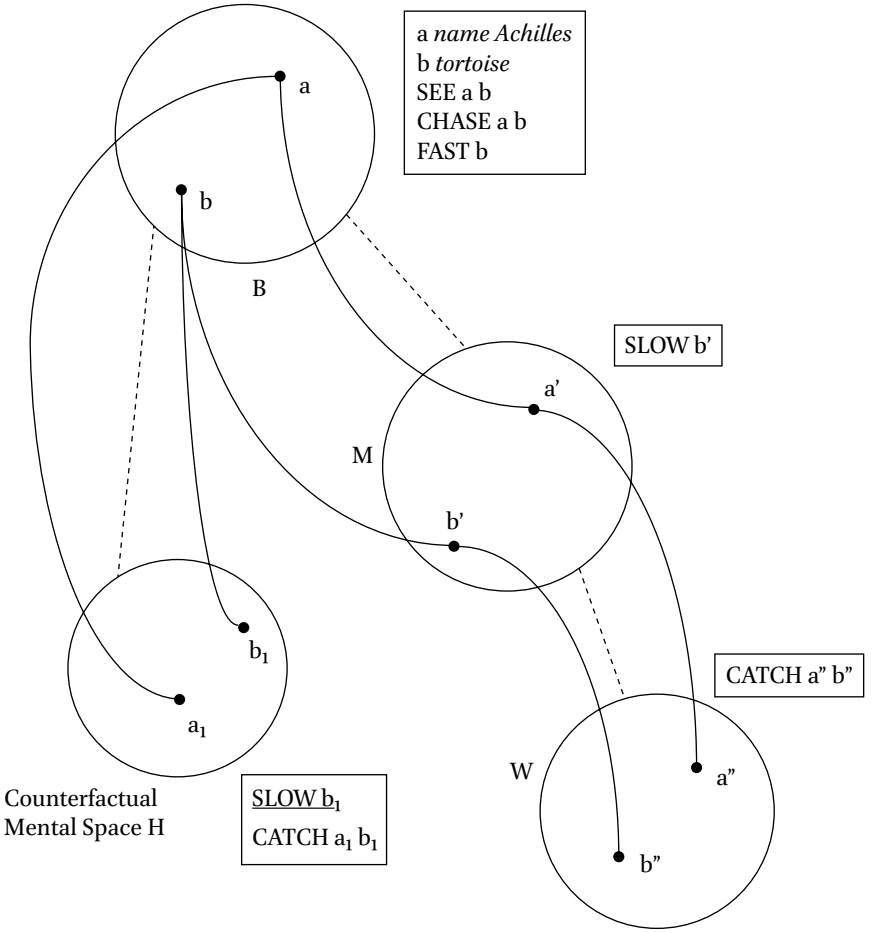
you have some fundamental cognitive operations that function over and over again. Therefore, linguistics sheds light on human thinking, because language is a window into this backstage cognition. But conversely, the study of meaning construction in other areas will shed light on linguistics because it will reveal aspects of these cognitive operations that are sometimes hard to see by studying only language. So that's the background that we operate with, and that guides the work. I indicated two websites, one for the website mentalspace.net. I don't know if everybody can see this pale purple here on the screen. The website is mentalspace.net, and it will give you access to the blending website but also to the Beijing Forum website where you have a number of readings related to the talks I've given, readings from many different researchers.

I also pointed out in my initial lecture, so I repeat it here very quickly for those who join us today, that there are many many books and special issues of journals that have been published on the specific topic of conceptual blending which is at the heart of the lectures that I've been giving and will continue to give. And these books and special issues address a number of very different areas. The areas can be language, but they can be also social science, design, artificial intelligence, music, art, sign language, and so on. Again if you look at the websites I indicated, you will find not only these books but also a great number of publications which may overlap with some of your own interests in one or the other of these areas. But the scientific point of mentioning this work is again to emphasize that the cognitive operations that we discovered initially through linguistic work turn out to be used in other domains, and give rise to work that is independent of linguistics but that is actually supported by the same kinds of scientific theories.

This morning at Beihang University, we addressed a very important topic of cognitive linguistics. We addressed metaphor, and one of the things that I tried to show in this morning's lectures was that metaphor was not a simple source-to-target operation, but rather involved the construction of complex, elaborate networks of integration. This afternoon, we're shifting from metaphor to grammar itself, and grammar of course is at the heart of what every linguist does and in fact it's in the heart of every linguist. Right? Linguists love grammar, they are the only ones in the world who love grammar. Most people in the rest of the world, the non-linguistic world, think grammar is difficult and sometimes unpleasant. But as we linguists know, grammar is fascinating. So today again we'll focus on grammar. And a quick reminder from the previous lectures of some of the things that we saw, that we studied, where grammar is actually involved, were grammar interacts with the meaning construction operations. Now it's not surprising that grammar would interact, because in fact language is what prompts the construction of elaborate mappings in our minds. So grammar is

actually a magnificent, very economical system that with few words can trigger vast meaning networks because we have the brains equipped to do it. Our brains contain background information that we've learned throughout our whole lives, and that is structured in a special humanlike way with frames, ICMs (Idealized Cognitive Models), connections between them, and many other things.

So one of the things we started with in the previous lectures was mental spaces. And one of the ways of setting up mental spaces is with grammar and language, like what you see here on the screen, (for those of you who have the book of handouts you can find all this in the first lecture of the handouts). And the very simple observation here is that a small text, like the one on the screen or in your handouts will trigger a construction of connected mental spaces, so I won't go over the analysis but this is basic mental space theory. Grammar helps to build up connected mental spaces.

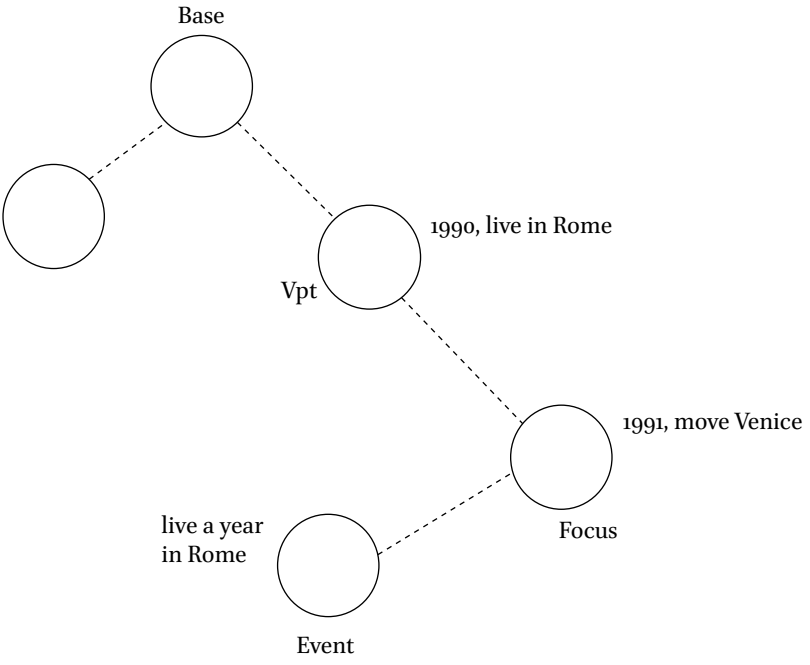


> *Achilles sees a tortoise. He chases it. He thinks that the tortoise is slow and that he will catch it. But it is fast. If the tortoise had been slow, Achilles would have caught it. Maybe the tortoise is really a hare.*

We saw another example that had to do with the same kind of thing but with the organization of tense in language:

> *Max is 23. He has lived abroad. In 1990, he lived in Rome. In 1991 he would move to Venice. He would then have lived a year in Rome.*

And so we had a very small paragraph here with different tenses, *is, has lived, lived, would move, would* and so on. In the analysis that was presented, (and that you can read in the readings if you were not at the lecture in question), what we saw was that the grammar in that case, with its tenses and sentence organization triggered the construction of several mental spaces that were related by time:



The space *1990*, was before the base space and *1991* was after the base space. And there was also an interesting shift of viewpoint and focus from space to space. So this is a reminder for those who heard the lecture, and an invitation

to the others to look in that direction for aspects of grammar that I will not have time to cover. In the example we just saw, an interesting corollary is that the path that is built between the mental spaces, like here, PAST and FUTURE, and PAST again, PAST PERFECT, is mirrored by a grammatical sequence, so that you have the path in a semantic sense. Connection between two spaces in English is actualized, is realized, with the simple past, and the future with the auxiliary *will* in English. And when you combine this, you get *past* plus *will*, and *past* plus *will* gives you *would* which explains why we have the form *would move* in the little paragraph that we saw.

More generally in the mental space section we saw that tenses using the *present,* the *past,* or the *past perfect*, could be used not only for time. (*pointing to slide*) All these sentences happen at the same time, the present. But the difference in tense is used to express so called epistemic distance (how, to what extent you think this is the case or not the case or may be the case). And so again, grammar here plays a big role in setting up these mental spaces in such a way that we have a different epistemic stance towards them, meaning that we have a different assumption about whether something happened or not.

a. *If you have Triple-A, then if you go to a telephone, you can solve your problem.*
b. *If you had Triple-A, then if you went to a telephone, you could solve your problem.*
c. *If you had had Triple-A, then if you had gone to a telephone, you could have solved your problem.*

Here, *If you have Triple-A*, maybe you have it, maybe you don't. Here, *if you had Triple-A right now*, you're sort of suggesting that you probably don't have Triple-A but maybe you do. And here, with the past perfect, *If you had had Triple-A right now*, the grammar is allowing you to express a counterfactual: namely you're saying you don't have *Triple-A*, but you're setting up the counterfactual mental space in which you do have *Triple-A*.

In one of the following lectures, this weekend, we studied phenomena of Causal Compression. And one example that we used was this sentence here, *Matina is three points away from the airport.* And the sentence was used in the case where Matina was a tennis player, and she was about to lose the match, she was very close to losing the tennis match. And as a result, the person on the radio, who was the sportscaster, who was reporting the match, used this expression *Matina is three points away from the airport* to say she is three points away metaphorically from losing the match. But if she loses the match, then by the tennis ICM, by the Idealized Cognitive Model of tennis (that we know

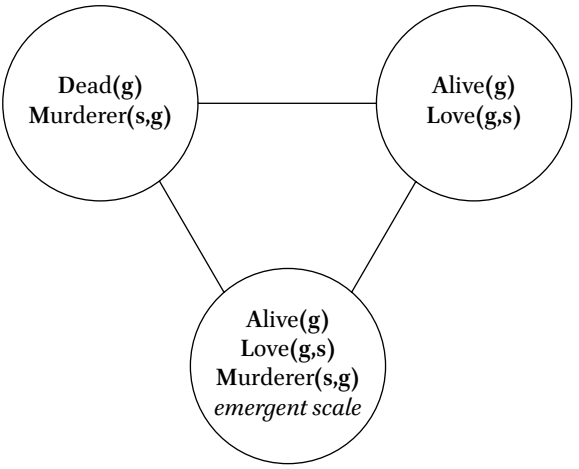
in this case, if you're a tennis fan), we know that if she loses, she'll be eliminated. If she's eliminated, she's out of the tournament; typically, she will then go home. If she goes home, then one possibility is she goes to the airport, and she takes a plane. So that in the final sentence, you have 'three points,' and you have 'the airport,' you have very little explicit grammar, very few explicit words. The words are not telling you about all this, but you reconstruct it instantly in your mind. The literal meaning of this sentence would actually make no sense, *three points away from the airport*. The airport's distance is not measured in points, it's measured in feet, or in miles, or in inches, and so on. So this is an example and we saw many in that lecture, where the language is minimal, but where the reconstruction that needs to be done in order to actually understand the sentence, to reconstruct the full meaning is actually very elaborate. That's one of the mysteries of language. How can very sparse grammar produce very rich meaning constructions. Importantly, the mental leaps that we have to do are not always coded in the linguistic signals; in fact, in most cases they are not coded, the linguistic signal just puts us on the right track.

We've also devoted a large amount of time to studying the operation of conceptual integration, also called blending. And I pointed out that in order to do an integration, you had to match inputs together partially. You had to find a partial mapping between the inputs, that depends on what they have in common, which is the generic space. And then you could build new blended spaces through conceptual integration. And in the blended space would appear emergent meaning through composition, completion, elaboration. So this is a fundamental theoretical architecture that we have for conceptual integration. And in today's lecture, I'm going to be applying this to problems of grammatical construction.

Let me quickly, for those who are joining us for the first time, let me give you a quick example of conceptual integration. This example is a counterfactual. Counterfactual means it's talking about something that did not happen. In fact here it's talking about something that is impossible. And the context for this particular counterfactual is a case where a teenage boy murdered his grandparents, and he was on trial, and he had been found guilty of murdering the grandparents. And now, the judge was about to sentence the boy, to say whether he would go to the prison for five years, ten years, forever or worse.

And his father, in this example, (this is attested data, real data) is pleading with the judge and saying, "*Please have mercy on my son*." "*In fact*," says the father, "*if the grandparents were still alive, they would also plead for mercy for their grandson*." So in terms of conceptual blending, what is happening is we have one input where the grandparents G here, are dead, and the son S,

has murdered the grandparents. And we have another input that is counterfactual (I mean the input that is not the case), where the grandparents are alive, and they love the grandson. They love the grandson. Why? Because they always loved the grandson. And we then build the blended space, in which paradoxically, the grandparents are alive, but they've been murdered, and they love the grandson, and they are pleading for mercy for the grandson. And the power of this particular blended space is that since the grandparents are the victims, if they plead for mercy, their opinion as victims has maximum importance and will maybe sway the judge. So even though literally this is an impossible situation—they can't both be alive and be murdered—in the blend it becomes a powerful, rhetorical way of addressing the judge. Well, this is one of many very diverse examples. And I just want to bring it back to refresh your memories, for some, and to give a glimmer to others of what this blending could be about.



So let's now start the new material in today's lecture, starting with grammatical constructions. Grammatical constructions have syntax, they have syntactical organization, and they have meaning components. That's what a grammatical construction is. And let us start with a very simple grammatical construction. We will start with NP NP again as a transition with the previous lectures because these examples were actually brought up a couple of days ago. And so here is an NP NP construction, Noun Phrase followed by Noun Phrase. And here some examples. *Caffeine headache*. It's also a Noun Noun construction: notice there are two noun phrases and each one of them in this case is a noun.

And we have *a nicotine fit, the money problem* and so on. And what was interesting about these examples is that they are the result of a blend, creating, making, something out of nothing.

Why? Because the money problem is not a problem because you have money, it's a problem of not having money. And the *caffeine headache* is produced in this case, by not having your coffee in the morning, and that gives you a headache. So we showed in the other lecture that the way that the missing things became things that we can talk about, like *food emergency*, meaning emergency because in fact there's no food. We showed that was done through one of these blends, and it leads then to the grammatical construction Noun Noun, *money problem* (problem because of no money). We also invoked a grammatical construction *I boiled the pan dry* where again there is very massive causal compression because the sentence by itself, just tells you that you boiled something. And then, it says *I boiled the pan*. But you didn't boil the pan, you boiled water inside the pan. And then, maybe, you went for a walk. When you came back there was nothing left in the pan, because all the water evaporated, and so the pan was dry. Well, on the screen here, you've got a long list of all the things that need to happen in order for this to be the case, in order to boil the pan dry. But you don't say them, you use a very economical compressed grammatical construction which in this case is *noun phrase, verb, noun phrase, adjective*. And that compressed grammatical construction allows you to reconstruct, in a particular context, a long chain of events which are not given to you explicitly.

Let's look at another simple construction, Adjective Noun. Well, when you are told about Adjective Noun, you think of *red ball*. And the adjective just indicates a property of a noun. So the ball is something, and red is a property of that thing, the ball happens to be red. But in fact, you have many other Adjective Noun combinations that are massive compressions, and not just a property plus the thing.

So here is an example, and there are many examples like that. The example is in English, when you say that something is *a guilty pleasure*. So typically, a guilty pleasure is something that gives you pleasure, but also makes you feel guilty. For example, you eat too much chocolate. Well, you know that you shouldn't eat chocolate, so it makes you feel guilty, but it gives you a lot of pleasure. Guilty pleasure is typically applied to small things not to big crimes. So it's something like chocolate. And as you can see, when you say "this is a guilty pleasure," and you're referring to eating the chocolate, pleasure is not directly a description of the thing, of the chocolate, or eating chocolate. It is in fact an effect, so there is a cause-effect Causal Compression. There is a cause effect

link. You eat chocolate, and the effect is pleasure, they are different. But now you compress, and you call eating chocolate a pleasure.

And again this falls under the sort of very general umbrella of metonymy, but it is in this case a Causal Compression, and so you can say: "that's a pleasure." Just like when you say: "your introduction, professor, was a pleasure." I don't mean that your introduction is the same as pleasure. I mean that it triggers pleasure, (listening to the introduction). In the same way, guilty is not a property of the pleasure, it's not the pleasure that is guilty or something. It's the person eating the chocolate that feels guilty. So again, you have a cause-effect compression. The chocolate is causing pleasure, but the chocolate and the pleasure together are causing guilt. You feel guilty because chocolate is not recommended in your diet, you're eating too much, or whatever. So you see that this very simple grammatical construction is actually used to evoke a very complex meaning, not just property plus noun.

Now here is another example, with again, apparently, a very simple grammatical construction, simple in the sense that is Noun Adjective. So we have *dolphin-safe tuna*. Tuna is a fish. And when you buy fish in American supermarkets, I don't know if it's the same thing in China, they'll tell you that the tuna is 'dolphin-safe.' What does that mean? *Dolphin-safe* is Noun Adjective. What it means is again a complex causal sequence that you have to unpack. And the causal sequence is this, in this particular case, (of course it is culturally driven): this is tuna that was fished in such a way that it did not harm the dolphins. The dolphins were not caught in the nets and killed, as a result of catching the tuna. In other words, the catching of the tuna was safe for the dolphins, meaning the dolphins were not hurt.

Now if you think about it, this is quite a complex meaning. The tuna itself is not safe, it's not the tuna you are trying to protect, because the tuna is actually already caught and dead and you are eating it. So when you say *safe tuna* here, you are not talking about the tuna being safe. You are talking, in this case, about the dolphin being safe. And you don't have a systematic correspondence between Noun Adjective and this very elaborate meaning. You have to unpack the compression. And again you unpack it by looking for the conceptual blends that will fit this particular situation.

Now, notice, here is a very similar expression grammatically, *a child-safe beach*, Well, this is a little bit like the tuna because now just as the dolphin is safe here, the child is safe in this case. You're talking about the beach where it is safe to take children, meaning if you take the children there, they will not be hurt, they will not be harmed. For example, they won't fall on the rocks, or they won't be eaten up by sharks: *Child-safe*.

But here is an expression that has exactly the same structure as *child-safe*: *a shark-safe beach*. You can say 'a shark safe beach,' but in that case, you have to reconstruct a different causal sequence. It doesn't mean a beach that is safe, where the sharks are happy and the sharks feel safe. It means a beach where children are safe from sharks, or people in general are safe. So the lesson from this—there is a double lesson: the construction is very simple in syntactic terms, but there is no systematic recipe, you cannot use the grammar here directly to say "eh that's the meaning," because depending on whether you put in *child*, or *shark* or *dolphin*, you will get very different frames reconstructed. So that's lesson number one.

Lesson number two: the meaning that you reconstruct is actually much more elaborate than the two words that you are given or the three words, in this case, you're given, the three words *shark, safe* and *beach*. Well, *shark, safe*, and *beach* could evoke many many things. But you reconstruct a non-ambiguous particular causal sequence, namely: you can go to the beach, and there won't be any sharks and you won't be a victim of the sharks, (different from the other two causal sequences). Because *dolphin-safe tuna* does not mean, for example, that the tuna can eat dolphin, or something like that, without getting sick. So there are many possibilities that you could have if you just jumbled the words, but in fact you don't have them.

Let us now jump to more elaborate grammatical constructions. And I'm going to take two examples, one from English, the Caused Motion example that has been studied a lot in grammar. And then I will invoke quickly similar constructions, but different, in French and Hebrew. So the guiding theoretical ideas here are that grammatical constructions are themselves integration networks. That you integrate, you blend, the syntactic form with a kind of minimal meaning, you blend that with a much more elaborate meaning. And as a result, you get a new grammatical construction with an emergent meaning, emergent structure, again, in the sense that we studied emergent structure yesterday and in some of the previous lectures.

So the Caused Motion Construction in English has this appearance. It has a noun phrase, a verb, a noun phrase, and a prepositional phrase. And you have examples of that with verbs like throw: *Jack threw the ball into the yard*. So the verb *throw* is a verb that expresses simultaneously that the subject *Jack* is doing some kind of motion, that he is holding the ball, and as a result of the motion, the ball will move, will go to some other location, in this case, the yard. So with simple verbs, like *throw*, the grammatical structure, NP V NP PP, corresponds to: NP does something, and as a result of the action of NP, this NP, the second one, will move and will go to the prepositional phrase location,

in the yard. But we find in English, very similar sentences, except that the verb they have, instead of being a verb of motion and action, like *throw*, is a verb that in itself does not imply that.

So here is example number one, *Phil sneezed the napkin off the table*. Now we have a verb *sneeze*; usually, this is a verb that is intransitive. You sneeze, and that's all. It's an intransitive verb, it has a subject, and the subject does something. But in that sentence, *Phil sneezed the napkin off the table*, it seems to become a transitive verb, with action on the napkin. And of course, what it means is: Phil did something, sneeze, and as a result, something happened to the napkin. The napkin moved, and it was blown off the table. Right?

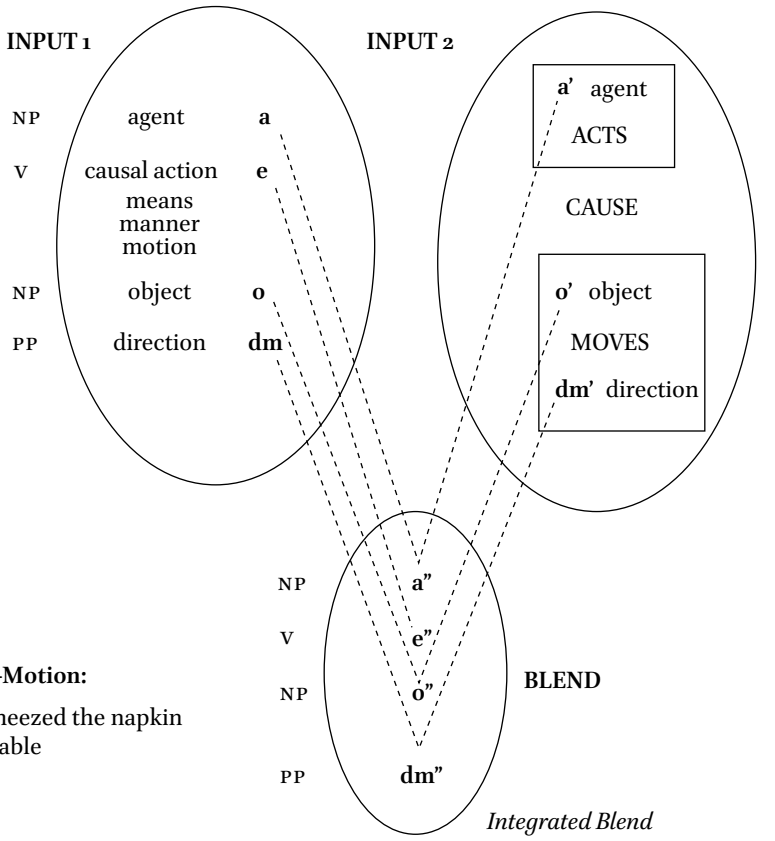
Now, here is a second example, *The sergeant ordered the tanks into the compound*. The verb *order* is not a verb of motion, it's a verb of social interaction, you give orders to subordinates. So it's different from the verb *throw*. Yet in this case, the consequence of the order of the sergeant is the motion of the tanks. So the structure again is exactly like the structure with *throw*, except we don't have the same kind of verb. And finally, in this example, with *Junior sped the Christmas car around the tree*, this is in the context where Junior, a little boy, just got a present for Christmas, and it's a remote control car, that you can control with a remote control. And he makes the car turn around the Christmas tree. But he himself, Junior, is not moving. He is sitting down, and as the result of the actions, the car moves around the Christmas tree. So in all those cases, you have the same grammatical structure as with *throw the ball into the yard*, but you have big differences. In the first case, Phil is doing some actions. In the next case, the sergeant is interacting with someone, ordering, but in fact, he's not interacting with the tanks, but with people in the tank, and there is Caused Motion. And finally in the third case there is speeding: speeding is a verb of motion, but it's not Junior, it's not the subject who is speeding, it is the object that is speeding, it's the car that's going fast around the Christmas tree. And Junior is not moving. So how does this happen in English? And again, English has this construction, but other languages, other similar languages, like French for example, do not have this construction. So it's language specific.

So let's now analyze the way that mental spaces are created and blended in order to allow this use of grammar. First, you have simple verbs, verbs like *throw*. That verb *throw* contains in itself an action that has a cause, and that has a certain means and manner. In the simple construction, *You throw the ball into the yard*, you have this verb of cause and manner. There is an agent who does the action, and the action triggers a motion, motion of the object in some direction. Very easy, right? Very straightforward. *Throw the ball into the yard, kick the ball over the fence*, and so on.

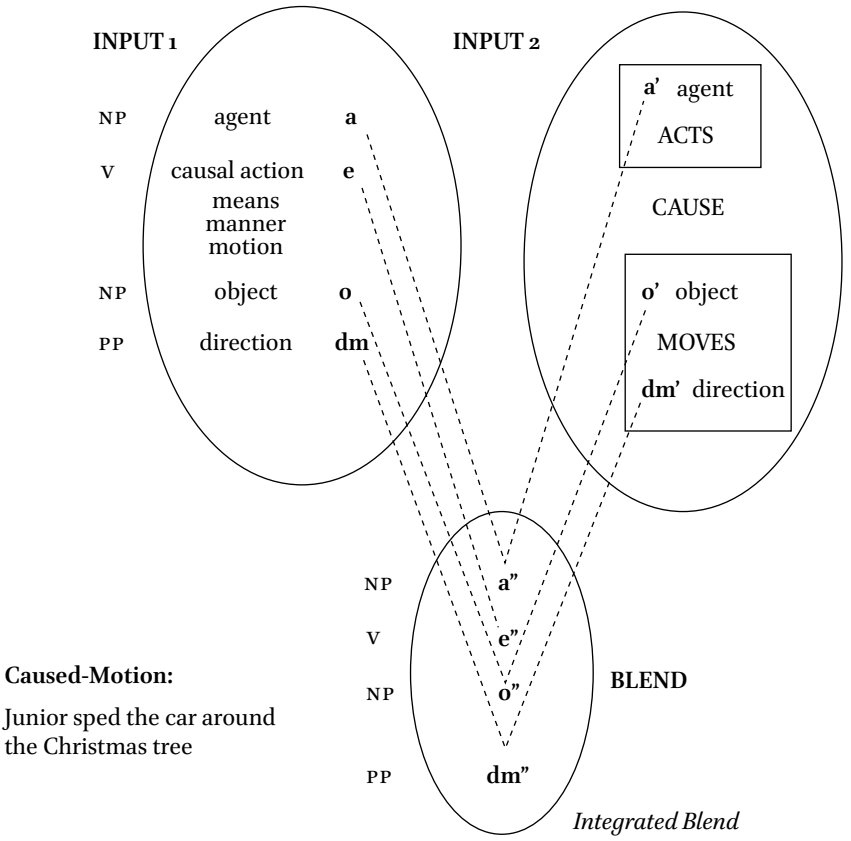
Now, what languages do, and not just for this construction, but in general, is they take their simple constructions, the transitive, the caused motion, the intransitive. And they map it onto a more complex semantic situation. Here, the second input, the one that's going to be the second input to our blending, is a semantic organization. Somebody acts, an agent here acts. That action of the agent causes something else, and something else is: an object moves in some direction. That is the larger structure. And then the blending is going to consist, as in this sentence, in taking the simple input, the one with the direct grammatical construction, *throw the ball into the yard* and mapping it onto the more complex semantic input, the one that says there is an action, there is causation, and there is motion, separately.

Now notice that when we have these two inputs, and the goal is to do an integration, the goal is to do a conceptual blend, we are going to have to find a mapping that connects the two inputs. And the two inputs are not isomorphic, they are not the same. In fact, one is richer than the other. So there are going to be more than one possibility for effecting the blend. One possibility, you have a single verb here, and you have three kinds of verbal semantic things happening in the other input. So in theory, this could be mapped either to this one, or to that one, or to that one. You have a choice now in mapping. And therefore, you have several possible blends, depending on what kind of mapping you actually choose.

So take the case here, *Gogol sneezed the napkin off the table*. Well, in the semantic input, you have *Gogol*, the agent doing something, sneezing. And then, that is causing the napkin to move off the table. Now in blending, we can take the verb element over here, and we can map it onto the action of the agent, which is *sneezing* in this case. So if we do that, we map V onto *sneeze*, and we project into the blended space. The other ones we will map will be straightforward, the direction here, prepositional phrase will map onto direction in the other input. The object here will map onto the object here, and the agent will map onto the agent. So in the blend, we end up getting the same agent *Gogol*, we end up getting the same object *the napkin* and the same direction, the prepositional phrase, *off the table*. But the verbal element that comes in, comes in from this, ACT, and so we get *sneeze*. So we get, in English, a syntactic structure that is exactly the same as in the simple case. But it has a more complex causal sequence, and the verb *sneeze* now occupies the position that would normally be in the position of a verb like *throw* or *kick*. So we got *Gogol sneezed the napkin off the table*. It's almost as if *sneeze* has become a verb of caused motion itself, but of course it's not. It's a construction that does that:



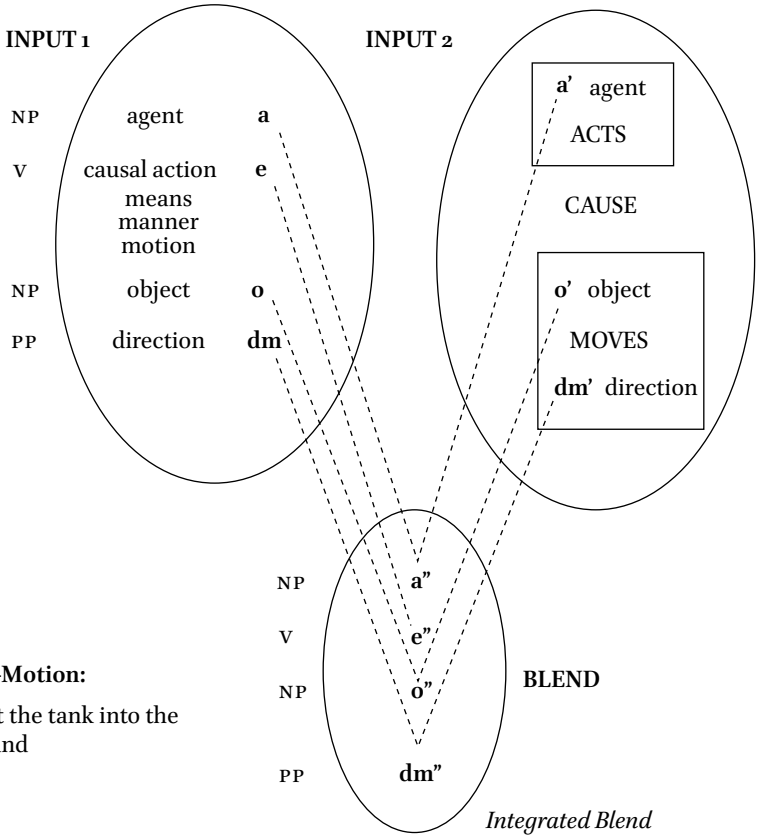
Now look at the next example, the one with *Junior speeds the car around the Christmas tree*. Well, we have the very same blending as a possibility. But this time, we are focusing on the motion of the object, it's the car that's speeding around the tree. Notice the sentence, the sentence that says *Junior speeds the car around the tree*, does not in itself, the language in the sentence, does not tell us anything about what kind of action Junior was actually doing. We understand the sentence in context because we know "oh, this is a remote control car, so the action of Junior must have been touching the remote control." And the cause, the causal link, is not specified explicitly in the sentence because, again, we happen to know that using a remote control has some effect on the motion of the car, but this is not in the language of the sentence. So the sentence actually only uses the motion of the object. In the blend that we are constructing, the verb of caused motion, from here, is projected to this position,



MOVE. So this is *speed, the car speeds around the tree*. And *speed* can then be projected into the verbal position of the blend.

I hope this is not getting a little too technical, it's easy in conception. You have a choice. In the previous example, it's the *sneezing* that got projected, in this example it's *speed*, the motion of the car. And in the next example, the one with the sergeant ordering or, I have another sentence, *letting the tank into the compound*, same thing. *He lets the tank* or *He orders the tank into the compound*. What is happening here is the very same integration template, the very same integration schema: this time it's projecting the CAUSE into the blend. It's because the sergeant gives an order, and *let* is a causal verb in the sense of Talmy. It's a force dynamic verb that removes an opposing force. So a verb like *let* is only talking about the causal aspect. If you say *He let the tanks into the compound*, you don't know what he did. How did he let them in? Did he let them in by raising the barrier in front of the tank? Did he let them in by giving the order, *Go into the compound*? Did he let them in by opening the door? The sentence does not tell us that. It just says that there was some action,

we don't know what, of the sergeant that caused the motion of the tanks into the compound. And it doesn't tell us how the tanks move, it doesn't tell us if the tanks move, for example, by themselves. That they were moving on their caterpillar-like wheels, or if they were sitting on the truck, and the truck was moving the tanks into the compound. Again, this sentence doesn't tell us that.



So the lesson from these kinds of examples is that we can augment the range of a simple construction, *throwing the ball into the yard*, where *throw* contains the action, the cause, and the motion. We can enrich that with other verbs that will be projected either from acting, from causing, or from moving, by exploiting the possibilities of blending.

If you look, in some detail, at English sentences with these verbs, you'll find somes pretty interesting things, a pretty interesting range of facts. So for example, you have: *The audience laughed the poor guy off the stage*. So if you start laughing at me, and saying: "What Fauconnier is saying is really ridiculous,"

then, you know, I will be upset, worried, and I will have to leave the room. So this would be *to laugh somebody off the stage*. You use the verb *laugh*, which again is an intransitive verb, but you project it in the way that we saw before. Namely, it takes the action of the audience, here is the audience laughing, and that causes the performer to go out of the room, he goes off the stage: they *laughed him off the stage*.

In the same way, if you say *Andy rolled the drum into the warehouse*. Andy is doing something, but he's not rolling himself. It's the drum that is rolling. And it's going into the warehouse; it's like the *Junior* example. But now, look at *He muscled the boxes over the fence*. This time, the verb indicates that his actions needed muscle somehow, in order to cause the boxes to go over the fence. So you can have verbs like *muscle* come in here.

Here is a very interesting one. *Hulk choked the life out of him*. So Hulk is a fighter, and he's fighting somebody else, and in fact, killing the poor person. And, in English, you can say that in the form *Hulk choked the life out of this poor guy,* (*of him*). Now you cannot choke life, so if you just look at this part, *Hulk choked the life*, you can see that *choke* is a transitive verb, but it does not take an object like *the life*. What's happening here is a combination of the blending with the metaphor. The metaphor is that when we are alive, we have life inside us, we are full of life. But when we die, the life goes out of us. That's the metaphor. So here, in this case, if you look at the blending structure, you have: *Hulk* is doing something, which is *choking*, he's doing some choking. And metaphorically, this is causing the life to go out of a person. So even though Hulk is really choking a person, the sentence itself is not organized in that way. It's organized in such a way that what you've got is: the life goes out of him, and so, in the blended space, *the life* is projected to the object position of the sentence, in the same way as in *He threw the ball into the yard. He choked life out of Bill*. When you *throw the ball out of the yard, you throw the ball*. But when you *choke the life out of Bill*, you don't *choke the life*. The reason you get the actual complex sentence is because you've been able to do the grammatical blend. So all these examples are meant to show you the interaction of grammatical constructions with blending, and the fact that the grammatical constructions themselves are fundamentally compressions. There are ways of compressing an elaborate causal sequence, like: he choked somebody, and as a result of choking the person died, and therefore, if the person died, that means the life went out of that person. A long causal sequence is compressed into *choked life out of him* because of the blending that we just saw.

Here are a few more examples. *He trotted the stroller around the park*. The stroller is for carrying little babies and children, right? Now the stroller is not trotting, probably you are trotting, trotting in pushing the stroller. But if *you trot the horse into the stable*, it's probably the horse that is trotting. Maybe you're

holding the horse with a leash, or maybe you're sitting on the horse, and the horse is trotting. Again, this is because in the blend, you have a choice. So if you're trotting, and the stroller moves around the park, the projection is coming from here, your action of trotting is being projected into the verbal position. But if it's the horse that's trotting, then *trot* is projected from the motion position.

In other words, a sentence that looks the same, like *The trainer trotted the house into the stable*, Or *The father trotted the stroller around the park* can actually have very different meanings. In one, the father is trotting, the other one it's the horse that's trotting. And the possibility is simply available because the blend is not fully determined; there are several ways to do the blending of the grammatical construction. So English is exploiting a very rich construction in order to use a very economical grammatical form.

I'll skip some of these later examples, they have the same flavor. You can look at them in the handout. And I also mentioned that you can do the same kind of analysis as the one I did here for other grammatical constructions in English, like the resultative construction, that we talked about before, *I boiled the pan dry*. Again you can do it as a blending of simple grammar over here, and complex causal sequences over here. Why? Now this is useful for understanding grammar. But it has a wider implication, which is that, in that one of the powers of the language, is to be able to take long diffused complex sequences, and compress them maximally. Now, we've seen that many times in the previous lectures; we saw that for metaphor, we saw that for Causal Compressions in general, *riding with Hitler*, and so on. Now we see it for grammar. Of course, these grammatical constructions are conventional, they are entrenched, you learned them as a child, and you transmit them to the next generation. And so they have a lot of stability, they are shared by the community, the linguistic community. And unconsciously, we know how to do these possible blends. So we can understand this big range of sentences.

There's another interesting consequence for linguists, which is that because it's blending that is going on behind the scenes, there is an element of uncertainty. And when the constructions are transmitted to children, to another generation, there can be slight mutations in the blends. The superficial result is hardly noticeable, but in fact, the blend has changed. And I would suggest (in fact, this is been defended by linguists, like Michael Israel and others) that historical change, diachronic change in language, is the result of very slight mutations in the grammatical blends, but after a certain amount of cultural time, you end up, of course, with a form of language that looks very different from the one you started out with. So that's again something that's pretty fundamental to language.

Now, on the handout, you'll find some examples from French, and this is a long, detailed analysis of French which I'm not going to do here, but I will

just point to it, evoke it. It has some connection with the case that we just saw in English, but it's not exactly Caused Motion, it's the so called Clause Union construction or Causative Construction. If you look on page 56 of the handout, page 6 of the handout for today, if you only have today's lecture, then you have the French on the handout, and here I've made a sort of translation, a literal word for word translation in English. And the point that I want to bring out is that French uses the verb *faire*, which is sort of like *make* or *do* in order to build things like *Pierre makes eat Paul* meaning *Pierre does something that has the effect of Paul eating*. Or *Pierre sends the package, Pierre makes send the package, Pierre fait envoyer le paquet* in French. And over here, *Pierre makes eat the soup to Paul.*

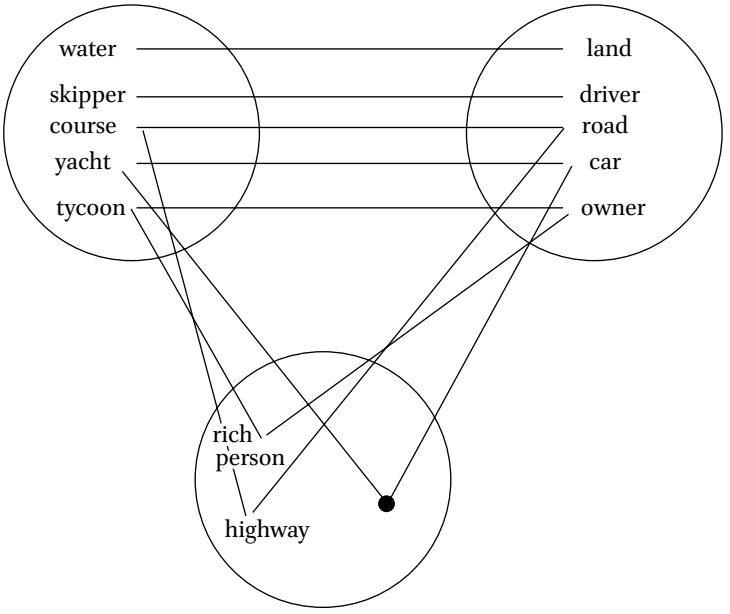
This construction, this double verb construction is actually very complex. People have written big books about it, because it has many funny grammatical features. But if you look at it in terms of conceptual blending, there turns out to be an easy and elegant solution to the grammatical mysteries. What French is doing with this construction is actually using the same basic structures. The Transitive structure, like *Pierre sends the package*. Or the structure here, which is the Transfer structure. The Transfer structure, *give something to somebody, give the soup to Paul.* And it's taking a more complex Causal sequence, and it is blending it with the simple syntactic structure, the transitive, or the intransitive for that matter, and here, the transfer structure. The way the blending looks is illustrated on your handout on page 8. And I give only one example, but in fact, there are three different blends. And the three different blends take as their inputs the three basic structures of French. And then, just as in the English example, they take a more elaborate causal sequence, and they blend it with the simple grammatical construction.

So here is the example with the transitive case. You have the transitive case, like *Mary feeds Paul*. Causal agent, some event, and some object. That's the simple transitive construction. *Mary feeds Bill*. And then, on the other side, you have a more complex input. Somebody does something, a causal agent acts on the object. And as a result, there is an event that happens. This is the event agent, who also happens to be the object of the action. So O(object) and EA(event agent) are the same. In the blend, you get a causal agent, you get action of the causal agent, marked by the verb *faire*, (which is like *make* or *do*). And then you get the event itself, marked by another verb, and then, you get the object.

Now instead of doing what English did in the previous construction, compressing with the grammatical structure of input, French has an emergent grammatical structure here with two verbs. So we find two verbs, and as a result, because there are two verbs in this emergent blended structure, there are several positions for clitic pronouns, and other prepositional pronouns, that

can go into these positions. And that's one of the things that give rise to the complexity. Again, no time here to go into the details. What's really interesting, I emphasize, is understanding what's happening in French as using a blend to get the simplest possible grammatical structure, and understanding that there is not one single structure here, but really three, although they look the same. Then we can separate and unravel the grammatical differences.

A couple more examples. Going back to simplicity, the case where you have two nouns. Noun Noun again, (they can be noun phrases). Here is an example, a *land yacht*. You just put the two nouns next to each other. The yacht is a boat, it doesn't go on land. The land does not support yachts. What the two little words here trigger is the construction of a blend with two inputs, one with yachts: boats, skippers, water and so on, and the other one with cars, drivers, roads and owners. And in the blended space, you project some of this, and you project some of that. What you get is the idea of a car that is very big, and that in some ways makes you think of a yacht because it is so big and the suspension is such a floating kind of suspension. And it's also for a rich person, perhaps the owner. So a very simple example. Notice the two words that you used, land and yacht. In order to get the understanding, you have to use yacht in order to evoke the entire frame of boats, and sail-boats and skippers. And over here, you have to evoke the entire frame of roads and cars. And in the blend, you get something novel, something creative, a new kind of car that is neither exactly a car nor exactly a boat.



I need to stop pretty soon because time is running out, but in connection with all the cases of conceptual blending that we have looked at, I'd like to point out that there are systematic grammatical ways to build these blends. You don't have to use them. We gave many examples that did not use a specific grammatical marker. It did not say: "Oh, watch out, this is a blend." But language has such grammatical markers and so *if*, for example, in English, is typically something that lets you explicitly trigger the construction of a blend. And you can see that with some of these examples: *If I were you, I would resign*. This is a blend of me and you, it's a complex integration actually of your situation, my beliefs, my attitudes, and you get a novel imaginative situation. You are resigning but you are me. Or this one, this was an ad, for VOLVO, the car company VOLVO, and it was a very bad ad. So don't be shocked. But it's real data. It says: "If cars were men, you would want your daughter to marry this one." So what it's doing is creating a metaphorical correspondence between man and car, and owning a car and marrying a certain kind of man.

In the same way, this last example, *If love is a journey, then you and I have run out of gas*. That first part, *if love is a journey*, is setting up the metaphor, the metaphorical blend, and then once you set it up, you can start to describe the blended space. And in the blended space, you and I in love, are traveling, but the vehicle we are traveling in no longer has any gas, which of course means that our love story is finished. We can't move along anymore. So this is like the VOLVO example. And some of the examples that we discussed in other lectures, (for those who were at the other lectures), could be formulated by using the explicit grammatical form. They don't have to, but they could. So the debate with Kant, (you may remember), we could express that explicitly with the *if* construction: we could say, *If Kant were alive*,...

[This is the example where I'm presenting my ideas, and comparing them to Kant's ideas. And in order to do that, I'm building a blend of a debate with Kant where Kant was actually in the room with me and he's arguing with me. This is a pretty routine blend: in order to present ideas, you bring people back from the dead, and you sit them in front of you, and you start arguing].

Well, you could do that with an explicit marker *if*: "*if Kant were alive, he would say ...*", and then "blablabla ..." You invent Kant's opinion. In doing that, *if Kant were alive ...*, what you're doing is you're actually setting up one of the inputs. You'll take the input in which Kant was alive, and Kant was expressing opinion, and then you'll blend it with the present situation.

The second example: *If Kant and I were debating this issue, here is what he would say ...* This is again a grammatically marked construction of the debate blend. But this time, the *if* clause is explicitly describing the blend itself, the blend with a debate that I am constructing. And finally, you can do it in using

an analogy with *If I were Kant, I would answer …* So I can say: "Here is what I have to say, the neural basis of the mind is this or that." And then, I can take a different role and say: "If I were Kant, I would say this. But of course, that would be wrong. My idea is right, and Kant is wrong." So I can sort of shift from one to the other. And these are different kinds of blends that I can build explicitly with grammar in order to do the very same thing that we saw with the initial Kant debate blend.

The same thing for many other examples here that we discussed, and I will skip them. Very small grammatical words like *if* and *of* trigger very systematic mappings, so that's something else, not just complex grammatical constructions like *sneeze the napkin off the table*, but also simple words. And so here you have a variety of sentences that are built with *of*. But they have different meaning structures. The metaphor, *Vanity is the quicksand of reason*, makes you build a metaphorical blend with vanity and reason on one side, and quicksand and travelers on the other. *Paul is the father of Sally* is a case where it's a frame, and the role fillers for that frame. They have the same mapping structure that you find here.

So *of*, as a grammatical word, is inviting you to construct blends of this kind. But the blends that you construct may turn out to be a simplex blend like this one, which is just a frame filling, or it may be a metaphorical blend like *Vanity is the quicksand of reason*, or it may be an analogy like *Geoff is the Einstein of cognitive science.* That gives you at least a small idea of the ways in which grammar is powerful in order to give us a pre-built set of compressions that we can use in very different circumstances, even though the grammar by itself is sparse, and there are not many words: the construction is simple. But we can apply the construction to something very different, and again by causal decompression, we can reconstruct the missing causal sequence. That's the power of grammar through blending and compression.

Thank you very much. I'm going to stop here. And then, if we have time for questions, I will gladly listen to your comments.

LECTURE 7

Origins of Language

Thank you very much for your kind introduction. The earthquake that just happened in China is a tragedy. I would like to express my sympathy for the victims of the earthquake and also for any of you who may have family or relatives in that region. I really hope they are safe. This is of course very very difficult for any country. We have earthquakes in California also. We have not actually had an earthquake as major as the one in Sichuan, but they fear that such an earthquake will happen in the next 10 or 20 years. So we feel very much for the Chinese people and in particular the people in Sichuan right now, who have to deal with the aftermath of the earthquake.

Well, this morning I will endeavor to talk about the origins of language and thought. Ever since humans could speak, they have wondered where language originated, and there have always been a lot of speculations. I am sure that since you are linguists, you know about the legends where, for example, children were brought up in a cave, without any environment, and then someone would listen to the first syllable of the child, or the first word. And they would say, "oh, that's in this language or that language, therefore that was the first language."

These were early speculations about the origins of language and what was the first language. And linguists have always done that. In fact, things got so bad in the 19th century, there were so many people speculating about the origins of language that I believe the society of linguistics in Paris, in France where I come from, decided to forbid any more papers on the origins of language. Nobody was even allowed to present papers on the origins of language, because there were too many, and they were too speculative, and they had all kinds of very strange, very crazy ideas.

Now suddenly in the 21st century, there is a renewed interest in the issue of the origins of language and thought. And so once again, there are many

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 | DOI:10.1163/9789004360716_008

publications on this topic. Mark Turner and I worked on conceptual blending and conceptual mapping together. And out of our work unexpectedly came some possible results regarding the origins of language, regarding this problem. And so we have a chapter in our book, *The Way We Think*, on this topic. And also there is a book which just came out at Equinox Edition. And it has a collection of articles on this topic. So we will again revive speculation about origins of language and thought. One of the reasons that in this modern period, there is this renewed interest is because there have been both archeological discoveries that are quite interesting, and there have been biological discoveries in the domain of genetics. That suggests a clearer picture about when humans with not only our anatomical properties, but also with our cognitive abilities, may have originated. I am certainly not a specialist directly of these issues, but, this morning, I will try to show how some of these issues in biology and archeology seem to fit together nicely with some of the results we have from linguistics and cognitive science.

So very briefly, for some of you who were not at the other lectures, with apologies to those who have heard this before, I will give a very short reminder of some of the issues that we have been talking about and also the spirit in which cognitive linguistics in general approaches such issues. These are the useful websites. If you want to find out more, get some articles, there is a specific website on the Beijing Forum within the mental space website. So again a good source for all kinds of readings. On the Beijing Forum website, we've actually put many articles that you can directly access in PDF format. So again this may be convenient. These are some of the books that have recently appeared specifically on the topic of conceptual blending, which is the organizing framework here for the lectures I have been giving in Beijing. And these books are very varied. Some are on linguistics but others are on topics as different as music, design, artificial intelligence, art, religion and magic, and so on and they are all taking as an organizing framework the framework of conceptual mappings that was initially proposed in cognitive, within cognitive linguistics. You will find information on all this literature at the websites that I just mentioned before.

The spirit of the Beijing lectures, in harmony with cognitive linguistics in general has four fundamental points that I have been evoking almost at every lecture and the four points, for those again who are joining us today for the first time, the four fundamental points are the following. First, that language is only the tip of the iceberg of meaning construction. So a lot is going on behind the scenes, most of it is going on behind the scenes, and language, therefore, does not directly map to meaning but rather triggers and guides meaning

construction of a much more elaborate sort than the grammatical structures that we explicitly see, and are conscious of.

The second point is that the meaning construction that is fundamental for language is also operating in many other areas with the same cognitive operations, in mathematics, religion, technology, poetry, and so on.

The third point: the conceptual mappings are the same for these superficially different areas of human thought. And the consequence for linguistics is that linguistics can have rich interaction with other areas both in the sense of finding ideas for understanding some of these operations of the mind and making them applicable to areas like music or mathematics and this is in fact exactly what has happened. So we have linguists, like my friend George Lakeoff or myself, doing work on mathematics for example by using the ideas that were originally developed in cognitive linguistics.

Conversely, it is very important for linguists not to lock themselves up in the language box and look only at language. Linguists, in the spirit of cognitive linguistics, need to look at meaning construction in other domains because in some of these domains, the meaning construction operations are more apparent or easier to find, but they apply in return to linguistic problems.

So those are the fundamental four working framing hypotheses, with the idea that hidden behind the simple words are vast conceptual networks in your head that you are not always aware of. But as a linguist, you try to become aware, you try to go inside your own head and ask: "What is going on in my head when I talk?"

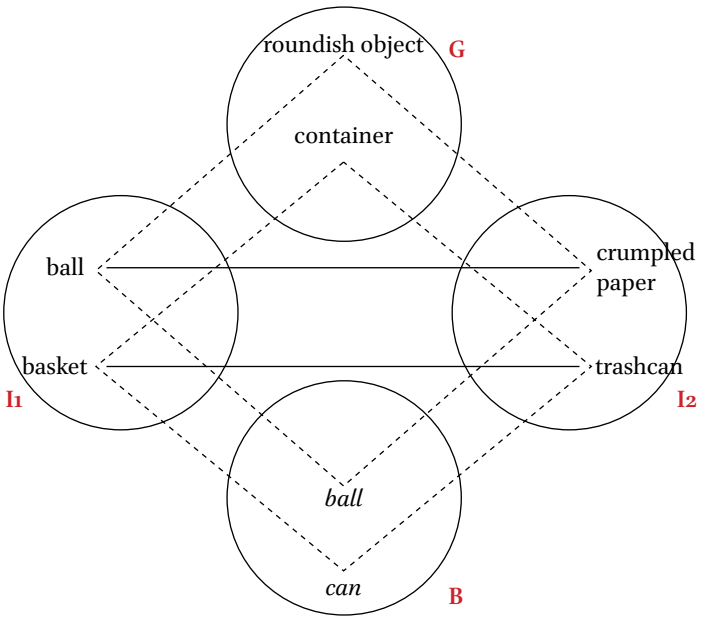
We have used, in the previous lectures, this framework of conceptual integration, where the most simple basic schema is a schema of two inputs that share some common structure, indicated in this generic space, and that project to a novel blended space where emergent structure is created in a number of ways. And that's where we get the power of novel meaning construction, both in everyday life but also in creative activities of art, science, mathematics and religion.

So these are some of the principles that we have been talking about and I will evoke them also throughout this lecture. And again for those who were not with us in the early lectures, I will give a straightforward example proposed by my colleague Seana Coulson. And this is the example of trashcan basketball, that we have not used yet in other lectures. But this is a very transparent example of what blending is about.

And here is the story about this. We all know the game of basketball, of course. You know, throwing the ball into the hoop and having two teams trying to score points. Now imaging a second situation, not on the basketball court, but where you have students in a dormitory and they don't have a ball, but they have a trashcan, a waste paper basket, and they also have paper that

they can crumple, and they start to play a game which is to throw the crumpled paper into the trashcan. And of course, as they do this, then rules emerge and they start to play against each other. And you can see that the game is in some ways like basketball, you have to throw something into something else. But in other ways it's quite different. Instead of the hoop being up there, the trashcan is down here. Instead of a ball, you have a light, crumpled paper. Instead of a basketball court, you have to run around the bed in the dormitory and so on.

So the new game, the trashcan basketball game is an emergent human activity which is the result of blending two different inputs. One input is the game of basketball where you have things like the basket and the ball and of course many other things. And on the other side, you've got things in your room that are not part of games, paper, crumpled paper, trashcans, and so on. And you map the trashcan onto the basket, and you map the crumpled paper onto the ball. And then you project, and now you have a new blended mental space, in which you have a ball, and you also have a basket, but the basket is the trashcan, and the ball, of course, is the crumpled paper. And within this blended space will emerge a certain type of game. People will of course add rules, and they will decide what counts as 1 point or 2 points and so on. And there will be an emergent game. The blended space has the same objects as the input of paper and wastepaper baskets, but it is very different, because it is organized as a game, structure coming from the other input.



So this gives a pretty good idea of how humans, very easily and naturally, can take two inputs that they are very familiar with, both paper and trashcans and basketball games, and they can create new activities that have emergent structure. The crucial thing is the structure here is different from the structure in either one of the inputs. And that's the characteristic fundamental property of conceptual blending.

Now once you have blends like that, you can enrich them. And in the lectures on metaphor, we saw how the fundamental, already very complex but mentally entrenched structure of metaphors of time, for example, could be additionally blended with other inputs to create more novel metaphors, literary metaphors and so on. So here is one that is not very literary, but this is from a comic strip and this is a cartoon from a newspaper, and this is a case where they don't know about Seana Coulson trashcan basketball, but they independently invented it. And they made another blend with the famous basketball player, American basketball player, Shaquille O'Neal. Do some of you know this name? Basketball player. He is very big, he is not as big as, he is not as tall as Yaoming, but he is very heavy and big. But Shaquille O'Neal is a very good basketball player, except that he is not very good at making the *free throws*,—you know, when you stand in front of the basket after a foul and you have to throw the ball into the basket. That's one of his weaknesses, that he is not good at that.

So in the cartoon, they say, "Here is the way the world would be, if Shaquille Neal, instead of being a basketball player, was an office worker, if he had a nine-to-five office job. And what you see is that in his office job, he tries to throw the crumpled paper into the trashcan, but he is always missing. He is always missing the trashcan. So what they did here in the cartoon is they blended basketball Shaquille O'Neal with his weakness in the free throw and they blended that with the idea of an office worker who throws paper into a trashcan. And the difference is that if you just throw things into the trashcan, you throw to get rid of them, but this office worker has made it into a sort of game, a skill trying to put the crumpled paper into the wastepaper basket.

So again an opportunistic example of how you can use a blend and then other blends, for example in this case to produce humor. Humor is heavily dependent on blends. You can also see even with this example that there are a few little things happening linguistically. There is a word, *trashcan basketball* that is invented in order to describe the new emergent game. And it's a two word grammatical construction, noun-noun.

In the lecture, lecture number six, we talked a lot about grammatical constructions and these noun-noun combinations. And we had examples like *land yacht* and *jail bait*. If you have a complete handout, you will find them at the end of lecture six. Now here is a case: from one input, you take one

word, *basketball*; in this case it's the description of the entire input in fact. And from the other input, you take one word which is one of the objects, *trashcan*, the one that is going to correspond, the one that is going to be mapped to the basket.

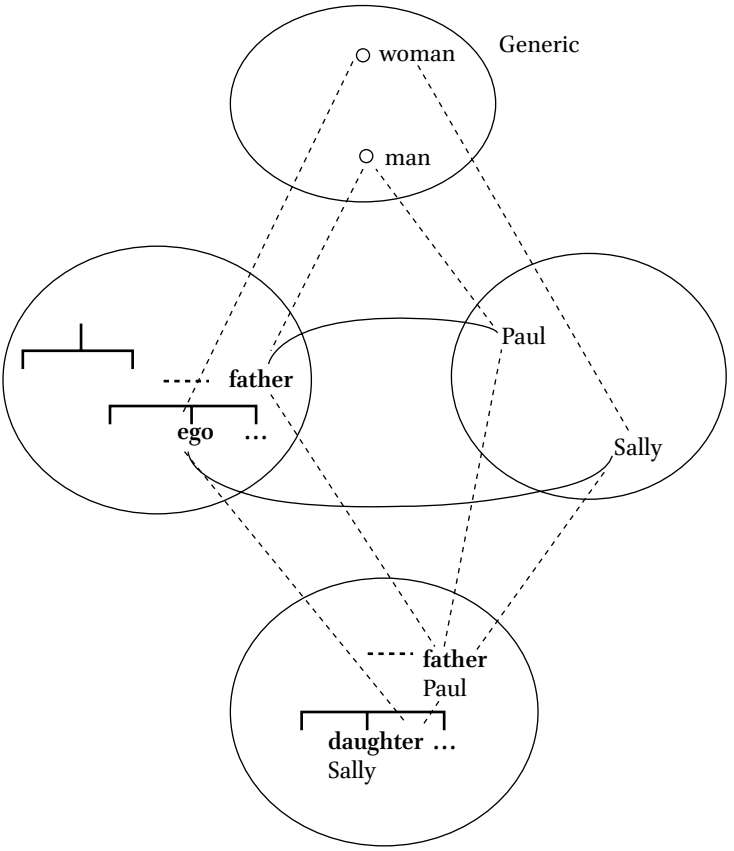
And so the linguistic way of referring to a novel emergent structure here is to take one word from one input and another word from the other input, not necessarily matching words. But in this case, the name for the whole game happens to contain two nouns already. You see this name itself is already a blend. The name *basketball* is taking two objects, two crucial objects in the game, *basket* and *ball*, putting them together and giving you the game of *basketball*. But then you put it together with *trashcan* and you get the new game of throwing the crumpled paper into the trashcan.

So this is what the blending network looks like. You have a generic structure meaning something that is common to both inputs: something round as a container, something round that you can put into a container and in this input, you've got the game of basketball, in this other input, you've got the trashcan and crumpled paper.

Now here is another thing that we have not talked about in the previous lectures, just evoked in some of the question periods. But it is probably relevant to this morning's issue of the origins of language. When we look at these conceptual blends, we find that there are different types of conceptual blends, and they appear on a gradient of complexity. You have some that are intuitively more simple and others that are more complex.

So very quickly, here are examples of these varieties of blends. One, we call the *simplex network*, and that one is actually very close to what people have traditionally called framing. So what it does is it takes one input with no frame like Paul and Sally, and it takes another input that is only a frame, like in this case, the kinship frame with *father* and *ego*. And maybe other family members you know the mother and the siblings and so on. But the important ones are the father and ego for this particular blend. So a frame on the one hand and two elements on the other. And we map them onto each other. And we project into the blended space. And now we have a frame with roles that are filled. So the roles *father* and daughter are filled by Paul and Sally. This is the space in which Paul and Sally are father and daughter.

Again, a very straightforward, apparently, kind of framing. There are some additional interesting emergent properties that I will save maybe for later. But this kind of simplex network is actually something that other species seem to be able to do. So chimpanzees and also very certainly dogs and cats and probably elephants and so on, many mammals, maybe all mammals, can do this kind of blending. They can learn specific frames about things and they



can apply the frames to given situations. So this is not a kind of blending that distinguishes humans from other species.

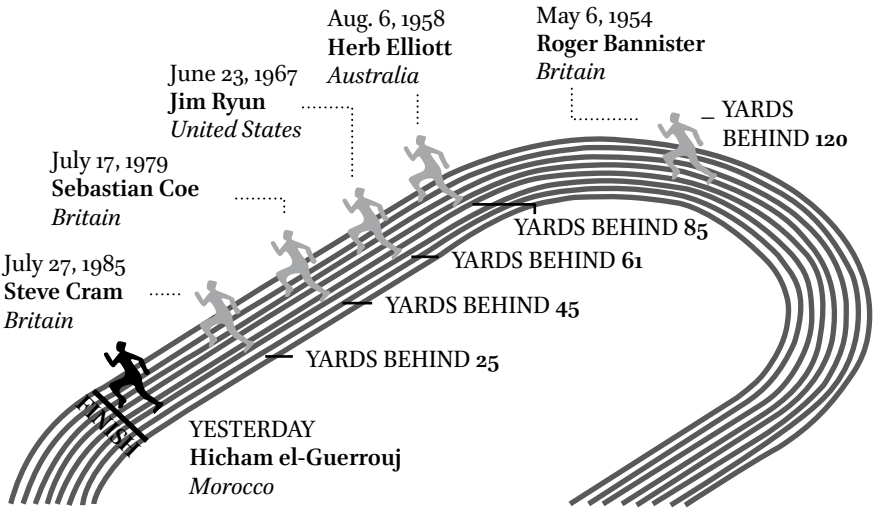
Now here is a second kind of blending, a little more complex, that we have studied. This is a case where the two inputs have frames and they have a similar frame, almost the same frame, the same organizing frame. And we had several examples of that, I will not review them. But I will just remind you one of the examples with the boat race. The Regatta: the catamaran sailing after the clipper sailed one century earlier. There was a blended space in which the sail boat now and the sail boat, the clipper, many decades earlier, were blended so that they could be in a race. Now that network has two inputs that have the same frames: sailing from San Francisco to Boston.

If they have the same frame, they are called mirror networks. The example of the debate with Kant is another. (Again if you were not at the earlier lectures, you will find out all this in the readings on the web). So these are well-known examples. The debate with Kant also had the same frame in both inputs. It

was the frame of a thinker who was thinking in some language and who had a purpose and who had some issues that he or she was thinking about. So these are mirror networks.

I don't know, there has not been so far the right kind of experiment to know whether chimpanzees, for example, have the capacity to do mirror networks. That's an open question. We are not sure.

(*pointing to the Great Mile slide*)



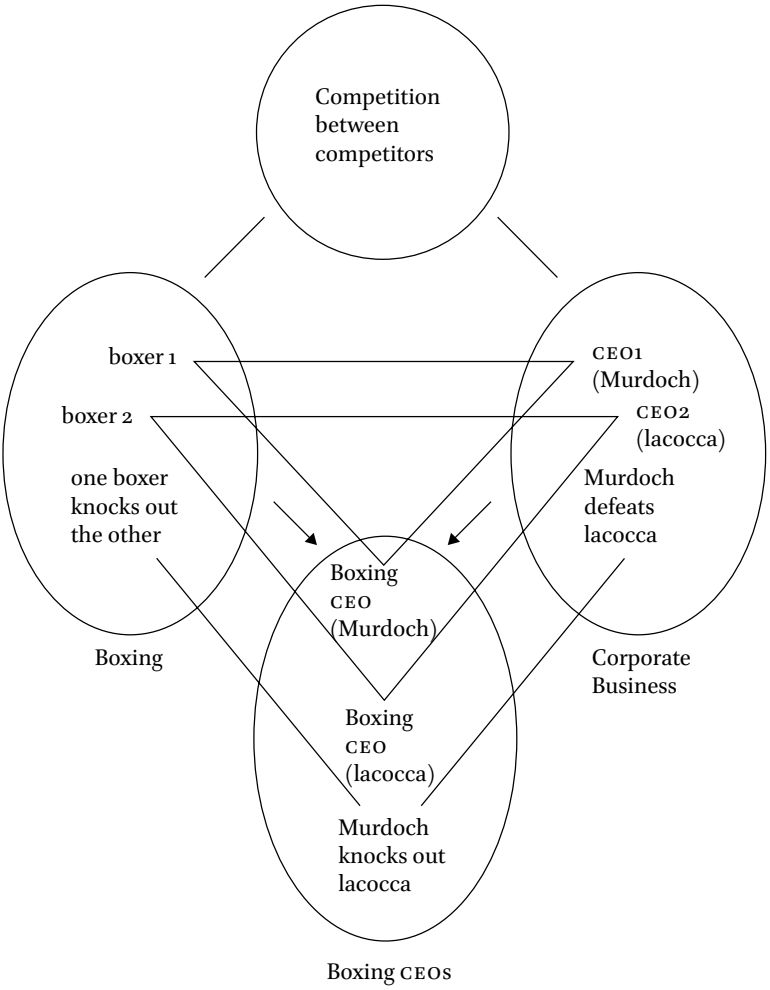
World Record in the Mile

This example was also a mirror network. There were six inputs in that case. And those were the six inputs of the six races where the world record was broken. And they were all blended into a single race with all the former world champions on the same track. Again, mirror network, because all the six inputs have the same frame.

A slightly more advanced type of network is the single-scope network. The single-scope network has two input spaces that don't have the same frame, that have very different frames. And then they project into a blended space using the frame of the first input but using the elements of the second input. And here is an example of that. If you have two men boxing, that's the input of two boxers. That's the framing input, and now suppose you talk about financial leaders, CEO's, chief executive officers of companies, CEO's in business. And suppose they have a business competition. So suppose it's Iacocca who used to

be the head of Chrysler and Murdoch who controls many newspapers, suppose they have a competition. We can describe the competition in terms of boxing.

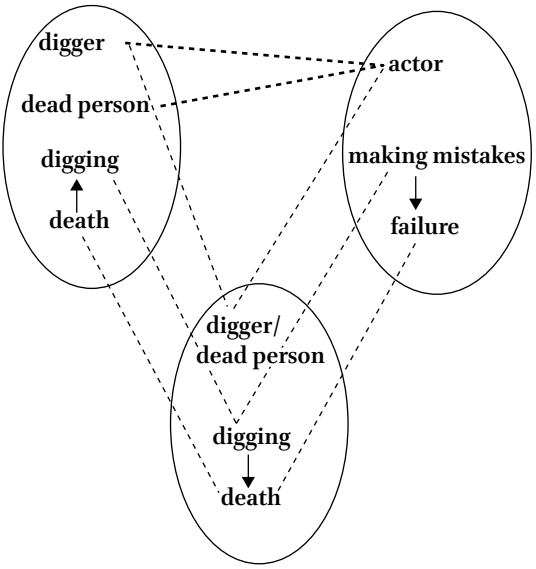
That's typical metaphor, of course. And we can say that one of the competing financiers (or CEO's) landed *a blow*, that's a boxing blow, and the other recovered, but one of them *tripped*, falling. The other took advantage and *knocked him out*. All these are in italics, all these are boxing terms, and what is going on here again is a conceptual blend where one input is the input of boxing, and the other input is the business input, with Murdoch, Iacocca, financial deals and so on. And in the blended space, you've got Murdoch as a boxer and Iacocca as a boxer, and they are fighting but they are also financial competitors in the blend. So that's the important thing of course.



Now, the important thing for the single-scope network is that the frame here is entirely transferred to the blended space. The blended space does not use the business frame. So actually, single-scope blends are very much like the traditional source-target metaphor, the source-target metaphor in the standard metaphor theory, as in Lakoff and Johnson. It's a case of single-scope blend. You have a source domain. You have a target domain. The source domain projects to the target domain. So this is the result. This is the source domain projected to the target domain and organizing the target domain with its frame. Again it is unlikely but possible that some primates have single-scope blending. It is conceivable that for example the chimpanzees like Sarah, who learned to operate with chips, blue, yellow, color chips, in order to refer to the frame, maybe, that's a case of single-scope. So advanced primates may well have the capacity for single-scope blending. Again, hard to tell. We need more experiments for that. We know humans of course all have this capacity.
Finally, the type of blending, that is, in a way, most creative and most important for the development of the purely human activities, is the so called double-scope blending where you have two inputs with very different frames but the blended space is drawing, is projecting, from both inputs. Not just one frame from one input, but the two frames from both inputs, are making a contribution.

So in previous lectures, we used examples like this one. This is the advertisement for children, to improve the education of children (see p. 35). And the children are blended with doctors, the idea being that if the children have a bad education, then 20 years later, they will be bad doctors. And when they perform operations on you, you will die. So in this advertisement, the two very different frames are blended, the frame of children studying and the frame of doctors operating. And suddenly you have a single frame, you have the children learning and also the doctors operating. They are blended into one frame. So that's a case of double-scope blending with these two inputs coming into one. Another case that we mentioned several times in the other lectures is the case of double-scope metaphors. Many metaphors are double-scope also. That is, they draw from both inputs. And so they require blending: you cannot do them with simple source-target projection as in the early metaphor theory of Lakoff-Johnson. You need to account for them with double-scope blending. And the way that works, the reason for that in a nutshell, is in the following diagram.

This will maybe explain why the traditional metaphor analysis will not work here, because if you look at the source domain, the source domain of digging graves is that you have two people here, the digger and the dead person, and it's when somebody dies that you later dig the grave. So the death is both the cause of the digging, and also it precedes the digging as an event.



The so-called target domain is organized quite differently. There is only one person, it's the same person who is making the financial mistake and who will eventually fail in the business endeavor and moreover, the element here that corresponds to digging, making mistakes, is actually oriented towards failure. The element corresponding to *death* is oriented in the opposite direction (from here). It's because you make mistakes that you have failure, so the cause goes this way. And also the events are ordered in time. This happens before this. So those two have very different structures. In traditional source-target metaphor, if you project this structure, you get the right structure. But here, you don't get this structure. So the two do not fit. This would be a bad metaphor if you just have source-to-target. But in fact, in terms of conceptual blending, it becomes an excellent metaphor, because you can project some of this to the blended space, the digging, and the death, and the digger and so on, but you can project all the event structure and frame structure of the agents from here. So that you have a single digger and dead person. You have an action of digging that precedes the death. The more you dig, the closer you are to being in dead.

So I think this diagram brings out visually very vividly that in order to get the right metaphorical blend here, you need to project from the two frames. Not just the single one. And that's where the power of double-scope blending comes from. And we saw other examples in previous lectures, like this example. *If Clinton were the Titanic, the iceberg would sink*. Well, again two very different inputs, they are structured in a different way. And the blended space

does not have the same structure as the source domain of the Titanic and the iceberg.

We also used—this is quickly for the people just joining us today—we also looked at some important counterfactual examples where you can build the counterfactual like this. This is a case where the young man murdered his grandparents, and yet the father is pleading for mercy and saying if the grandparents were still alive, they would plead for mercy for their grandson. Because they love their grandson. And so this is again a case where you are blending two completely incompatible spaces. The one where there's been a murder and the grandparents are dead, and the other space where the grandparents are alive and they love the grandson and they want to help the grandson. And in the blended space, all this comes together. The dead, the murdered grandparents, become alive in order to save the grandson who is being sentenced by the judge.

So humans have as part of their double-scope capacity this very important powerful capacity to build counterfactuals. And counterfactuals and metaphor both play a big big role in the development of science. It's through successive metaphors and counterfactuals that you can build scientific experimentation, that you advance physics and you advance mathematics and so on. So those are crucial. Again primates, chimpanzees, who are of course very advanced in many respects do not have double-scope blending. They do not have counterfactual ability for building counterfactuals, they do not build double-scope metaphors.

So all that is very specifically human, and in one of the previous lectures, No 4, I think, we also illustrated this with cases from mathematics. In the sixth lecture, we showed that for grammatical constructions in general. And we took examples like *Gogol sneezed the napkin off the table* or *The sergeant let the tanks into the compound*. We showed that grammatical construction in general was a blending of simple syntactic structures with minimal meaning and complex meanings on the other hand, complex causative meanings. And they get blended, so that in the blend you keep a simple syntactic structure, but you are able to reconstruct a more elaborate, more complex meaning. This means we have examples now of many things that are double-scope blends, and that are needed for language, metaphor, grammatical constructions, and counterfactuals, that are also needed for mathematics, and science, that are also needed in order to produce religion, as I will show in just a minute.

Paul is the father of Sally.
Zeus is the father of Athena. She was born out of his head,
fully clad in armor.
I'm your father for today.

The Pope is the father of all Catholics.
The Pope is the father of the Catholic Church.
George Washington is the father of our country.
Newton is the father of physics
Fear, father of cruelty
The Child is father of the Man

[*pointing to slide*] The examples that you've got here show that even the same word, the word *father* can be used on a gradient within this hierarchy of conceptual networks: the simplex, the mirror network, the single scope, and the double scope. So if you look at this example, *Paul is the father of Sally*, this is a simplex network. It is just framing: Paul and Sally go into the ordinary father and daughter frame. This one, *Zeus is the father of Athena. She was born out of his head*, this is also a father-daughter kinship, but it comes in with additional blended structure where instead of coming out of the womb of the mother, Athena can now come out of the head of the father Zeus. So it's an unusual kind of procreation but again within the kinship system.

The next one is a case where you have a child and you are busy that day, and so you ask your friend, your neighbor, to take care of the child, to take him to school, to go and get him at school and take care of him. The neighbor can say *I'm your father for today*. In other words, the word father here gets extended by building a blended space in which *father* means not quite the biological and genealogical father, but the nurturing father. Remember George Lakoff's examples in *Woman, Fire and Dangerous Things*, his example about the word *mother* and radial categories. Well, this is how radial categories actually get formed. You extend from *father* and you get other meanings.

Then *The Pope is the father of all Catholics. The Pope is the father of the Catholic Church*. These become, as you can see, more and more metaphorical. The Pope is not of course the biological father, but again he takes care, and there is a symbolic religious sense in which he is a father in a child-father relationship to the faithful. [*pointing to next slide*] When we get here, we have a similar thing: *George Washington is the father of our country*. But in a different way. *father* here emphasizes the causal element that George Washington was the founder and from him came the country of the United States in this case. So he is no longer around. The Pope is around to take care of us, maybe. George Washington is not around any more, he is dead. But he is the father of our country in a causal sense.

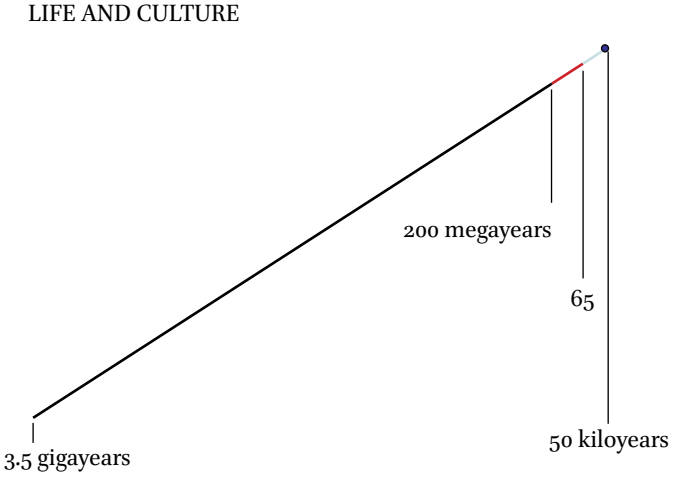
So all of these, if you analyze the blends, you will find that they work by using different selective projections. From the input of "father," you project only certain things in each one of these kinds of examples. *Newton is the father*

of physics, becomes even more abstract and causal. And here we have, from a poet, Ezra Pound, *Fear, father of cruelty,* even more abstract and metaphorical. Now it's emotions and human characteristics like fear and cruelty that are projected to father and so on, with of course again emphasis on the causal connection.

So when we get here, we have very clear double-scope blends. Up here we have simplex and in between we could argue that we have (somewhat) mirror blends, the same frame organizing both but with different properties in the blended space. So the same word can be used on the whole gradient of conceptual networks.

The last example here is from also the poet Wordsworth. *The Child is father of the Man*. And that is a spectacular double scope where the literal meaning seems to be contradictory, how can the child be the father of the man? What this one means, emphasizing the causal relation, is that the way you are as a child, the way you are brought up, educated, the way you behave, the way you learn certain habits and how to do things will determine what kind of man you will be. So child and man here are actually identical even though they are very different. This is the mental space connection of identity, the same identical child and man. But the child is causing the type of man. So the creativity here is obvious and it's double scope.

How does all this connect to the problem of the origins of thought and language? Well, when we look at the evolution of life on earth, from early bacteria, cockroaches, and so on, we find three and a half billion years.



And as we go on and on, over right here, we find the dinosaurs, maybe the extinction of dinosaurs in this little red part, so you can see, even the dinosaurs don't have a long time on earth, if we look at this diagram. And then over here we have this a very tiny point actually that would be the present kind of human being. The present kind of human being, there is reason to think that they have not been on earth more than about 50,000 years now. It could be 35,000, it could be 65,000. It's not important. It's still a very small point on the entire evolution of life on earth.

But also if you look at mammals: mammals have only a short span over here. The humans under 100,000 years is a very short span. Now what is it that makes us think that that is less than 100, 000, probably about 50,000? Well, there are two types of work. There is work by archeologists that's quite interesting, and they found cave paintings, like the Grotte Chauvet in France which is one of the famous caves. You have these lions: the drawings are very striking, powerful art on the cave walls.

This is a human hand found in Grotte Chauvet. Now what is striking about these cave wall paintings is that they are extremely good. It's not like they had childish, paintings and then later we found evidence of people learning to paint better and better. No. The very first evidence of human art is excellent art, very powerful and very good art. And this art, there is reason to think, was used for religious purposes. For example, the animals on cave walls were probably, some of them anyway, considered to be a way to access the spirits. Spirits who had a double personality: they were part animal and partly like humans, able to think, to talk and so on, but of course more powerful than humans.

So religions depend, in this case, on being able to blend animal features with human features. This is a strong double-scope blend. This has been noticed by another archeologist Stephen Mithen, who says that in order to get religious practice, in order to get modern human thinking, you have to have the possibility of cognitive fluidity, which is the ability to do double-scope blending

between very different inputs. So it looks like in the case of art here, before about 40,000 years ago, there is no evidence of art anywhere. Suddenly there is evidence of art in different caves around the world and the art is already sophisticated and the art is presumably being used for religious purposes.

Also the same with tools. You find that with Neanderthals, for example, the same tool is being reproduced over and over again with no interesting creativity of tools. Starting around 50,000 years, suddenly there is a wide variety of creative history of tools. The diagram shows Homo Sapiens up here about maybe between 100, 000 and 200,000 years. But as archeologists like Klein and biologists have shown, there are two kinds of anatomically modern human beings that came from Africa, that have the same anatomy, and the same that we do. And that's probably about 200,000 years ago out of Africa. But there is a cognitively modern species that comes out of Africa much later. That is only about 50,000 years ago. This is argued by the famous archeologist Klein, but it's also argued interestingly by geneticists who have studied DNA and in their study of DNA, they have been able to corroborate the fact that there would be a common African ancestor for us. That would be about again 50,000 years. So even though the anatomically similar species is older, the cognitively similar one would presumably be about 50,000 years old, coming from a single woman ancestor in Africa, very interesting.

There is more on your handout I think. And what these geneticists end up with—Cavalli Sforza, is another one who has found the same result—and Cavalli Sforza ends up bringing the origin of language to about 50,000 years. So we have now religion, art, language, and tool-making technology and they would all seem to be born at about the same time, 50,000 years ago. And that would be the time that this cognitively modern human ancestor would arise.

So what next? Well, informally, what all this suggests is that because to do religion, you need the cognitive fluidity of double-scope blending, in order to make the new tools, the new technology, you have to blend certain kinds of tools with others mentally, in order to get new ideas. And of course in order to get language, you have to have all the double-scope blending that I mentioned at first. It suggests then that the human beings before the cognitively modern ones did not have double-scope blending and the ones after that did have double-scope blending. That's one idea. That double-scope blending is really something recent in the history of mankind.

Now how does that bear on the theoretical issue of the origin of language? Well, let's look quickly at some other theories before we go back to our theory. Some other theories. Here is one popular theory, a nativist theory with Chomsky as one of the main proponents of the theory. The Chomsky idea is that language is so different from anything else, there must have been

a sort of biological event that happened in order to make language possible. So there is a language organ in the brain that is different from everything else in the brain and makes language possible. That's the nativist's view. But then it poses a problem in evolutionary terms, in terms of Darwinian evolution. How could something so sudden happen? In evolution, mutations happen very slowly, very slowly. So how could you suddenly have one day, nothing for language, and suddenly the next day everything for language? That sounds very strange.

So other researchers like Pinker and Bloom say there must have been previous steps. There must have been simpler languages maybe before. The trouble with that hypothesis is that there is no evidence for them. Just like there is no evidence for early forms of art, drawings on caves, that would be sticks and circles instead of being fully elaborated lions and tigers, so there is no evidence for intermediate aspects of language. Another kind of theory says that the brain is a statistical machine that gets better and better, but again, why then would there not be intermediate steps? So it runs into the same problems.

Well, from our point of view, that is me and Mark Turner doing this work, the other proposals are victims of two fallacies. One is the cause-effect isomorphism fallacy which consists in thinking that if you have a sudden effect, if you have something very different, there must have been a correspondingly sudden event, a big catastrophic-like event to produce the catastrophic effect. Now this is a fallacy because in fact many many things in the world are continuous, very gradual. And then at some point, even though they are very gradual, they suddenly produce a big effect.

The examples of that are all over the place. For example, suppose you have your bathtub and the water does not turn off completely so that the drops of water drip into the bath tub, drip, drip, drip, all night long, all night long. The bath tub slowly fills up. Right? It's all continuous. One drop at a time and the change at every point is hardly noticeable. It's a level of water in the bath tub that takes a long time to go up. But suddenly, it must be one last drop that suddenly is too much water. And when that drop happens, you don't just get one drop falling out of the bathtub. You suddenly get the bathtub overflowing. And you get a lot of water that comes out of the bathtub. So here is a case where a very continuous, minute, set of events will suddenly produce a catastrophic event.

And the second fallacy is the idea that when you have a function, you must have an organ for it. So if you have language, there must be a language organ in the brain. That of course is not the way evolution works. Dinosaurs evolved, and the organs evolved so that they had feathers. And apparently one of the

reasons feathers were favored was because of temperature: to regulate temperature. As the dinosaurs evolved, they finally had enough feathers that one day they were able to fly. But it's not like one day they didn't have wings and the next day suddenly wings appeared and they could fly. No. There was a very slow process.

So in fact, a desirable account of the origins of language must take all these into account. It must recognize that language is singular, but it must also reject, in order to be in harmony with biological evolution, it must reject extraordinary events, like the brain suddenly changing, suddenly growing a language organ, and it must show how a continuous path of evolutionary change could have produced something so special as language, but also other things that are special for humans, religion, art, mathematics, technology.

So this is what we need, and again this is on your handout, I will not belabor it. But I will add one more thing. What makes human language totally different actually from even some languages you can teach the chimpanzees. The chimpanzees you can teach about two hundred frames. That's already pretty good. You can teach them two hundred words and they know it in the form of chips or in the form of signs. And they know that each one of those chips corresponds to a particular frame like drinking, or eating or fighting or whatever. They can learn the frames.

But humans have language that is equipotential, that can be used for anything new that happens. So we don't limit our universe to 200 frames. We can have literally hundreds of thousands of frames, and when new events come along, we can talk about them with language. How do we do that? We use double-scope blending. For example, when people invent the computer virus, and we need to talk about it, we use another domain, the domain of viruses that are harmful. And we blend the virus domain that we already know with the new discoveries about computers and we get an emergent notion of computer virus. And this is the way that, as humans, we have language that is equipotential. What does equipotential mean? It means that it has potential equally for anything. It means that when anything new happens, you can find a way to talk about it. So that's a big difference between primates who learn a little bit of language to refer to a frame, and humans, who when they are one and a half years old, can already talk about anything that happens to them.

This equipotentiality of language is only possible because we have double-scope blending. If we had only framing, then when something new happens, we would not have a frame for it, and therefore we would not have language for it. But with double-scope blending, we can use old language in an old frame,

blend the old frame with the new events, and use the same old language in a way that will now fit the new frame. And if you look at the evolution of language, this is the way it happens over and over and over again.

Given that, we can now put forward an account of the origins of the language that meets all the conditions that I talked about before. Because we can now remember that blending evolved on a gradient, on a continuum of small differences. And you had prototypical cases with the simplex, the mirror, and the single scope and the double scope. But in between, you've got all kinds of intermediate cases, so the natural assumption here is that biologically, the brain, just like the bathtub filling up slowly with water, the brain very slowly moved up the level of the gradient of types of blending. But when it was at one of the levels like single scope, mirror, or simplex, it could not produce equipotentiality. And in the domains of art and religion, it could not produce cognitive fluidity, where you have animals being humans at the same time and becoming spirits. So it's only when, very slowly and continuously, the stage of double-scope blending was reached, just like the bath tub overflowing, that suddenly there was the capacity to reach equipotentiality in the domain of language but also in the domain of religion, in the domain of science, in the domain of art. So this hypothesis explains why there are no fossils of language, there are no earlier simpler languages, because they would not have been useful. It's not useful to have only two hundred frames when the world has hundreds of thousands of frames.

You remember that chimpanzees have brains that know thousands of frames (in their head). The new ones they can conceptualize, but they are not able to have a language that would fit the new frames because they don't have double-scope blending. So that is the hypothesis that we propose and that meets all these conditions. Very progressive evolution, but also the singularity of the phenomenon, and the explanation of why language, art, science, and so on, appear together and appear very suddenly, because behind the scenes, in the evolution of the brain, there is the evolution of blending which finally reaches the double-scope level that is needed for all these human singularities.

All this does not mean humans are better than anything else. We like the things that we do, we like painting, we like art, we like all of that as humans. It doesn't mean that they are good or bad. Stephen Mithen, for example, points out that when you have this cognitive fluidity, that's also how you are able to do very bad things, like treat people as merchandise for concentration camps where you kill them. That also demands double-scope blending.

So there are innumerable human activities that demand double-scope blending and also very hideous, criminal activities that humans do, that

demand double-scope blending. Here, we are not saying because you do blending better, you are a better species. No, that's probably not the case. But what we do explain, what we do account for, is actually why language and art and religion and technology would suddenly explode around 40,000 years ago. That brings me to the conclusion of what I wanted to say. So, thank you very much!

LECTURE 8

Material Culture and Meaning Construction

Well, let me thank you very much for your very kind introduction. I had no idea of the personal touch that was added at the end, and I'm very pleased if that's the case, if any of the research could be helpful to you and could encourage the development of cognitive linguistics that we see today in the world, and in particular in China, in many, many different cities and many, many different universities. So I have been fortunate indeed to be able to interact with people in several Beijing universities now, and this afternoon I'm very fortunate and honored to be able to speak in your university.

The topic this afternoon is "Material Culture and Meaning Construction". Let me try to explain very quickly how material culture can be a topic of importance for linguists, and a topic of interest in order to perhaps discover some principles that operate outside of language but are equally fundamental for language itself. Now why do this? Because cognitive linguistics is probably very different from a number of standard linguistic approaches and frameworks in trying to look at the cognitive basis for thinking and for language. And that cognitive basis, as it turns out, shares a lot with other human activities, human activities other than speech and language. So this is why there is this interesting intersection in the work we do between work in linguistics and work in other areas of cognitive science.

Very quickly, (I've been doing this now in every one of the lectures outside of Beihang), for those of you who join us only for this lecture or only today because you were not at the previous ones, I just want to briefly recapitulate. There are websites here where you can find a lot of readings, a lot of materials that I talk about. There are quite a number of books now that are on conceptual blending, which is the organizing framework for the lectures that I've been giving. But these books are on a variety of topics that are quite different. Some are linguistics, but others are design, artificial intelligence, art, music, literature and so on. So this is a display of the evidence for the mutually beneficial

All original audio-recordings and other supplementary material, such as any hand-outs and powerpoint presentations for the lecture series, have been made available online and are referenced via unique DOI numbers on the website www.figshare.com. They may be accessed via this QR code and the following dynamic link: https://doi.org/10.6084/m9.figshare.5831178.

interaction between various areas of cognitive science, looking for similar principles of human thought and action.

In every one of these lectures I have pointed to the background philosophical spirit of the work that we do, and in particular that language is only the tip of the iceberg of meaning construction. So when we speak, or when we sign if we are using sign language, there is enormous mental activity that's going on that we're not conscious of, but that is crucial to understanding how language works and also how human thinking works. Meaning construction operates in many areas of human activities. And (number three) the conceptual mappings that we study are the same in these superficially different looking areas. So again, the fundamental point of our spirit of inquiry is that linguistics can shed light on other areas because language is so rich and so interesting to study in the way that it guides meaning and prompts for meaning. Linguistics can help, in many ways, to shed light on general human thinking, but conversely, and this is a little bit the focus of the lecture this afternoon, it turns out that the study of meaning construction in other areas can in turn lead to insights in linguistics proper.

So let me move on. This is the same sort of thing in a single sentence, the same general philosophy of research, what happens in our heads. And the main organizing concept here has been the notion of conceptual integration. This is a minimal schema where we only have two inputs. In reality, in any real human phenomenon, you have usually many more than two inputs, and many inputs that can be psychologically different for the same people. The people are experiencing the same overt stimulus that will typically trigger different inputs, depending on their experience and so on. There will be of course a common core which allows for exchanging meaning and ideas without total misunderstanding, but with some misunderstanding usually. The fundamental principles are to take the inputs and be able to match them and find partial counterpart connections, to find generic structure that they share and that will motivate these mappings, and then to create new blended spaces by projecting selectively from the inputs and creating emergent structure in novel blended spaces and also all over the network.

So in the previous lectures, we studied quite a number of the examples, like the example of the boat race. I just point to it so that you can look at it, if you like, directly in the readings. Also through examples of grammar in lecture No. 6, we noted and studied the important fact that grammatical constructions typically involve double scope conceptual blending. Now double scope blending is the kind of blending where the inputs are different and have different organizing frames. And this morning in the lecture at Beijing Normal University, I talked about the origins of language and specific human thought,

and developed an argument which is published, and can be read by those who were not at this lecture. The argument was that there was gradual neurobiological evolution that led to different types of blending capacities, some of which are attested in primates and other mammals for that matter. And others which seem to have developed gradually and are specific to humans, in particular the all important double scope blending which makes certain singular human activities, like religion, art, science, technology and language, possible.

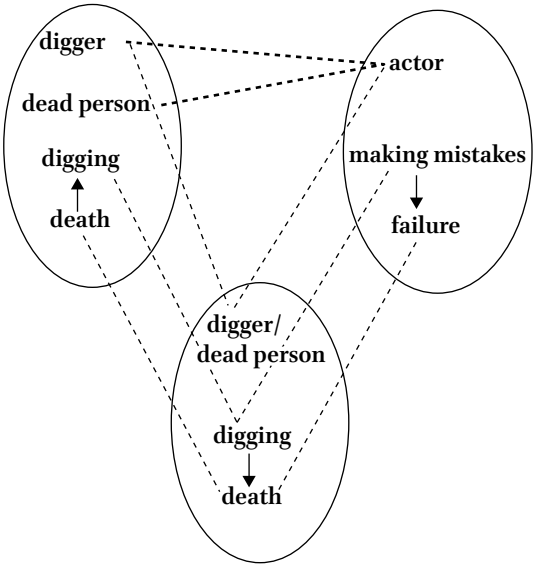
So the gist of the argument in this morning's lecture was that blending evolved gradually. There were presumably very, very slow biological mutations. But the species that we belong to are anatomically and cognitively modern humans that probably originated in Africa about 50,000 years ago. This is the hypothesis of geneticists and archeologists. So 50,000 years ago, you would suddenly have humans who are not just anatomically like us but cognitively like us. And that would account for the sudden explosion of human activities, like beautiful prehistoric cave paintings about 35,000 years ago, or very diverse tools. Whereas before, the tools produced were always the same and very simple.

Presumably language would also come along at that point. This is why from that point of view, double scope capacity, the capacity for double scope blending of inputs of very different kinds, seems to be fundamental to many of the specific human kinds of activities. So in the domain of grammar, the double scope blending of grammatical constructions explains a number of interesting linguistic facts, like the facts in English linked to the caused motion construction. Again I refer you to the corresponding readings if you could not hear the lecture on Sunday. Also an interesting point was that syntactic complexity has nothing to do with meaning complexity. So consider very simple grammatical constructions like adjective-noun "guilty pleasures": We are able in order to interpret them to decompress a very long causal relationship. The fact that for example, if I smoke, it's a *guilty pleasure* when smoking triggers pleasure which in turn causes guilt. So there is a long causal chain here, but there is not a thing that's a 'pleasure,' and that would feel guilty. That's not what these kinds of construction give you. So the importance of causal compressions is something that we have stressed in the whole series of lectures many, many times from many different angles.

Again here are some examples that were given on Sunday of very simple grammatical constructions: *dolphin-safe tuna, child-safe beach, shark-safe beach*. The point was that in order to reconstruct the meaning, you have to use complex background knowledge, but you also have to do a very intricate causal decompression. The *dolphin-safe tuna* means, for example, tuna that

have been fished in such a way that the tuna were caught, and the tuna were killed, and the tuna are now in the can and ready for you to eat, but dolphins were not harmed in the process of fishing. And all that gets compressed into *dolphin-safe tuna*. *Child-safe beach* is a beach that is good for children because there are no dangers, but *shark-safe beach* is also a beach that's good for children and adults because there are no sharks. So the structures are the same. The causal decompression is different. And one can systematically account for this in terms of decompression and compression.

Metaphor is a topic that we spent a fair amount of time on. And one of the things that was important to know was that in order to get metaphor, you have to be able to do double scope conceptual blending. I used this example many times now in the lectures, but I'm reviving it once more for the people who are just joining us. The point that was made was that in the apparent source domain of digging you own grave, there are two people: the digger and the dead person. And there is a causal chain of events that goes from the death of the person to the digging by the other person. It's because one dies that the other does the digging.



But in the target domain of the metaphor, you have one person, the actor, who is making the mistakes. And the mistakes are causing the failure which happens later. So even though digging corresponds to making mistakes, and the

actor corresponds both to the digger and automatically to the dead person, you can see that the source and target do not match in structure. So you cannot use the standard simple source-to-target transfer of inferences, because it will give you the wrong result. What happens here as in many, if not most, metaphors is that you have a conceptual blend in which one of the inputs transfers some of the frame structure. In the frame compression, there is a digger, and there is death. And it's very 'human scale,' what we call 'human scale': events that we can understand easily. But the structure, the frame structure that there's only one actor and the causal and event structure are transferred from the other input. So in the blended space, we get a special kind of death that is the result of digging your own grave and when it's big enough, you fall in the grave and you die. And of course that, in turn, is in the blended space making mistakes and failing, for example in your financial enterprises.

The result needed for today's lecture is that we need double scope blending, and the second important result is that we are able to compress things by blending. So the complicated idea of making mistakes, not being aware of them and maybe failing later financially because you make more and more and more mistakes, this is all compressed into a very direct human scale scenario: you dig the grave, and it's deep, and suddenly you are in the hole, and you can't get out, and you die. The compressions that we can have are either:

1) outer-space compressions: relations that link things in the two inputs can be compressed into a single relation in the blended space (and I will come back to examples of that).

Or

2) the compression can be borrowed from one of the inputs and projected to the blended space.

So let's see if we have any examples of that. Here's projection of an inner-space relation to the blended space. Well, the case of the grammar, for example, borrowing a simple syntactic construction like *throw the ball into the yard* and blending it with a complex causal structure such as: Gogol sneezes, and as an effect of the sneezing, there's some air, and the air happens to blow into a napkin, and the napkin falls off the table. And all that gets compressed into *Gogol sneezes the napkin off the table*. A very simple syntactic structure. So grammatical constructions, in that sense, are compressions that can apply to much more diffuse and intricate meaning situations.

(And I use the following example over and over again, so apologies to those who followed me from university to university). This is the excellent example of the politician who vetoes a foreign aid bill that would have given money that could have been used to buy food, that could have been transported on boats, that could have been taken to poor countries in which the children who don't have enough food, and some of those children are starving. And if the bill had been voted, then the long chain of events might have given some food to the poor children. And the compression here consists in taking the politician who vetoed the bill, who prevented the bill from being voted, and saying to that politician: "You are snatching the food out of the mouths of starving children," or pointing to the politician and saying, "He's a really horrible person. He's snatching food from the mouths of starving children." Again this is a case of borrowing compression because we take the already compressed and human scale scenario of somebody taking food from children, and we blend it with this much more complex chain of events that have many political actors and many customs officers involved, and doctors, and people transporting food, and on and on and on. And the compression is perfectly sensible for everybody. We understand that, even though of course it is literally false.

So these are important examples of compression. In doing compression, in these conceptual blends, there are some overarching goals which are to end up in the blended space with something that is diffuse becoming compressed and simple, obtaining global insight, because, directly, you see a scene that you understand, somebody who takes food from children, whereas a long chain of political events is hard to conceive. The overriding principle that contains all the others is that you achieve human scale in the blended space. For example, with 'snatching the food' or 'digging the grave,' you have seen scenarios that are directly intelligible to people, because they have experienced them, they have a spatial component, they happen in a short time, and they have few actors, two or three maximum, they also have stronger emotions in them, stronger vital relations. In the blended space of a person snatching food, you are angry at that person. You have emotions for what he is doing to the poor children. Those emotions are projected from one of the inputs. And they now apply to the other input, by virtue of the emergent structure in the blended space.

So these are just a few examples of compression, and compression is a very general phenomenon. In the book *The Way We Think*, you can find a detailed analysis of the constraints on blending and compression and how, for example, analogy can compress into identity, which itself can compress into uniqueness, and on and on. Time can compress into space but it can also compress into shorter amounts of time. Causal relations compress into

uniqueness very easily. This was a quick background about what we've been doing.

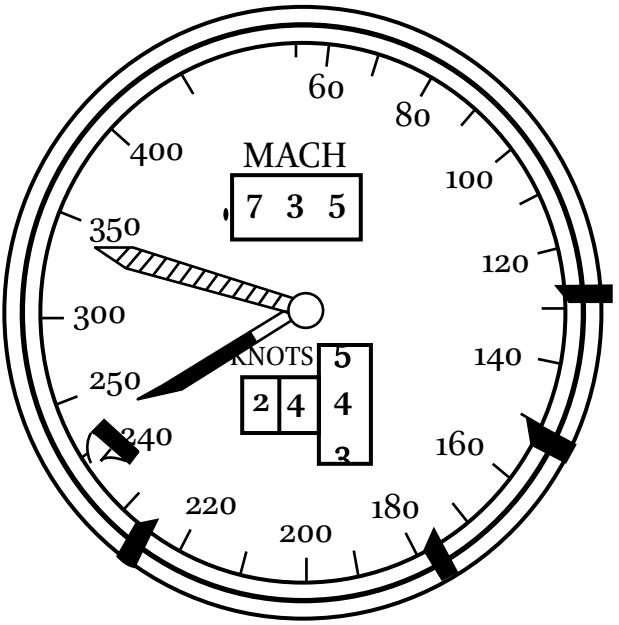
And now I'm going to get into the actual topic of today's lecture. And the topic is triggered by some extremely interesting work by a colleague of mine who is a cognitive scientist and anthropologist. His name is Ed Hutchins. And he discovered and proved and showed that when you build these conceptual blends, there are ways to anchor them to material objects. Cultures actually develop specific material objects that will anchor the blends. And the material objects will then be transmitted to further generations, which will allow the transfer of the blends themselves. How was that different from what I just talked about? The examples I talked about were compression of an idea or compression of a metaphor or compression of a grammatical construction. Those examples had inputs that were completely mental. They are in our heads. We have on the one hand the idea of the person snatching food, on the other hand the idea of the politician vetoing the bill.

But what Hutchins looked at were cases where in addition to conceptual blending, you have objects that serve as an input. The structure of the objects serves as an input and can then itself come into the blended space and become a material way of remembering or manipulating the blended space. Now I'm going to show you some of these objects that Hutchins talked about and you'll see that they often have to do with various kinds of technology. But then I intend to return to language and speech by showing that in fact we can look at writing and we can look at signing in sign language and we can look at speaking phonetically as also having components of material anchoring.

So we'll start with the more visible cases, the one that Hutchins talks about. And I will start with the measurement of time. In the previous lectures we talked about time a lot, because we talked about the complexity of time metaphors. And so this was mentioned in the previous lectures as one compression that humans do. This is not a material compression. It's a conceptual one. Humans see the day, day after day after day. And all these days are analogous. They have the sun rising, and the sun setting, and the sun being high at noon. And they are also similar in the activities people do. They have regular activities like breakfast and lunch and dinner and so on, and lectures or whatever. And the analogy of these days is compressed into a unique cyclic day, so that we can talk about days not in terms of all the multiple days that people have ever experienced or will experience, but in terms of a single day that is cyclic and starts over and over again. We say the day runs its course. We say that we go through the day. And then the day starts again when we wake up.

So we've compressed all these multiple days into a single day that goes around and around. And then, material anchoring comes in with the invention of various time keeping devices. And I will just use the watch that we use today. I won't worry about the history, but they have a similar history. And with the watch that we have today, and if you think of a child learning to tell time and learning to understand the connection of the watch with conceptual time, what you need to do is to be able to put in correspondence the conceptual notion of the cyclic day and the mechanical object, the watch with hands that go around and around. And from those two notions, you get a blended space in which you have time here on the clock or on the watch, and in which you have emergent structure. You have new units of time here like seconds, minutes, hours, that you did not have in the original perception of time. The universe does not show you seconds, minutes and so on. And of course the mechanical device input doesn't in itself have time in it. The reason we end up with a timepiece here with watches or clocks that tell time is because the engineering of the device is such that all the different watches and clocks are synchronous. This is an engineering possibility. And so it allows a compression of the multiple timepieces that we have. Maybe we all have or many of us have watches on our wrist or on our cell phone or whatever. And they are compressed into a single one, the idea of universal time that we all share.

This turns out to have very important implications for metaphor, that I talked about on Saturday, I think. We won't return to them here. Here we look at the material anchor aspect, namely, that the culture, within cultural time, successively evolves these material objects, in this case the watches, in such a way that people can use the watch in order to trigger the blend. That is, if you know what a watch is, you don't just know that it has hands that turn round and round. The child who first experiences the watch experiences the watch as a toy that you can play with. But when you learn the conceptual system, you learn to map the watch and the clock to your daily activities, to the days, to the weeks perhaps. And you end up with the richer conception of the timepiece. So the watch has now become a material anchor for the conceptual notion of time. Things like seconds and minutes and so on cannot exist without the engineering spectacular feat of building completely synchronized objects that have motion. So it's the motion of these objects that we interpret as time. That's an example of a material anchor, a material object that serves to help us in one input. Our conception of the material object helps us to build a complex blended space in this case, the notion of timepiece, and measurement of time with seconds, minutes, and hours.



Let's look at a second example. This example is a dial from airplanes, not the most modern airplanes, but slightly older ones. They have this dial for the pilot in the cockpit. And the dial has these clips on it, which actually have different colors. I should get a color slide here. So in there: like green, blue, yellow, orange maybe, I don't know the exact color. And the clips can be moved. These are clips that you can move on the dial. The dial itself is showing you the speed of the airplane.

If you look on Page 2 of the handout, you will see this dial. And next to it, actually, you will see the corresponding display for modern airplanes. So, if you read the description here on the handout, you will see that the dial is giving the pilot information on when to reconfigure the wings. The wings have flaps. And the flaps can be in these four different positions. And the four different positions depend on the speed, but they also depend on the overall weight of the airplane. That is, how much fuel it's got in it and how much merchandise, how much cargo it's carrying, and how many people.

So in order to know when to change the flaps on the wings, you have to know the weight of the airplane and the time that the airplane is going to land—when the pilot is going to land the airplane. Therefore, you know the pilot has traveled a certain distance. A certainamount of fuel has disappeared. The plane is lighter in terms of fuel. There was a certain cargo in the plane. So

at each trip depending on the cargo and depending on how far you travel, the positions of the speeds at which you must change the wing flaps, the speeds will be different.

On the modern display that you see on the handout, you have to read the speed. It's in the left window, and it tells you "two hundred." And then you have to ask yourself—if you are the pilot—you have to say, "given how much cargo I have and given how much fuel I spend, is this the right speed to change the flap on the wing?"

But what the older system with the dial does is the following: The pilot, before leaving, before even flying up, the pilot knows how much fuel he's going to spend on the trip. And the pilot also knows how much weight he's carrying. So he looks it up in the right tables. And he finds for that weight and for the weight of fuel on arrival, he finds the right speeds to change the flaps. And then he moves the clips. He moves the clips to the corresponding speed. He does that before taking off.

And then,—that's the beauty of the thing—he does not have to worry about the speed, because all the pilot has to do now is to always have the same behavior. He knows that when the speed indicator gets to the orange clip, you change the flap. When it gets to this yellow clip, you change the flap again. Because of this clip (I call it the blue one maybe), change the flap and [then] the red one.

This is in the blended space that has been created. In the blended space, all you need to know is the color of the clips. And the rest is irrelevant. So what has happened is [that] this has served as a material anchor. It has been mapped in this simple dial with a hand and with the four colors, and you don't even have to look at these numbers any more. It has been mapped onto the complex, diffuse, situation of computing the speeds, computing the weights, and so on. And in the blended space now, the pilot can just remember only one thing: the colors on the clips and to change the flap at the same color no matter what trip he is on. Because, of course, on different trips, these clips will be in different positions, but they'll all be in the same order with respect to each other, and so the pilot will always be doing the same thing.

Well, this compression of behavior for the pilot is actually very similar to the compression that we saw for snatching the food from the starving child. That is, it has human scale now. You could teach a child to do this. You tell the child, "Oh, change the speed when you see the red or the blue or the yellow or the orange." It becomes a simple human scale activity. It is made possible by the engineering of the material anchor. And then it's made possible by the action of the pilot when he starts out with the plane and actually puts the clips in the right position.

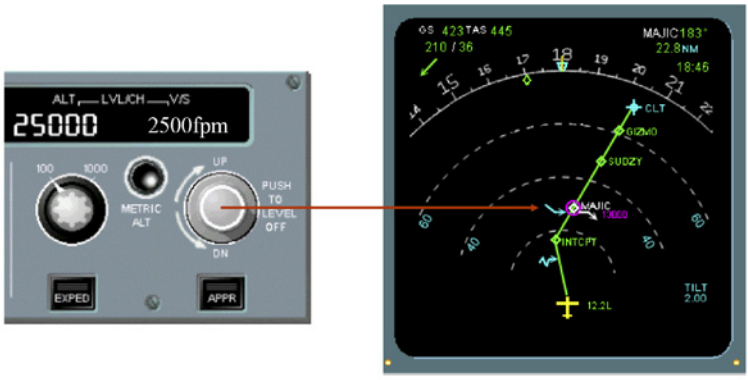
Here's another very interesting airplane example of the same kind. This is a modern jet. And on the display in the airplane cockpit, there is another automatic computation of the future flight of the plane. The plane is headed in a certain direction and will land at some airport. Now if you look at this explanation, in order to be able to land when he wants to, the pilot has to know what speed will correspond to a certain altitude. So during descent, the pilot will be told at a certain altitude, for example 13,000 feet: "Now you are clear. You can land." He wants to achieve that altitude by the time that he reaches the location. So that will depend on what vertical speed the pilot is actually taking. And the pilot has a knob where he can control the vertical speed. You and I, most of us, I presume, are not pilots. So we don't have to worry about this complex behavior where you have to make sure that you are going to be at 13,000 feet exactly at this point and therefore have to adapt your vertical speed so that you get that result. Complex computation goes on inside the plane, and goes on inside the pilot's head.

Now, what happens is that, on the display, there is this blue arrow which the pilots call a little hockey stick, (you know, like playing hockey). So this is a hockey stick. And the hockey stick on the future flight will tell you the altitude of the corresponding point, and you will be told this is where you need to be at 13,000 feet in order to be able to land. So the pilot can see the hockey stick.

But now, here's where things get interesting. If the pilot modifies the vertical speed: then for example, suppose you increase your vertical speed, so you go down a lot faster. Then you will reach 13,000 feet earlier before this point. If you

reduce your vertical speed, you're going to reach the point later. Because either you go down very fast or very slowly, and so on your future flight that will change how fast you reach a certain point.

Now what happens is that the pilot, by just turning the knob for vertical speed, will make this little blue hockey stick move. It will move because the vertical speed will change the place where the ideal altitude is reached. Right? Given this system, everything is now compressed. The pilot, instead of doing the long, complex calculation and coordination, can just say, "Well, I know I need to achieve the altitude you know in this city, so I just move my knob here. And the knob will make the hockey stick move and I'll just keep moving the knob so that the hockey stick stays exactly in the position where I want it to be. So, again, a tremendously complex engineering calculation and computation by the pilot has suddenly been compressed into something very direct and very simple, which is: you turn the knob, and you look at the blue hockey stick, and you want it to stay in that position. And again, now, you can teach this to a child.



In the fourth lecture where we studied emergent structure, we showed that similar things happen in mathematics. More complex stages of mathematics actually produce nicer, more human scale compressions. So imaginary numbers become conceptualized complex numbers in space, which is a very easy conception it turns out, but very hard to discover for the mathematician. In the same way, here, this is a hard thing to achieve as an engineer. But, crucially the compression was not taught to pilots, because the airplane instruments were not deliberately conceived in order to allow this compression. It's an accident of the system that you can actually manipulate the hockey stick.

This is not something the engineers had foreseen. And so the pilots discovered this. They were not taught this. And so the pilots said, "Hey, look, I found a really great system to do my landing. All I have to do is to turn the knob and to wherever that knob will move the hockey stick, to wherever it should be for the landing." And when the hockey stick is in the right position, "away you go," he said, "away you go." And you land.

So notice how different this is from digging the grave and snatching the food. It looks very different. But in fact, in order to achieve this, it's like the watch and it's like the other purely mental compressions. These are cases where the human species has culturally been able to build material objects. In this case the material display and the knob and of course the airplane that goes with all the hidden complexity. So just like we have hidden complexity in our mind, the airplane of course has hidden computations going on that will automatically calculate the position as a function of the vertical speed.

All this we don't need to see. All we need is this human scale operation in the blend where we turn the knob, and the little blue hockey stick moves, and we—the pilot—achieve the right result. So this is quite spectacular in cases like this. It's, of course, accessible to the human mind because you have double-scope blending, but this time, the particular material anchors that you need, whether it's watches or the dial with the clips or the display here, all these material anchors have been produced this time by the culture over a number of generations, over a period of years, with specialized engineers.

Hutchins shows other cases where you have a material anchor. For example, your hand is a good material anchor, and there is a system apparently used by Japanese students a lot—maybe some of you know it—where you can immediately find by looking at your fingers what day of the week some particular day is going to be. So you're told March 13, 2025, and you look at your hand, and you say, "That's a Wednesday." Does anybody know that system? This happens because there is a clever correspondence that is set up between the different parts of your fingers and the different days of the week, and there is a human scale operation where you can just do something simple. (I don't know how to do it anymore—I learned, but I forgot). But it's very simple and then you can find that it's a Wednesday. So here's a case where the object that is used as a material anchor is not a complicated feat of engineering. It's a complicated feat of biology. It's the hand that you happen to have with you all the time to do other things. And suddenly it gets used as a material anchor.

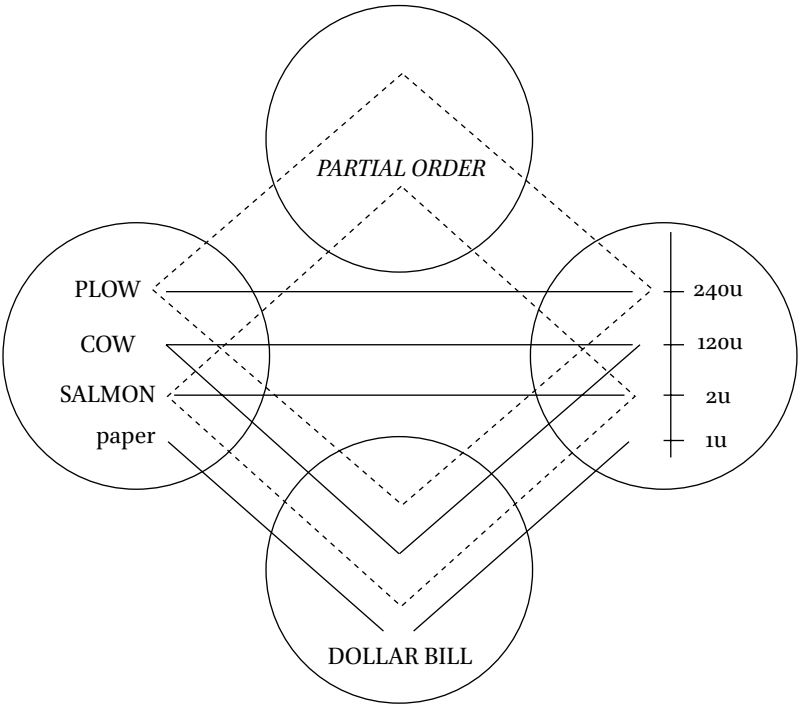
Well, let's switch to money. The conception of money seems very familiar to us. We just take yuans out of our pockets and we give them to somebody. And they give us whatever we want, bottles and books and everything else. And

we've done it for so long. As children we learned to do it early. So it seems like the most simple and obvious kind of behavior. But if you think about it, it's actually a very strange behavior. Here's this piece of paper. In itself the piece of paper of course has no value. I can burn it. I can do whatever I want with it. So it's only through a complex mental and social process that suddenly that piece of paper can do magic, like getting me the water and anything else.

In order to do this, in order to achieve this, we need money as an abstract concept, which, notice, other species don't have. They have exchange between some things, but they don't have anything general like money, that they can use for anything they want. And the way it works is something like this. You have two inputs to the kind of blend you need for money, whether it's a paper, bill or a coin, a material piece of gold or metal, or whatever. The money is going to be the material anchor for the blend. So let's see how that works. One input is the input of trading and bartering without money. So try to go back to a time when there was no money, and people had to just exchange things. So the fisherman with fish has 30 salmons, and he could bring the 30 salmons, and he could ask somebody who was weaving cloth: "I will give you 30 salmon, and you give me your piece of cloth." And then the piece of cloth could be used to get maybe 10 chicken from the farmer. And the farmer could give to the blacksmith. He could give two cows in order to get one plow. So obviously there is a rich system of exchange for humans that is easy for us to understand. It's called bartering. And so an economic system can function with this, and without money. So suppose you have this input of plows and cows and salmon and cloth and everything; they are goods, and you sort of know what something is worth, whether you can get some fish for your chicken or some cloth for your cow, or whatever.

You end up having a notion of what they are worth proportionally, of course. You can build a conceptual scale this time that the cow is worth for example 60 salmon here. The cow is 120 units (or something) the other one is 2 units. This is abstract. This is just to express the proportion of the two, still no money, still no material anchor. Now magically we take the "money", whatever it is—in this case, on my slide, it's the Cuban Peso. But it could be the American dollar or the Chinese yuan. And what we do is we put it in one of the inputs; we suddenly put in this piece of paper. Now the piece of paper at that point has zero value. As a piece of paper, you cannot eat it. You can not use it for clothes, you can not do anything with it.

So the piece of paper in itself has zero value. The trick is for society in this case to make a piece of paper in such a way that it are hard to imitate—right?—hard to make as "counterfeit" pieces of paper. So you make them in a special way, and then from this input where they are just pieces of paper, you bring them into the blend. Now in the blend, you have the notion of value of



things which is projected from the real world of things, a plow that's worth a lot to me, a salmon is worth a little bit and so on. And then from here you have the actual proportion of value for these objects. You bring in the dollar bill and of course the social community agrees on some value for this element on the scale. So over here it's only paper, but over here it's like the timepiece that we had before. In the input you just have some mechanical device with the hands turning. But in the blended space, suddenly that mechanical device becomes time. And here you just have paper, but when you project it into the overall blend, then suddenly everything has value. A cow has the value of—whatever it is—120 units here. And the dollar bill itself has value in this case of one unit.

So we operate in the blend with projection from the exchange system. We can exchange things here and in particular we can exchange so many dollars for so many cows. That's easy. And from over here, we have the proportion which is not the inherent value of the paper. The paper has none, but it's the emergent value in the blended space. So something as simple as a piece of paper can suddenly become a material anchor for an elaborate blend.

This is relevant for linguists for the reason that I announced at the beginning because these operations are the same ones that we saw with metaphor,

with grammatical constructions, and so on. So there are examples of this. We're using material objects in addition to our conceptual structures. But they are also interesting, I think, for linguists, in another related respect. They show the evolution of a concept. And here at this very simple stage, you have the concept of money, in the simple sense of money that you can give to somebody else, put in your pocket and so on. Why? Because it's a piece of paper.

Of course as further blends come along, the concept of money will change, because maybe you won't have to manipulate money at all. It will all be with a credit card or something else. So this is not a credit card. It's my hotel card. But imagine it's a credit card. Then it's a different conception of money. This credit card is also a piece of paper, almost plastic, but it doesn't map to a single value here. It has more complex interactions. And to relate to this blend, you have to start doing other successive blends. We talk of money in all these cases as if it's always money, but in fact both the manipulation and conception changes all the time because of influence from the technology that we build, the banking system in this case, or things that we discover.

So in mathematics, the concept of number changes all the time. Now for linguists, you say "number". Oh that's a word. You look at the dictionary. What does number mean? Well, one, two, three and then you stop. But the reality is that you have over cultural time, over centuries, a change in the concept of number. Through successive blends, each notion of number is blended later with others. Well, here it's the same thing. This very primitive notion of money that is the result of the blend can now be blended in turn with other things such as, for example, banking where you just write notes, where you sign your name on a check. So you blend this notion with the notion of check where you decide what the piece of paper is worth, how it maps onto this. And then the notion of the check itself can be further blended in order to produce more abstract notions like the credit card. But in each case, the blended space you end up with is a very simple one. Again a child can learn to use money—give the one yuan and get a bottle of water or something. And the child can also, unfortunately, learn to use a credit card. If you give the child the permission to use a credit card, then they understand, they give the store keeper the credit card, and they say, "I want that toy and this toy and that toy." And it works fine. So these are very simple to use even though in invisible mental and social worlds, they actually build on very complex connections.

Well, here's another example of the material anchors and conceptual blends. And this one is taken from the domain of magic and religion. So it's an example of Voodoo. And in the simplest case of Voodoo, you would have two different inputs. So this is the case where the sorcerer who does the Voodoo can kill somebody by making a little doll of the person and then performing the right

ritual. And on that doll ideally you are trying to get hair from the person. You steal hair from the person. You put it on the doll, and maybe a piece of clothes from the person to make the doll's clothes. And then you stick a big pin into the doll. That's what happens in one input. So in that input you have a doll, and you are sticking a pin into the doll, and the doll of course is an inanimate object, and nothing special happens to the doll. But that input is then connected to another conceptual input where the doll corresponds to the person the witch doctor wants to kill. And parts of the doll, the hair of the doll, correspond to the hair of that person, because it's a piece of the hair. It's a part-whole metonymy. It's a synecdoche. Or the little shirt of the doll corresponds to the shirt of the person—it's a piece of cloth from a shirt of the person. Again you have a part-whole metonymy that's operating here, a synecdoche that's giving you connection between the real person and the doll. And so of course the action over here corresponds to something happening over here. The real person dies as a result of having the Voodoo performed.

In this input, there is nobody actually stabbing the person. The person is not being attacked or anything like that. So in fact what is going on is that this Voodoo ritual with the result of the person dying is a cause and effect relation. You do this and later the person dies. And this is compressed into a blend where the doll <u>is</u> the person, so it's compressed into the person. And when the sorcerer does the action of stabbing the pin, the pin is a lethal dagger, and it kills the person because you are sticking the dagger in the person. And therefore in the blended space the person dies.

Now you might say, "Well, so what? I mean, isn't this just crazy? I mean, it's made up by the witch doctor, and who cares?" In fact, a number of people do die as a result of this kind of Voodoo practice. And one of the reasons is belief in something. If you believe in the conceptual blend, if the whole society around you believes in it, then people see the Voodoo ritual with the stabbing of the doll, they see that you have been killed. You no longer exist. And you also believe in it. Therefore you believe you don't exist any more. And nobody pays any attention to you any more because you are dead. And you yourself, you know that you are dead, so you don't live. Your life has lost any meaning, and in fact you die. So you die through a complex causal connection which is not directly the hatpin in the doll.

But the reason you die is because you and others in the social group happen to share this blended space in a very strong way, so that whatever happens in that space actually happens. And this is true for many religious rituals. If you are a Catholic who takes communion and believes in the Eucharist, then the material anchors in that case are the host—you take communion and you swallow the host—and the priest has the wine also to give you communion.

And the wine is the blood of Christ, and the host is the body. And if you believe that, then you have a strong blend which is shared by the members of your community. In one of the inputs, you have Christ and the invisible aspects of religion. In the other input, you have very practical things. You have the little wafer, the host that you're going to eat. And you have the wine which is ordinary wine. But in the blended space, that wine is the blood of Christ, and the wafer is the body. And you have the belief, and therefore many feelings, many emotions will follow.

So the power of belief operates independently. Whether that belief is right or wrong is irrelevant here. If you believe, whether it's the Voodoo example or the Catholic communion example, or any others in religion, you are able to create blended spaces which become the new reality and which people around you share, and therefore will trigger your emotions and responses and so forth.

Now the key, the crucial thing for us as linguists, is that the compression that we find here is the standard compression that we find in very ordinary linguistic examples, examples that I showed you, that I evoked, in previous lectures, like "my tax bill." My tax bill gets longer all the time. It's the compression of different tax bills. You get a different one every year, and you compress them into a single one. So the analogy of the tax bills becomes compressed into the uniqueness of a single tax bill. And this analogy of the tax bills, the fact that they are different, some are longer than others, becomes compressed in the blended space into change.

Language, in other word, systematically has built in compressions and blends of this kind in its most elementary structures, whether you say "the tax bill gets longer," whether you say "guilty pleasures" or "dolphin-safe," or more elaborate syntax like "they prayed the boys home", which is caused motion, but with verbs that in themselves are not caused motion at all. That's why the two kinds of phenomena have to be brought together and looked at, because as it turns out, they require the same kind of compressions, just as in the language examples.

Remember we had counter-factuals like the one with the grandparents and the grandson that murdered the grandparents. And we had the example where in the blended space the father said, "If the grandparents were alive, they would plea for mercy for the grandson." And that was illogical. Because they couldn't both be alive and be murdered. Well here again, this looks illogical also, like the Voodoo or the Catholic Eucharist. Right? They look irrational because "how can you kill somebody by putting a pin in a doll?" or "how can you get the religious experience of Christ by eating a little piece of wafer?" From the outside, those look illogical, but when they have been compressed into a blended space, they become the reality of our cultural

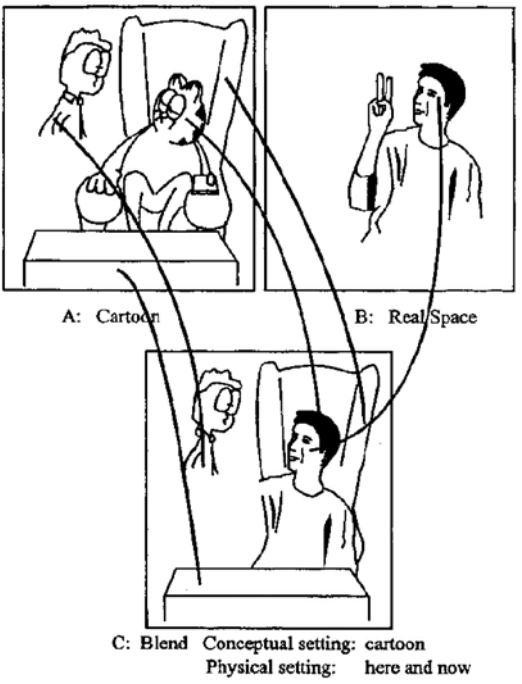
experience, so we would not question our beliefs here any more than we question our language. People don't keep asking all the time: "Why do you say my tax bill gets longer? You can see that my tax bill is not changing size. It's always the same size. And I have another tax bill from last year. It's a different one." No, people accept the compression as automatic, whether it's grammatical constructions or whether it's in this case religious experiences or the examples before that of the pilot in the cockpit.

Why do I bother to bring together all these examples? Well, to make as strong a case as I can for the notion that these very singular human activities, technology leading to planes, science leading to mathematics, religion leading to Voodoo or the Eucharist, and of course language leading to grammatical compressions like "my tax bill is longer and longer", that they are all using as a fundamental cognitive framework and operation the same type of double scope compression. Without the double scope compression, you cannot do any of these. They will not make sense.

Let me just evoke a couple more things, sort of returning to language now. A sign language, as you know, is a language often used by the deaf, but that can be learned by anybody, especially if you are a child. And the sign languages have elaborate grammar, elaborate phonology just as complex as the spoken languages. But in some cases because of the spatial modality of sign language, you see the material anchors a lot better, a lot more directly.

So here's a genuine piece of data. This is a man who is reporting a conversation, who is talking about a cartoon with the cat "Garfield". I don't know if this is a known cartoon in China. But this is a cat, and this is the owner of the cat. And so this is the original cartoon. And this man speaking in sign language is describing something that's happening.

But *that*'s what we actually see. So we see this, and he is looking in that direction. And he is making a certain sign. But the important thing is that he is using his own body and his own position in space as a material anchor in order to map onto this cartoon that he is describing, so that you see that here, he *is* the cat. He is mapped onto the cat, and he's taking the same stance as the cat, looking at the owner. Now, there's no owner over here, but by means of words in sign language, he is also evoking the owner. And in fact, he can shift perspectives and take the perspective of the owner. So here's the material anchor in this case. It's the body of the person with the right orientations. And in the blended space that we build when we interpret what's going on here, we project this person as a counterpart of "Garfield" the cat. So we understand this is Garfield. And we project the owner over here of Garfield into the blended conception of the cartoon even though over here it's only indicated by words.



And so we build this. So the material anchor is crucial in building our conception of what the person is trying to say. The person is using his body to produce words just like we produce words also with our mouths. But he's also using his body [in other ways] and we do that all the time. I've been gesturing in front of you, moving my hands, and moving my arms, because we have a system of gesture that also has a very strong metaphorical and materially anchored component. And the gestures are a useful part of communicating.

Now we see that this is happening in sign language. Let me give another example. Linguists all love anaphor, pronouns and so on. One way of setting up pronouns in sign languages, it's to set up imaginary positions in space. So that this person is here. This person is here. And now I can refer, I can remember these positions and I can refer back to the person. In spoken speech I cannot do that, because I have a linear stream and I have to use "he" and "him" and so on. And in spoken language, I have to build the mental spaces in my head with the connections between the various participants. In sign language, I can help myself a little with the modality, by having some material anchors for the actual reference that I'm pointing to. So it gives what looks like a very superficially different pronominal system, but in fact the reason it's different is only because the modality is superficially different.

But what the spoken language person is constructing are these mental spaces where you do have positions of reference and connected reference. And in the sign modality, you indicate the connection explicitly by actually moving your hand. And you indicate the reference by pointing to where the referent is. Now if the reference is a person in the room or myself, I can use myself and all the persons in the room as a material anchor, as a referent, just as we do in fact in spoken language. When we gesture, we use people in the room, and we point to them, and in fact we can even point to absent people. If I'm looking for your friend Li Ping who was sitting over there and he is not there any more, I can point to over *there* and say, "ah, he's over here now." Or I can say, "Where is Li Ping? Now he's gone. Oh, now I retrieve him. He's over here." So there are all kinds of ways in which we can use the anchoring around us. The real world around us can become material anchors for gesture and speech. This is specially apparent in the case of signed language where it becomes part of the grammar. There is an excellent book that I recommend very strongly by Scott Liddell. It came out two or three years ago. It's on the website I told you above, and it details the mental space building and the blending that goes on in the grammar of sign language. It's 'grammar' in sign language, because now the conventions are very rigid.

So we are almost at the end. I was going to tell you about another kind of work on blending in technology and that's the invention of the ATM. And this is pretty straightforward. You know the ATM machine where you get money from the machine. And it's very straightforward that it's a blend of, on the one hand the banking system, and on the other hand something like computing. So you get a blend that's the ATM with the material anchor of the actual machine that you go to. It's nontrivial to analyze this blend. And it's not as simple as it looks to find all the right counterparts. And so on your handout, you can look at this work by Barbara Holder who did a very detailed, very interesting article on creating ATM's, credit cards, check books, and extensions to check cards. So this is again a case of conceptual change where the notion of credit card will change, the notion of money will change. And we could go on and on if I had more time.

This is an example I will show you very quickly of how material objects that we handle all the time can be used as material anchors for expressing something. So this is my bill. See this is my name here, and it's the bill I get in the mail to pay my electricity in California. Now if I turn over the envelope—(and I hope the computer … there we go). It turns over the envelope, and up there, you see "Make this envelope disappear. Go paperless." Now you see what they are trying to say. They are saying you don't have to pay your bills with paper bills. You can go online and have just a regular payment of bills without envelopes coming to your house every month. But the literal meaning here is "making the envelope disappear." That would be a magician saying, "Hey, here

is the envelope. [Abracadabra], no envelope." How can that mean: "Go online." That envelope will always be there. The envelope that you got in the mail, no matter whether you go online or not, it will always exist. It won't disappear because you start to have a computer account for the electric bill.

So what's actually happening here is again very, very elaborate. It's like the dinosaurs and the tax bills that we talked about. But even more elaborate. We imagine strange envelopes. If I don't do anything, envelopes keep coming in the future. If I do something, envelopes stop coming. Now I compress all the envelopes into a single one, like the Cyclic day, so this is the envelope, because I can say "this is the bill" or "the envelope that comes every month in my mail." Notice how language compresses: there's now a single envelope even though in fact you will see hundreds of envelopes. It becomes the envelope. Now you take the particular envelope that's in your hand, and you compress further, so that all these imaginary envelopes that you would be receiving suddenly are this envelope which is the envelope you've already received. And then the ones you will not receive are compressed into nothing. You have nothing.

So before, you had one envelope. It's the compression of all the ones you've received before. Analogy compressed identity into uniqueness. And on the other side, you have all the envelopes, imaginary envelopes that you will receive in the future if you don't do anything. You compress them and you get nothing because you have switched to online, so no envelopes come. So you go from having the one envelope to having nothing. Now, that's a very, very fancy human meaning construction. And linguistically it means that you have to use the word *disappear*, but you have to go from the literal meaning in the blended space, and you have to decompress your blended space into this long sequence of scenarios with many, many envelopes and counterfactuals and so on, a very complex logical operation to do all this.

There are many other compressions and examples. And we could go on and on. I could tell you about how mirrors are compressions and how they blend to get used. And the use of mirror, as in "language is the mirror of the mind,": you think of that as original, and a mirror itself as simple, but to understand a mirror, to be able to talk to your mirror, to be able to use the mirror, to see other people and imagine another world, you actually have to build a very complex blend. So very simple things like mirrors, material objects again, turn out to trigger vast expanses of conceptual decompression.

I hope this unusual point that I've been trying to make is clear: that things like airplane cockpits, watches, the hand when it's used to figure out the day, or the Voodoo dolls where you put a pin, or the envelope, are all part of these same cognitive operations that we find for grammar and language in general. Thank you!

LECTURE 9

Generalized Integration Networks

Thank you for inviting me to your beautiful university. And thank you to all the participants here for braving the rain and the storm, and the elements, in order for us to be together once again. In the last week, we have been talking about a number of topics that have to do with backstage cognition, the tremendous amount of cognitive work that is happening when we speak, and when we think, and that is responsible in some sense for language but, conversely, that language is guiding.

In every one of the lectures in the other universities after the five lectures we had in Beihang, I did a very short but still too long recapitulation. For this particular lecture, let me just remind you of the main spirit and philosophy in which we do cognitive linguistics.

One point is the many books and there are also many articles and conferences that have to do not just with cognitive linguistics, but specifically with blending theory, which I have been talking about a lot in the Beijing lectures. And blending theory has to do with the organization of conceptual mappings that are creative, both in the long term, giving rise to human creation and mathematics, art, science, religion, but also creative on the moment where you are able as you interact with others to understand humor, understand jokes, understand stories. You are able to do blending on the spot.

So conceptual blending turns out to be a very crucial human capacity, crucial in order to have language. This was the argument in lecture No 7: that you need advanced double scope blending in order to have something like language, and presumably that is how language emerges very suddenly, because the gradient of blending, the very slow biological evolution leading to slight changes in blending, finally reaches the double scope capacity. So the importance of studying double scope blending is significant. And as these books attest, it gives rise to ideas not only on language, but also in a lot of other very

All original audio-recordings and other supplementary material, such as any hand-outs and powerpoint presentations for the lecture series, have been made available online and are referenced via unique DOI numbers on the website www.figshare.com. They may be accessed via this QR code and the following dynamic link: https://doi.org/10.6084/m9.figshare.5831181.

 | DOI:10.1163/9789004360716_010

different domains: design, artificial intelligence, music, literature, religion and so on.

The guiding methodology in cognitive linguistics in general and in particular in the lectures on conceptual mappings that I have been giving contain these four points that I repeat. I apologize for those who have heard them now four or five times before. These points that I repeat at the beginning of each new lecture in a different university include:

Number one: language is only the tip of the iceberg. There are enormous meaning constructions going on, and language gives us clues. Given everything we know, background knowledge, and context knowledge, we can then build rich meanings with economical guidance from the forms of language.

And No. 2, meaning construction operates in many domains, not just language. So in math, religion, technology, etc., the same kind of human conceptual mappings are responsible for activities that are very specific to the human species. Other species do not have this, for better or for worse. I am not saying it is better to have them or worse, I'm just saying humans have them and other species do not have them.

Strikingly, the conceptual mappings are the same, so these very deep aspects of human backstage cognition operate for language, but they operate for all the other things. And the consequence of that is that linguistics will shed light on other domains and on general principles of cognition and conversely other domains will shed light on linguistics, because they will help linguists understand the cognitive operations that we are talking about.

In the simplest form, conceptual blending takes two inputs that have something in common, so you can have a partial mapping between them. What they have in common is in the generic space, and an important part of blending is to project selectively from the inputs, and then the blended space has a dynamic life of its own where the emergent structure is created. Emergent structure is created by cognitive processes such as pattern completion or imagination, elaboration of the blended space.

Those are the initial fundamental principles of conceptual blending. But then you also have (I won't talk about them here), a number of important governing principles that constrain conceptual blending in various ways.

Instead of talking abstractly, I will use some new examples, examples we did not have in the previous lectures, in order to present at least informally for those who come here for the first time to "the Beijing Forum Cognitive Construction of Meaning Lectures". So I will use these cartoons to illustrate the notion. The cartoons are not just jokes. They are actually political cartoons so they're published in newspapers in order to make a point, in order to defend some opinion.

So in this cartoon, where this firefighter is also, as you can see, President Bush, here is President Bush, and his fire truck is the Bush economic policy, right? And you can look at this cartoon and presumably in 2, 3 seconds you have got the point. The point is a pretty simple one. The firefighter should be putting out the fire that's over here. Everybody in this part of the neighborhood has their houses on fire. The firefighter has a nice big smile, a very nice guy, but instead of paying any attention to what is going on over here, he is actually using the water in the fire truck to fill up the swimming pool of the rich people.

If we interpret that literally we say: "What is this about, it doesn't make any sense? This is a crazy firefighter, he doesn't know his job, why is he filling the pool?" and so on. But of course, in fact what we do immediately here because we know the context, we know about politics and this is about the American government, is that we decompress. This is the blended space, and we decompress the blended space into a number of inputs. There can be more than 2 inputs. In the basic schema there are 2 inputs but in reality there are usually more than 2. So in the case of the firefighter, there are 2 main inputs: one is the input of firefighters, who put out fires and so on; and the other input here is the input of American politics and government where you have a President, and you have a government and you have economic policies, that of course have the goal of making the people happy, and richer if possible. So that's the decompression from the blend: you decompress into the 2 parts. And in the 2 parts, you see that over here, you've got the firefighter using his truck for the pool. And over here, you've got the American policy.

Now, the input that you actually know about firefighting, the input you can bring in from your background knowledge is that firefighters need to put out

fires. Their job is not to fill swimming pools. Therefore, in the input that you know about firefighters, you have firefighters putting out fires. But in the blended space that you create over here, you have the firefighter filling the pool. And as a result, you run the blended space. You do the elaboration in the blended space; and you say: "Well, this firefighter is not doing what he should do at all. Obviously he likes the rich. The rich have no interest in the neighbors on the other side." And in the blended space, if you push it, you can analyze this cartoon for a long time, it becomes boring. But you can see this is a very strange neighborhood, because there is the fence, and the houses catch fire only on the other side of the fence. Nothing happens on this side of the fence. On this side of the fence, the rich people are not even aware of the existence of the poor people. And furthermore, the firefighter is not aware that there is the fire. So it's a very strange scene.

Of course, it is meant to refer to the input in real life where the rich live in very different neighborhoods from the poor. So it's not just the fence that separates them, it's actually a long distance. And the transfer of inferences here is that the economic policy and the government's attention and energy correspond to the water, and the water, instead of going to help the poor, is going to help the rich, but the rich don't need it. They already have a swimming pool that is full of water and they don't care. So the message comes across very fast. Now this example is like many others that we have see in the last 8 lectures. They have the characteristic that in the blended space you have a compression to human scale. Human scale means something here that you can apprehend directly, something you know: you know about houses, you know about fires, and so on. It's not abstract. One of the inputs here was economic policy; that's an abstract input where people can argue, can be very specialized, and you don't know what the right economic policy would be. But in the blended space, you immediately see this is a crazy economic policy. One that is completely at odds with the interests of the people.

So, compression of something diffuse and complex, like economic policy in government, to human scale is exactly what blending does. And again in the previous lectures, we have seen that it can happen for grammatical constructions—compression to human scale. It can happen, as in the lecture yesterday on the material culture: you build material anchors, you build watches, dials for airplane cockpits and other instruments. And you make the world usable in a direct way instead of having to do complex, sometimes in fact impossible, computations.

Here is another example. Also Bush. Bush is very, very popular in cartoons. He is not popular in the country but he is popular for cartoonists, because they can always make fun of him. This is a blend. And you can see Bush is playing

a game with this Middle Eastern Sheik, of some kind. And the blend consists in taking as one input the supposedly simple game of checkers. And on the other side, the very complex game of chess. So then you end up with this bizarre game where some of it is chess and some of it is checkers. And so in the blended space they're playing this game. Now the bizarre thing is that this player is not aware that this is a chess game so he is playing checkers. In other words, he is playing a completely wrong game. He is not just a bad player. He is actually such a bad player that he is playing a different game. And therefore, he is completely out of step. This player is thinking of the chess move but also is very puzzled to see these checker pawns on the board, wondering what's going on.

What else do I have? Oh! It's another Bush, I didn't do this on purpose. I have three Bush cartoons. I didn't even do this on purpose. There are so many Bush cartoons. Since some of you also probably have some interest in American civilization and American culture, this is a way of seeing one aspect of it. And this has to do with the current situation in which on the one hand, the president, the American President George Bush is considered very close to fundamentalist religious thinkers. And he is considered to be opposed to abortion and so on, but opposed to stem-cell research in particular, and also to scientific research on global warming. So that's been one of the criticisms against the president.

So in this cartoon, you have a blend of several inputs. I don't know if you can spot all the inputs informally. On the one hand, there is, as one input, the input of Adam and Eve in the Bible version and Christian version of the genesis. Where there is the tree and the apple. Eve takes the apple and Adam bites the apple, and they are not supposed to do that, this is forbidden by God. So, one of the inputs is God here, forbidding Adam and Eve to get the apple. But from another input in the blend, instead of putting Adam and Eve here, they put the scientist Newton. This is the physicist Newton and there is a story as you probably know of Newton discovering his theory of gravity by seeing an apple fall, or having an apple maybe fall on his head. He said "Oh, the apple is exactly like the moon, is exactly like the planets and sun, all this is gravity". So that's a different input from Adam and Eve. That's a second input.

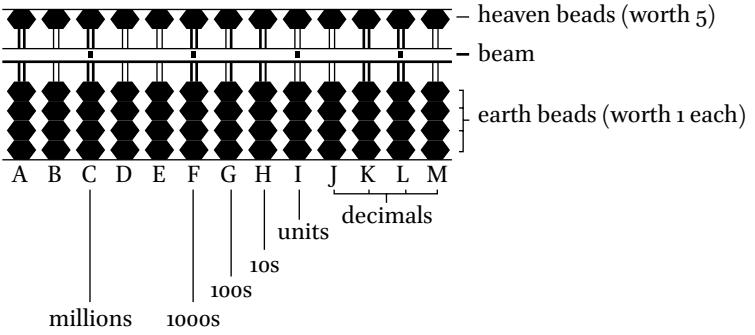
And then there is a third input. We see this is supposed to be Bush, so the third input is American public life with the president, the people, the controversies about stem-cell research, global warming and so on. And you put them all together. And what you get in the blended space now is an image of President Bush here, who thinks he is God, and is going to prevent people from taking the apple, Adam and Eve's apple. But also, since this is now the apple of Newton, it's science. So it's a god here that would be against science. But also it's a god that is completely irrelevant, because Newton does not pay any attention to him and doesn't even notice him and it doesn't matter. What's going on here doesn't matter. Science, scientists are going to advance anyway.

So in this blend of at least three inputs, three or even more if we look closely, the cartoon is able to transmit its message immediately. Because as humans we look at that, and if we have the background knowledge, we're going to be able to produce the blend instantly and to run the blend and understand the consequences. Maybe it's also relevant to note here with these funny examples, that none of them is a metaphor in the simple sense of standard metaphor theory as in Lakoff and Johnson, where you had just the source and target. Here you don't have just the source and target you have several inputs and they are blending into a novel blended space. So it's not just a metaphor that's

operating. Same thing of course for the case of the game. You don't have the source domain projecting to the target domain here. You've got inputs there being combined, being blended.

Yesterday, at the previous lecture, the lecture was on material culture and I talked about various kinds of devices like dials, and airplane cockpits, and watches.

There is one that I did not mention but that is very striking as a powerfully compressed blend, and that is the abacus. Do people still use the abacus in China? Then you know a lot more than I do about it, because you probably use it in school. And you can see that what the abacus is, is a material anchor. In itself, it's just little beads that you can move on a little metal rods, right? So that's a very simple device. It blends with the functioning of arithmetic in a complex way for multiplication and addition and so on, and so you map all these aspects of the material objects, you map them onto arithmetical concepts or arithmetical manipulations. And so in the blended space, what you have is the operation of the abacus that you know how to run, and as a result, in manipulating the abacus, you're actually doing operations in the other input, in the input of mathematics, arithmetic, multiplication and addition, and so on.



Now, just like the other cases that we saw yesterday, the cases of the watches and dials and so on, this is something that is elaborated by a culture. It is discovered by cultures. People don't just find an abacus one day in the sun, and then say that would be interesting, that would be fun to use for calculation. People actually do a lot work to produce the best possible material anchor, and then they can use it as a blend just like clocks and watches. Material anchors of this kind can then be transmitted to children and children can be taught to use

the abacus, and in learning to use the material anchor, in order to do the arithmetic, they also learn the arithmetic presumably, so they learn by manipulation of the object the conceptual structure behind it: multiplication, addition and so forth.

Just as the children will learn time by first manipulating toy watches: at first they don't know what it means, and little by little, they will connect it to the conceptual spaces related to time. So this is actually a very powerful way in which human thinking, not just of individuals, but of cultures, stabilizes knowledge through material objects that can be built, manipulated, and then transmitted, a very interesting result from the discovery that material anchors play such a great role in conceptual blending. This discovery was made by my colleague Ed Hutchins, who is a cognitive scientist and anthropologist.

In the previous lectures, we went over different kinds, different types, of conceptual blends, that went from simplex blends such as *Paul and is the father of Sally*, where you blend the frame of kinship with the people Paul and Sally, to slightly more complex mirror blends where the inputs have the same frame: the examples we have, were the Regatta, the boat race, and the debate with Kant, the runners, the people who break the world records; all those were examples of mirror blends. Then there was the single scope network, where the two inputs are very different from each other and our example was businessmen described as boxers. Single scope is very much like simple metaphor: it takes one input that would be like the source domain and would project this frame to the target domain which would be the second input. So in the blended space, you get the result.

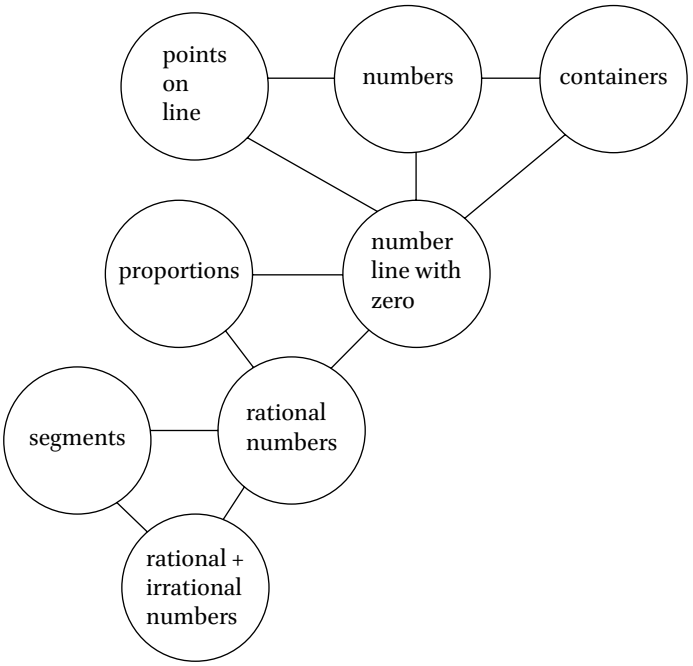
But the most interesting, the most important for human purposes, is certainly double-scope blending. And we find double-scope blending operating in metaphor again, and over the last 8 lectures, metaphor, counterfactuals, grammatical constructions and artifacts, technology, like the computer desktop, like the abacus, like the watch, religious rituals, and on and on. So the argument that was made in lecture 7 was that double scope was the condition for these human activities of language, technology, religion and science, which all came about, which all seem to have arisen, at the same time.

What I'd like to do, my goal today, in today's lecture, is to go a little bit beyond that, and to talk about the fact that what people actually do is not just integrating one, two, or three inputs, even double scope, which is already again very advanced, but they're actually building elaborate networks of integration, elaborate networks of blending. The goal, as we said before, is to achieve compression of certain types. And these are the overarching goals of compression that you can meet with blending, making complex structures easy for humans to manipulate and to transmit to future generations.

Now, in one of the lectures—I think it was Sunday, number five on metaphor—we have already studied in some detail a complex integration network, the integration network for time. And the kind of data that motivated this network has to do with all kinds of ways that we think and talk about time, where we have subjective speed and subjective leaps for time. You can look at these examples, if you have not seen them before. On Sunday then, we developed the argument that you did not just have a simple space-to-time projection (like source/space and time is target and you get the space-time metaphor), but that in fact, you have to build a much fancier network and this is the network we came up with. There is nothing surprising about finding such networks because we have minds that are capable of very, very powerful integration and we can do successive integrations and so we come up with this kind of network for time. Now, this network, however, has become entrenched. It is one we share; we think about time in the same way: the kind of examples that I showed you just now are shared by the community. When somebody says "Time came to a halt", or when somebody says "Where have all those years disappeared?", or when somebody says "The years go by so fast", all of these, for us, are totally, very directly, intelligible and it's because we share this actually elaborate network of construction of time. So we culturally share and culturally transmit them, and they are learned by children.

In the same way, in another lecture, we touched briefly on the evolution of the concept of number in mathematics, and we found that you went from the initial pretty simple conceptions of number, one, two, three, or numbers on a line, or baskets with one egg, too eggs and three eggs, we went from that to more and more sophisticated notions of number, and 'rational' here is the last one on this screen but it continues; rational got blended in turn with other things.

And so the concept of number, continues to evolve. Now a mathematician who has this rich conception of numbers does not just have the last blended space at the end. If they had only that, nothing would work. The blended space by itself is very simple and does not in itself contain the notion of complex number, in order for this to be efficient mathematically, you have to have the full network. So you can look at mathematics. This is what I have done, but also what Lakoff and Núñez have done in their book on mathematics. You can look at mathematics as evolving to produce these successive notions of number. But you can also look at the mathematician as having unconscious knowledge of this elaborate network. He doesn't just know irrational numbers; he knows how they connect to rational, how they connect to proportions, how they connect to numbers like zero and so on. Just like the time network, this is an elaborate network of integration that is shared: it has been developed culturally over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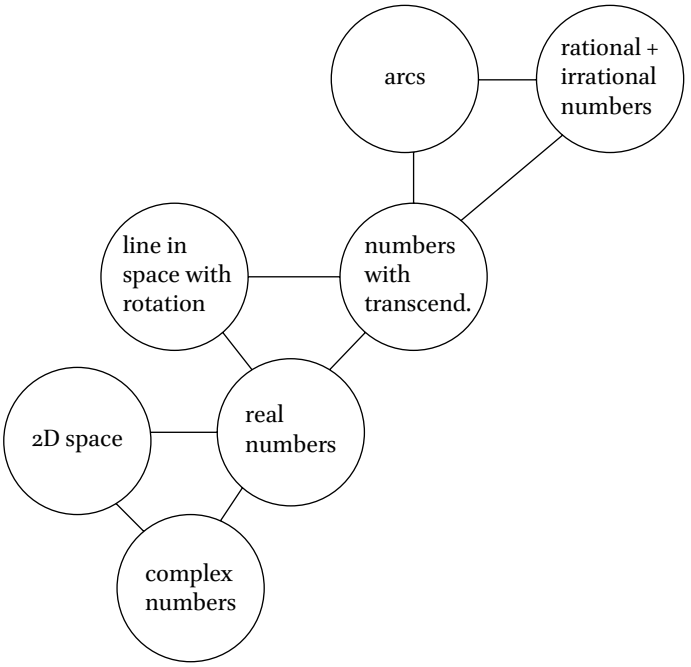
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time. And then everybody who does mathematics basically has this kind of network psychologically.

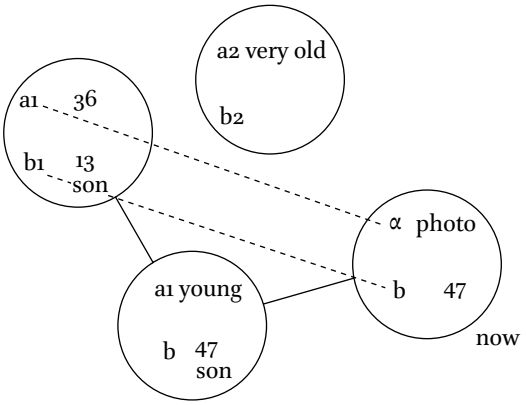
Now, this afternoon, I'd like to look at the cases where we get similar networks, but we construct them on the fly. We construct them as we go along on the basis of things that we're told.

So let me take a couple of examples of building up integration networks. Here is one. It's a little passage from a literary biography. The writer is reminiscing about his life, and he is reminiscing about his father. And here he talks about his father. But the situation is the following: he happens to be about, let's say, 47 or 50 years old. And he is now this writer, this author. And he has a picture of his father on the wall, and the father was 36 at the time when the picture was taken. So the father was 36, much younger than the man now.

However, when the father was 36, his son, the writer, was 13. And he says: "At 13, I was easily fooled by clothes." and the father had this cassock that was for an old man. And so, to a 13 year old, the father, even though the father was only 36, seems like a very old man, even though he was actually only 36. So he looks at the picture and then he says, sitting now, (this is the author now, the author is now sitting, he is looking at the picture): "*Sitting now in another dusty room. Its air thickened with pipe smoke of the same brand*,"—he smokes the same tobacco that his father used to smoke—"*I find myself staring back, puzzledly, at a man much younger than myself. His hair is black and thick, and his skin unlined*." What he is looking at is the photograph. But now he looks, he sees the man, and then he says "*His preposterously old clothes only serve to underline his youth as he returns my gaze*." Now notice the crucial part: "*He returns my gaze*". So the picture is the father who is now looking back at the man, and he is astonished, that is the funny part of the blend, he is "*astonished to find himself the father to this bulky, balding fellow in his forties*".

You understand what's happening here? The father suddenly says: "Can this be my son? I'm 36, here is this old, 47 year-old, guy". But of course, this is going on in the mind of the author; the photograph has no mind. So this is the construction of the author, and it's a very easy construction for us to build. Again, it's a complex integration network. And it is being built by producing successive mental spaces and successive blends.

So very briefly, here is the outline of the mental space structure that's being built. You start over here: you have the 13 year-old son and the 36 year-old father; that's what he is remembering—when the father was 36, and when he was 13. And this is what was going on in the mind of the son. The son found the



elaboration of the blended space:
a and b look at each other

father very old. Notice that b1 is a counterpart of b2, a1 is a counterpart of a2. This is the standard mental space terminology or notation that we introduced in the very first lecture, so the connection here is between counterparts: a1 is the counterpart of a2 here, and α here.

The father, the 36 year-old father, corresponds to the photograph that the man b who is 47 is looking at; so this mental space corresponds to the reality of what's actually going on. Another mental space corresponds to what he remembers of his father. This mental space over here corresponds to what he remembers that he, as a child, thought of his father. He thought his father was very old. Now, we put some of these together. And we get a blend here. We take the photograph. We bring in the photograph. And the photograph is mapped onto the young father. And so in the blend we get the young father. And we get the son, who is 47. But we get from here the fact that he is the son of this man, because here is the son of the 36 year-old man.

So now in the blended space, we have the 47 year-old son, a 36 year-old father. That's the first result. The second result is that now pattern completion applies as in all the other blends we have seen. That is, we have two people, the father and the son. The son is looking at the father, so the father looks back at the son. And so you run the blend, right? You elaborate the blend. The father is looking at the son, and of course he is then conscious of a very strange situation that he is 36 and he has this old bald son, right? So you can see that by elaborating the blend here, you get the description. That you actually find the author saying: "astonished to find himself the father to this …"

What's the point here? There are two points. One is that cognitively we read the book, we come to this passage, we have no trouble at all reading this passage, we just read on. We appreciate it or we don't appreciate it. But we read on. We are not suddenly puzzled, saying "What can this mean?", "How can the father be younger than the son?", "How can a photograph be thinking?" We don't do that. We automatically do the blend. And this is part of the way we build meaning. This is not an exceptional case. This is what we have seen over and over again. Of course, these cases are more visible and bring out the phenomenon. But they're using the same operation that we see in all languages.

Now the other point is that you can achieve some literary effects by making some of the blends more visible, as in this case. I have an example here—in fact, yes, here is an example that underscores that. You've got examples that are just standard grammar, standard linguistics. One of these from Leonard Talmy is "My tax bill gets longer every year." We have talked about that example several times. "The trees were taller as we went up the mountain" The tree is not growing tall. It's different trees. And there is a compression of analogy into identity. So you treat the trees as if they were the same trees in the blend, just growing. And over here, "The modern pronghorn runs as fast as the ancient pronghorn". Again this is a compression in language. Pronghorns are animals. There was not just <u>one</u> modern pronghorn and <u>one</u> ancient pronghorn. There are many, many pronghorns over tens of thousands of years. We compress them into one ancient one and one modern one. And then we compare them, so we have compression.

Now, these things are just ordinary standard grammar that we don't even notice. To explain it, we have to do all this analysis and decompression. But in everyday life, these are totally standard. This is the same thing, but pushing the blends further. The author is traveling. And the author says "*the trees that had been skeletal and grey the day before*." So he is traveling across America, maybe. And so the day before, there were thin grey trees. Now he is in a different region and there are trees that have leaves, different trees. This analogy in the inputs is compressed in the blend. He does actually exactly what we do here, but he does it in a more visible literary way. He says "the trees that had been skeletal were coming into leaves, were growing leaves." , as if they were the same trees because he can compress them into a single tree. And then he says this, and the blends become even more visible and more interesting. He says "the harder I stepped on the gas". Step on the gas is to accelerate in the car, you push on the accelerator, so you go faster. And he says "the harder I stepped on the gas the faster I could make things grow". So what's happening of course is that if he goes faster by accelerating, then things change around him faster. But with this

compressed blend, it's as if the same thing is changing and changing faster, if you go faster in the car. This blend is very noticeable, the previous ones are not, because they are conventional grammar, but of course they have the very same structure. This one has just been pushed a little farther.

The example of the father and the son goes on. There is another interesting blend. I will skip it from now, because time presses. I will show you this other one just quickly, the same author with the father and the photograph finally meets his father. The father is not dead, but he has lost contact with his father. And one day he meets his father; the father is changed, the father is very different. And so you can see the report here. He is facing his father now, his real father, in the chair, and he says: "*There were two men in my father's chair. One was my contemporary*." The man looks like him, he doesn't look at all like his memory of his father. And "*a cheerful, bearded radical debunker*", a guy who talks a lot and so on. That's the way his father actually is now. And he says "I could only see the other man, a far older man, if I squinted hard" like this. Because of course his memory is of his father being older, so he knows that the man here has to be older than him. But the man has a modern look. And so notice the way he said *he* is decompressed. He is now decompressing the single man into two inputs, the modern one that you see and the really old one that is his father. Again, these are literary devices but they're just using the ordinary blending operations and making them a little bit more fancy, a little bit more noticeable.

Then he goes on, he says: "*while my father talked I tried and failed to get the two men to coalesce into one person, but they wouldn't go*". So it's like he is talking informally about blending theory! Saying: "Oh, I have these two men. I know there is really only one man, my father, but they're so different, so I want to get them back into a single man. But I can't. They are so different from each other. It goes on, but we will skip that for the moment. And we will go on to what's more explicitly in your handout.

The theoretical points I want to emphasize this afternoon, are that there are things we call metaphor, things we call blends, things we call metonymies. But those are surface descriptions. And they do not really cover coherent classes of phenomena. When you say metaphor, many, many different things are metaphors. When you say counterfactual, many things are counterfactuals, and on top of that many things are simultaneously counterfactuals and metaphors, and metonymies, and so on.

So the surface, the names we have, are not good theoretical names. They are impressionistic, they are inherent from a tradition of figurative speech and metaphor. What's actually going on is that in any given product, in any given data, you have many compression operations that are at work. And as an

analyst, as a linguist, as a cognitive scientist, you need to find out behind the surface of the data of the language what operations are actually at work. It's uninteresting, and in fact it turns out to be incorrect to say: "oh, that's a metaphor, so I understand it," or "that's counterfactual, so I understand it." Because in fact you need to unravel the exact functioning of mappings and to see how the emergent structure is produced.

So here is an example. This is an example that I found, I forget, two or three years ago in the newspaper and it is apt today. Because I think China just enacted a similar law right on May 1st. I was in fact prevented from smoking in a restaurant, because they told me with the new law now you cannot smoke any more. I thought China was the only place that I could still smoke. I live in California. France also has a law like that. Now there is nowhere in the world for the poor smokers to go. They are thrown out of every restaurant.

So anyway, in the newspaper, here is what they were saying. This is in California—you have the same laws in China—saying: "no smoking anymore, no smoking in bars, no smoking in restaurants." So "No Smoking" signs were tacked up in bars all over California yesterday. And hard-core smokers, people who smoke a lot, who like to smoke, were so angry, they were angry about this law, (I sympathize with them). They were so angry that if they had been allowed to light up (light up means to smoke), if they had been allowed to smoke, the smoke would have been coming out of their ears. They would be so angry, the smoke would have been coming out of their ears. Now, of course, this is a joke, right? But we read it and we understand it immediately. And we can think "oh, that's a funny way of talking about the smokers being angry, right?" We build the integration network on the spot.

Contrary to TIME or a number of other examples, this is not a conventional network. This is not one that we've used before. But if we start to break it up into pieces, we find that actually it has properties of networks that we know, that we are used to. So what are they? How do we get this one that is novel, using bits and pieces of networks that are more entrenched, more conventional? Well, the first one is really important. It is actually the anger network. Some of you may have read in George Lakoff's book, *Woman, Fire and Dangerous Things* one of the appendixes at the end of the book. It's a case study of anger, the metaphor for anger. It's work done with Kovecses, and it's very nice work on the data that motivates the anger metaphor.

In working further on anger, Mark Turner and I found evidence that the anger mappings constituted another conceptual blend with three inputs. So in the anger metaphor, you have three inputs. Do you all know the anger metaphor? The kind of things you can say is that "he was really angry", "he exploded with anger", or "he was steaming with rage", or "he was hot under the collar", or

again as in the other example "he was so angry that the smoke was coming out of his ears", you can say that.

Now there are three inputs. One of them is the input of heat. It's the idea of something cooking, in a pan, let's say, and it's boiling and the cover is on it, and so it's building up pressure, right? It's a liquid or substance that's building up pressure under heat, producing steam and that could explode. This is projected to the emotion of anger itself, so the pressure corresponds to the degree of anger. The more angry you are, the more pressure there is in this domain, this metaphorical domain that is linked to 'angry.' The steam is a sign of anger, when you see somebody is angry. Well, in this blend, you see the steam coming out of the person's ears. And there are orifices (that means holes) out of which the steam can come. In this domain (heat input) it's things like teapots. People have ears and mouths.

Now the third input has to do with the physiology. This is a folk theory. But that correlates the way people look and their emotions. So if they're angry, all things being equal, it is thought they will tend to be red. Or they tend to have higher blood pressure. Or they will tend to perspire more. All of these will be signs of anger. The explosion you have here would map onto the angry person who shakes and can not control their movements. So those are the three inputs. And when you put them together then you have the conventional conceptual blend of anger where these three blend in such a way that anger is something in the body that builds up, that boils and makes pressure and then can produce steam and come out. A very conventional blend in the language.

Now a second aspect here is the smokers. When it says "if the smokers had been allowed to light up, they were so angry, the smoke would have come out of their ears". Now this is related to a type of counterfactual that we have seen in previous lectures. This is the so-called Zoloft counterfactual, where they say "If they were still alive the grandparents would plead for mercy for their grandson." Remember this is the case where the grandson murdered the grandparents. But the father comes along and says "please, you know, don't give him a harsh sentence, because the grandparents would defend him if they were still alive." So we have a blend in which the grandparents are dead, because they have been murdered, but they are also alive and defend their grandson. And this is possible with blending, and is considered a good defense for the grandson.

Now, in the smoker case, we find exactly the same thing being done. Because, in fact, remember the reason they are angry is because there is a smoking ban, because there is this new law about smoking, and so they are furious, so they can not smoke, right? But in the blended space, it says "if they

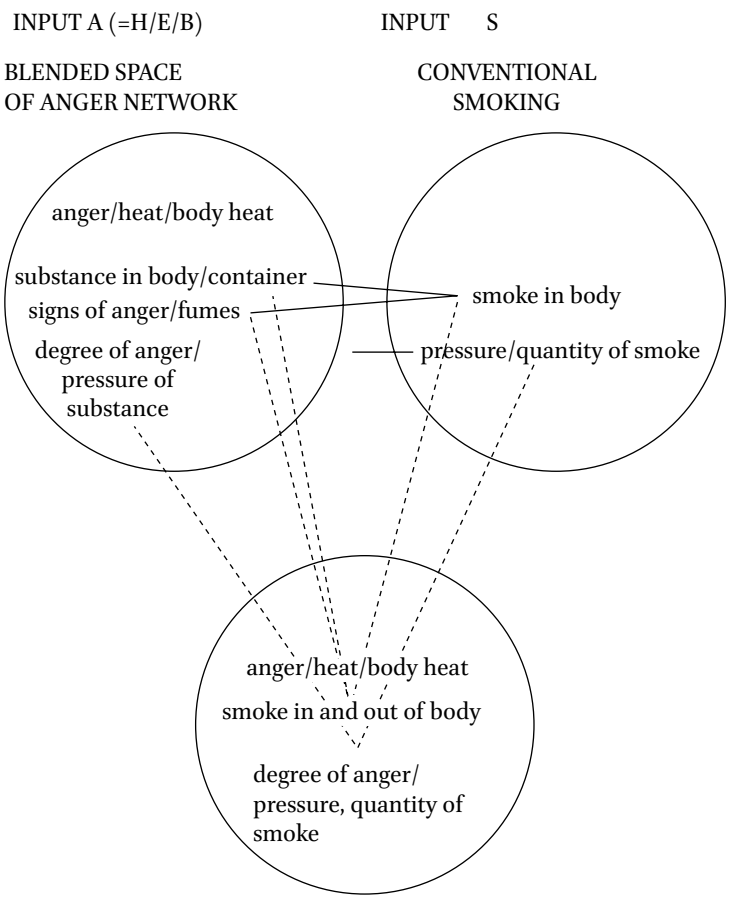
could smoke, if they were allowed to smoke." So the blended space brings in the counterfactual situation where there is no law, nothing prevents them from smoking. You bring that in and now, they are allowed to smoke, but they're still furious, that's being brought in from this input. And there is a smoking ban in place, that's also brought in from this input. Logically this is contradictory, because if they're allowed to smoke, then they have no reason to be furious, so it's like the example with the grandparents and the grandson. If the grandparents are alive, there is no reason for the grandson to go to jail, because there was no murder. On the other hand, if the grandson murdered the grandparents, then they are not alive, they can not speak.

So we produce this kind of networks very easily. We combine them together. We get something here that is illogical but that works perfectly. We understand the degree of anger: this serves to point to the degree of anger. Since they are smokers, if they could smoke, they would smoke a lot to show the anger. Why would they smoke a lot to show the anger? That doesn't make any sense, because if you are smoker, it's not because you are angry that you suddenly start to smoke a lot. So the smoke that we are talking about here is not real smoke. It's metaphorical smoke. It's the smoke that comes from the anger metaphor. In the anger metaphor, angry people have smoke coming out of their ears, because in the input of heat and fire there is smoke. So, cleverly, what's happening in the newspaper's little paragraph is they are combining the real smokers, bringing them in from the counterfactual space in which they would be allowed to smoke, and then they are combining that with the smoke from the metaphor of anger. So this is the space of anger. In the blend, in the anger blend with angry people, signs of anger give you fumes and those fumes are mapped onto the smoke in the body of the smokers, this time, real smoke of people who smoke, over here. And the degree of anger that was metaphorical over here is mapped on to the actual amount of smoke that smokers have.

And now you do another blend, and in the other blend you now have a very strange situation: the smokers, because they are angry, have smoke coming out of their ears, but also it's counterfactual, because in fact they are not allowed to smoke, so they would have smoke coming out of their ears only if they were allowed to smoke. But the smoke coming out of the ears would be this metaphorical smoke. Now again, when we read the little passage, we can construct all that automatically. It's not hard, it's a novel network that we construct. If you look at all these spaces in order to understand the three-line paragraph, we've built them immediately on the fly. We've built all these mental spaces. Those are the ones I showed you: the anger metaphor over here and you blend it with the smoker space and you get another blend and

then again you blend that with the Zoloft counterfactual space. And finally you get the result of these smokers, who are also non-smokers, angry with smoke coming out of their ears.

We go into some details here to show you explicitly that we do this very naturally in reading text. In the two examples I gave you, you built these spaces very easily. So you build complex networks. You don't have to have them already entrenched, as in the case of time or in the case of number and so on. You can build new ones; you have creative ability. This is very creative both on the part of the person who writes it but also the understander. You have to be creative in order to understand it, because if you just try to understand literally what is says, it will make no sense at all. So your mind has to



BLENDED SPACE S/A OF SMOKERS' ANGER

go and rebuild all these series of blends in order for this to be funny and to make sense.

One last example from literature about these networks. I will go a little bit fast on this example because it is a long one. This is an example from Shakespeare and the only part we have to look at very closely is this last part here, which says: "Poor boy! He smiles, as who should say, had death been French, then death had died today." Now you need a little bit of context to understand this. What it means literally is that if death had been a Frenchman, had been French, then death itself would have died. A little bit strange. Now the context is the middle of a great battle between English and French, the English against the French. And the man, the father, whose name is Talbot, is carrying his son. The father and the son have both been fighting the French. But the son has been mortally wounded. So the son is dying and the father is carrying the son and he is trying to revive the son, he is saying come on, come on, wake up, don't die. He says to the son: "Speak to thy father ere thou yield thy breath!" That means speak to your father before you stop breathing. He tries to excite the young man, so that he won't die. And here is what he says: "Brave death." Here is death; he is coming to get you! "Brave death", fight against death!

How can you best fight against death? Well, you hate the French; you fight very well against the Frenchmen, right? So how can you fight against death? Imagine that death is a Frenchman. Imagine you really want to fight death. And he tells his son: "Imagine that death is a Frenchman and you will fight." And he sees the son is dying. The son is not able to speak. But the father says: "Poor boy! he smiles, methinks …—Had death been French …". If death had really been French, then "death had died today", that is, if death had really been French then the son would have fought it and he would have killed death. But he knows death is not French, so he doesn't have the motivation to kill death.

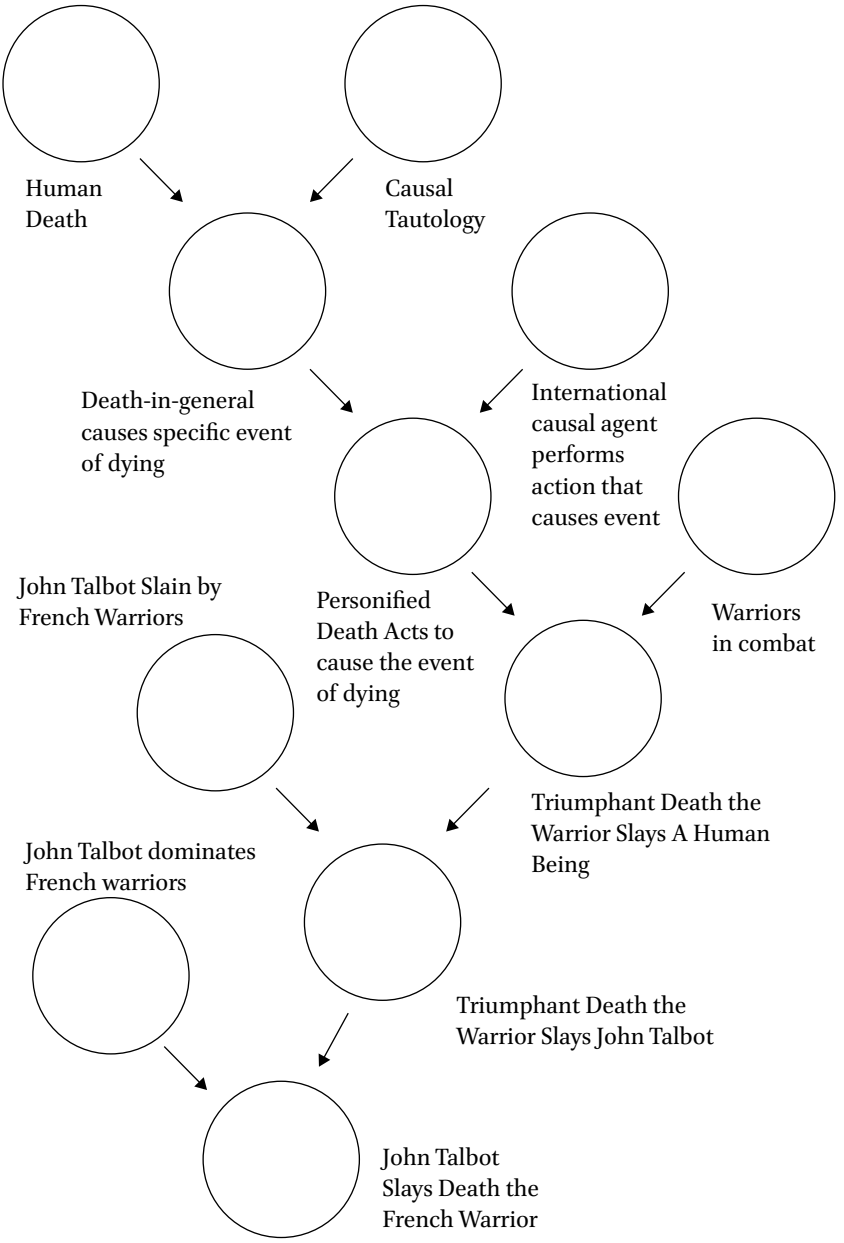
This is by Shakespeare. And it is of course a play with words, a scene, you know very extreme in a way. But all he is doing is using very, very conventional integrations, but he is using many of them. And here is the analysis. This is a little passage in Shakespeare that I found and my friend Mark Turner analyzed the passage, so he did all the corresponding blends. And I'm not going to do them this afternoon, because it would take a long, long time, but I will give you a glimmer of the idea. Here is the last blend that we get, the very last blend where the young man John Talbot, instead of dying, fights death. Death is French, and because death is French, John Talbot fights death very well, and kills death. And death is now dead, and John Talbot is not dead. How do you get that? You mix the input where John Talbot fights French warriors and you need another input where death is itself a warrior and fights

John Talbot. How do you get those inputs? This is where you go up. You have to look for these inputs and you find that they also are the results of blends. So you go up to the one that I just showed you (and I'm sorry for going so fast). So this one here is itself a blend that we find detailed over here. So here is death, John Talbot and now other French warriors on the field and death of course is killing a lot of warriors.

Now there are two inputs:Talbot and the French warriors. And over here you have death and killing warriors. And you get this blend. But now how can death be a warrior. Death is an abstract idea, it's people dying. There is not a person who is death. So where does this come from? Well this one in turn is a blend that you have to decompress, so you decompress it. This is the blend. And you decompress it and you get these two. You get the personified death which is conventional—all of these are very conventional. We use it all the time. We say, "death is at the door," or "death is coming to get us," and so on. And over here we have an input of warriors who fight—just a normal input of war. But this one we have to decompress even more. So we go on and we decompress again to see how we can get from death is a person, to death is an abstract cause.

And finally we have to decompress even more and we find this. (*pointing to slide*) so we have to decompress and decompress a lot in order to understand Shakespeare's line. And here is a recapitulation of the amount of blending that goes on in understanding Shakespeare's line "had death been French, death would have died today." However, a lot of this is entrenched in conventional networks that you already use all the time. So Shakespeare is not really constructing the whole thing. Shakespeare is taking advantage of the facts we have all this already available. And then Shakespeare only has to add this last little part to produce something that is very surprising, that "if death had been French, death would have to die"; the result is very surprising, but he is really adding only one level of conceptual blending.

The consequence for linguistics and for cognitive science is that when you have piece of text, whether it's Shakespeare or the example of the photograph on the war with the father, from the point of view of what's happening in backstage cognition, you have to think in terms of building pretty fancy networks. The example with smoking ears is one we understand immediately, but we're quickly building a complex network. People who listen to Shakespeare know Shakespeare has blends, blend after blend after blend. Before coming to China, I went to a conference in Philadelphia that was called 'Shakespeare and the Blending Mind.' It was about the connection of conceptual blending in cognitive linguistics to the study of Shakespeare and other poets, writers and authors.


Human
Death
Causal
Tautology
Death-in-general
causes specific event
of dying
International
causal agent
performs
action that
causes event
John Talbot Slain by
French Warriors
Personified
Death Acts to
cause the event
of dying
Warriors
in combat
Triumphant Death the
Warrior Slays A Human
Being
John Talbot dominates
French warriors
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Warrior Slays John Talbot
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French Warrior

Very fancy elaborate backstage cognition is going on behind what seem to be one line sentences. People are doing them with no effort because they go and see a play and they enjoy the play. And you can see in a play how much blending is going on, because there is not only the blending in the text, but there is in fact massive blending between the actors on the stage who are people doing something on the stage and of course the story that they are telling with the warriors, the judge, or death for that matter. And the audience looking at that is perpetually making these different blends between the real actors (in French, we say flesh and bone actors) and the character that they play, and then within the text there is blend after blend that's coming all the time, now people not only process acting easily but they enjoy it. They go to the theater. They pay money to be able to do this. So it shows that the idea—often a mistake made in psychology of thinking—that if there is complexity, there is going to be cognitive effort, is not true. There can be great complexity and no cognitive effort.

> Fallacy 1: DIFFERENT SURFACE PRODUCTS RESULT FROM DIFFERENT COGNITIVE OPERATIONS
>
> Fallacy 2: IF IT'S NEW, IT'S GOING TO COST MORE
>
> Fallacy 3: A WIDE-RANGING COGNITIVE OPERATION PURPORTS TO EXPLAIN "EVERYTHING"

Why? Because if you look at your handout here you see fallacy number two and fallacy number three, I guess, but fallacy number two in particular. The fallacy is that because we found something new, like blending, and more complex, then it's going to be more, much more costly, cognitively for people to do it; they are not going want to do it. But that's a mistake, because once people have the brains, they can do that. It's not hard for them to do it. In fact, they like to use their brain in the best possible way. If you have feet then you can walk, then you know, you can walk across a stage. If you don't, if you are a tree, and you don't have feet, then the problem does not arise. But it's not painful for you to walk across the stage because again you have exactly the apparatus. It's painful for you to do something extreme, like trying to run very, very fast; that's a different matter. So it can be painful to do advanced mathematics or play advanced chess, because there you have to push your conceptual system to the limit.

That's about it for this afternoon, what I wanted to discuss with you. Again the main point being that it's not the case that you have *simple* products: something is metaphor, something is counterfactual, etc. If you look at the smoking ears example, the smoke comes through the ears. It was metaphorical, it had the metaphorical anger, it was counterfactual, it had the counterfactual: *if they have been allowed to smoke* …, it had a number of metonymies with the smoke standing for the anger and so on. And so the product itself was a complex network with lots of mappings. And it made no sense to ask: "Should we put it in the box of metaphor? Should we put it in the box of counterfactuals? Should we put it in a completely different box? Makes no sense. I will stop here. And have some discussion.

LECTURE 10

Methods and Generalizations in Linguistics

Well, thank you for your very kind introduction and your reminiscence about the year 2001 and the linguistic institute. Thank you for inviting me and inviting all of us. Some have had the tenacity to actually follow me in some of the different universities. And to those, I say a special *thank you*, of course. And to others who will join us here, maybe just for the first time to hear this lecture, I would say *welcome and goodbye*, because this is going to be the last, as indicated. This is going to be the last lecture. Last for me, but I could go on; I could stay in Beijing, go around, maybe, and lecture in universities all the time! I have gotten accustomed to this enjoyable activity :-).

My goal this afternoon is the following: in the series of nine lectures, we broached upon several different topics. In fact, a wide variety of topics, because we went from very minute elements of grammar to very wide ranging considerations about discourse construction, or about cultural artifacts, and the way that they are used to anchor meaning; and in one of the lectures, we were even more ambitious by offering some hypotheses about the necessary ingredients for the origins of language and specifically human talk itself. So it's a wide range of topics and I'd like to come back to some of them this afternoon and give a panorama. But I would like, at the same time, to use this panorama in order to do two things.

One is to go perhaps into a little more detail in some of the analyses and point out some of the features which may be of interest to some of you. For example, I have been asked: are there any connections with discourse analysis or are there connections with teaching or learning? So these are things we can explore in the lecture or in our last discussion period. The other point that I will try to emphasize as I go along, is a point of method. Cognitive linguistics is not only an exciting new area with a very different focus from traditional linguistics but it's also a new area that has its own methods, that has developed a number of methods. And many of those methods are in fact

All original audio-recordings and other supplementary material, such as any hand-outs and powerpoint presentations for the lecture series, have been made available online and are referenced via unique DOI numbers on the website www.figshare.com. They may be accessed via this QR code and the following dynamic link: https://doi.org/10.6084/m9.figshare.5831184.

 | DOI:10.1163/9789004360716_011

the methods of good science. So in this university it is especially appropriate to emphasize that. By methods of good science, I mean especially the ability to conceive explanations, accounts, theories, that will have maximum rigor on the one hand, and that will have maximum coverage: that is, they will cover all the data that we know. And linguists look at fantastical amounts of data, so linguistics is a very empirical science, because we spend our lives, hearing language, reading language and looking for language. Linguists are especially tuned to particular little things that they hear, that they suddenly see the relevance of. Of course, other people don't have to worry about that, but we do as linguists. So we hear a sentence and think: "oh, that shows something about conjunctions or something about the subjunctive." Or in my case, I hear examples on the radio or I see them in comic books, and I say: "hum, that's a very interesting example of conceptual blending or mental space connection," and so on.

So the empirical nature of cognitive linguistics is very strong. That's number 1, but number 2: to be a good science, you have to achieve generalizations. That is, you have to be able to have accounts, explanations that do not just fit the particular data that you address, but that will project later to other kinds of data. And in cognitive linguistics, there is a new exciting dimension to this, which is that it's not only generalization within linguistics itself, saying we will explain other things, we predict certain things about language, and we will see whether they happen or not. That's of course already important. But because cognitive linguistics is about cognition, and because it turns out that human activities of various kinds, not just language, are governed by the same kinds of cognitive mappings, because of that, it turns out that we can get confirmation of some hypotheses in linguistics in some other areas, study of religious rituals or study of airplane cockpits. These are themes that some of you will remember from previous lectures. We went to look at areas that were not specifically linguistics, in order to confirm the operation of the various mappings that we are looking at. And conversely, we can do the reverse,...

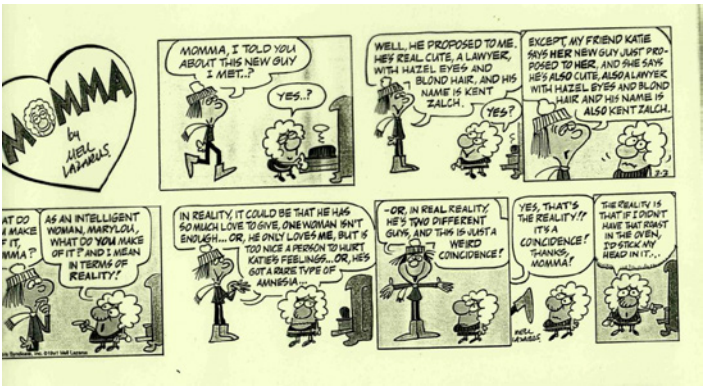
([*pointing to slides*] Websites that could be relevant for those who have not seen these materials before, and lots of books that could also be relevant. Again, books in very different areas; you can find all the information on the corresponding websites.)

Back to the rest of my sentence.Notice I stopped in the middle of the sentence and I was saying *conversely*, and *conversely* is right here. And conversely, the study of meaning construction in other areas will shed light on linguistics, so it's useful to ask ourselves how other kinds of meaning construction

function because the rules, the laws, we find for the mappings in those areas turn out to be useful and beneficial in explaining linguistic data and linguistic phenomena in general. That's the philosophy that all of cognitive linguists operate under, and in particular the area of research that I'm most involved in. Therefore, the issue of method is an issue of "What kind of generalizations do we discover, and what is the justification for the theories that we propose?"

And so I will ask you to also sometimes look at your handout. I think there is a handout for this lecture, on which some of these themes have been listed. Let me make sure. On the handout, there are some remarks about methods, that I will be talking about as I go along. But there is also, on the handout, a reminder, a recapitulation of a number of key phenomena that we studied in other lectures. I will be alluding here to those phenomena but I will be looking at different kinds of data and making some different points about that data. So on the handout, it's more examples that we have already covered and that are highlighted. I will try and introduce some connected but different data.

With these preliminaries out of the way, let me start. The first lecture we had in the series was on mental spaces. Informally, intuitively, the idea was fairly simple. It was the idea that whenever we talk, we set up lots of mental spaces and we connect them in various ways and in particular they can be connected by relations of identity, representation, analogy among others. When we do that, we use some principles to go from one mental space to the other. A fundamental principle that we gave examples of, is the Access Principle that allows you, if you have two connected elements, to access one of the elements by describing or naming its counterpart in some other mental space. So let me illustrate some linguistic aspects for some of you who heard the first lecture and also for those who have not yet looked at mental space phenomenon. To give you an idea, I use a comic strip. Comic strips are easy to use because they provide their own context immediately. You don't have as much explanation to do. This is an American comic strip. This is the mother, and this is the daughter. And the mother would like the daughter to be a conventional woman, and to be married and to marry a rich man—a doctor, a dentist, a lawyer something like that. But the daughter in the comic strip (over years of this comic strip), she always comes back with these guys, who have long beards, and they have jeans, and they have holes in their pants, and they don't earn any money. So the mother is always discouraged by that.



Here is the beginning of this strip. The daughter says: "hey, I met a new guy." And she describes to her mother the new guy and she says "look, he is cute and he is blonde and his name is Kent Zalch. And even more important for the mother, he is a lawyer. So fantastic. And then she mentions something else. She says: "my friend Katie says her new guy, her new boyfriend, just proposed to her. And he is also cute, and he is also a lawyer and he is also blonde and even worse, his name is also Kent Zalch. So look at the expression of the mother. You can see that in the mother's mind, something is happening. That was not pleasant. Well look at what the daughter was doing. I wish I had a blackboard but I don't think I am not allowed to draw on this wall.

So I will draw with my hands. Imagine the mental spaces. I think you can see what they are. She, the daughter, has set up two mental spaces, one where she is with her boyfriend and the other one with her friend Katie and her boyfriend. And the two boyfriends are very similar. So we talked in previous lectures about the analogy connection, remember? Analogy was very important. So in this case, there is a very strong analogy between the two mental spaces in terms of the two boyfriends.

Now the mother instantly does something that blending theory allows her to do. What does she do? She compresses the analogy into identity. This is the same boyfriend, right? Of course, the daughter says "Ha, it's a funny coincidence. There are two very very similar boyfriends." So, then the mother would not only compress the two boyfriends, but pragmatically (this is where discourse and pragmatics come in) she would use her schematic knowledge in order to draw the consequences that this guy is proposing to everybody and is not a serious prospect to be her son-in-law. And that he is probably not really a lawyer. You can see a lot of deduction that language does not explicitly give us, but we reconstruct it easily. How do we do that? Because we have a lot of

background frames that are already structured by our language but also very importantly by our cultural knowledge in this case.

So, then, the daughter is still a little worried by this analogy. She asks her mother: "What do you think?" And the mother, of course, is furious and she says: "As an intelligent woman, what do you make of it?" And I mean, in terms of reality." So, she is telling her daughter: "Why don't you compress into identity? Can't you see that when you have such a strong analogy, it's the same guy and therefore that guy is not a real, a genuine, fiancé or possible husband or whatever?

Well, the daughter does not want to be concerned. The daughter is very optimistic and happy. And she starts to counter her mother. So, again, we see an example that we find in all kinds of discourse. You build this discourse and you have a rhetorical component. And in the rhetorical component, you argue with the other person and one of the ways of arguing with the other person is to build interesting mental spaces in which you can draw consequences.

So, what Marylou does is build three alternative mental spaces. She says "oh, well, maybe, he has too much love to give and one woman is not enough." So, that's one possibility. Notice a very subtle linguistic thing that happens here: before, she had said that there were two guys, but now she is saying *he* in the singular. So, in fact, covertly, she has adopted the compression of her mother that there is only one guy. She starts from these two different mental spaces; now she compresses into one space in which there is this one guy who is a fantastic guy, and just is too nice to tell her friend anything else. In the second mental space, "he only loves me but he is too nice a person to hurt the feelings of my friend Katie, so he says to her " I love you" and so on. But he only loves me."

And then she Marylou goes on with different possibilities: in the singular, *a single guy*, he's got a rare type of amnesia. So this one is really bizarre, right? He doesn't remember that he proposed to the other person. Now you can see the mother is more and more depressed in hearing all this. And then, here is where you have a spectacular mental space shift. Over here, we had a single Kent Zalch, the lawyer. And then alternatives, he is like this, he is like this and he is like that. And then Marylou says "oh in real reality", so, she now builds another super mental space that is not just the reality that she had before, but now it's a real reality and in the real reality, he is two different guys. So the anaphora in the discourse is working with the singular *he* coming from the previous mental space. The one here but suddenly it's connecting again to the two different Kent Zalch's. And so she goes back to her initial decompression of the situation into two mental spaces. And she says he is two different guys and this is a just weird coincidence. And now the mother is surprised that she suddenly

would go back to this theory. And in fact, it goes on and she says "yeah, yeah" and so the daughter is very happy and she says "yeah, it's just a coincidence, thanks, Momma." And she says *thanks* to her mother for having discussed this with her. Of course, the mother says "the reality is if I didn't have the roast in the oven, I would stick my head in the oven".

So, this is a typical unfolding of mental spaces. The fact that it's a comic strip does not make any difference from many other discourses. In any discourse, you will find similar things. Some of you may remember, from yesterday, we had a decompression of a single person. It was the father. The guy was looking at the picture of his father and later he meets his father. His memory of his father is so different from his father that he has two different people that he cannot merge into a single one. He can't merge the memory of his father and the father that he hasn't seen for many years. So we do this decompression all the time.

Another example we had was Calvin writing to himself in the future decompressing into Calvin now and Calvin in the future. He writes a letter to Calvin in the future, saying "dear Calvin, you are lucky; you've done things that I have not done," and so on. So, you find that kind of decompression all over. Actually, it's a very frequent discourse phenomenon. And here, it illustrates the way that these connections will go. Now, notice, the Access Principle was used in order to do this. That is, it's because we have the access principle, that we could use the singular *he* in order to access the two different boyfriends, the supposedly two different boyfriends. We could access them in terms of *he* because *he* was connected to the two boyfriends. So, we see the Access Principle working in the Momma example in a very interesting way. Even if there are two counterparts, the Access Principle still works. It takes the one counterpart and the two that correspond to it and still accesses the two at the same time. This was actually a motivating concern of early mental space theory.

We use these results, these findings, in order to explain a number of linguistic facts of meaning. And I'll just mention a couple. For example, *In 1952, the president was a baby*. Depending on how you use the Access Principle, it can mean either that the current president was a baby in 1952—you've got a 1952 mental space and you find a baby—or it can mean that in 1952 the person elected to be president was actually a baby. So, the baby was a president. Infrequent for presidents but not for kings. As you know, many kings were just very very young when they became kings.

And all of these examples: *If the US becomes a monarchy, the king will raise our salaries*. If the US, the United States, becomes a monarchy, the king will raise our salaries. Well, there are two interpretations of that. One likely interpretation is that the US becomes a monarchy and then someone ends up

being king because it's a monarchy and then raises the salaries. But it could also be the case that there already is a king but he is not the head of the state, as in many countries where the king is not legitimate any more. And then, if the US becomes a monarchy, then the present king will be in power and will raise our salaries. And you can look at a variety of these and you find similar ambiguities.

In your handout, you can look at another list. That's on the handout here, and it's a list on page 3 of the handout, on page 82 of the big handout book. And you find a number of very basic sentences that serve to motivate mental space theory. *Max thinks the girl with blue eyes has green eyes*. It looks like there is a contradiction somewhere. The girl with blue eyes cannot have green eyes. And yet, of course, with the Access Principle, the girl really has blue eyes. So, that's how you can describe her. And then her counterpart in Max's belief space has green eyes because that's what Max thinks. And if you look at the following sentence, *Last year, the girl with blue eyes had green eyes*, you see a mental space builder for time, *last year*, and again, you find that what could be a contradiction in one reading, the contradiction of having simultaneously blue and green eyes is not a contradiction with the Access Principle where we take the girl who has blue eyes today, and had green eyes last year, through whatever means, laser, contact lenses, coloring, whatever.

This is a fundamental starting point and, as the comic strip example, I think, indicated, actually governs a lot of discourse. You have to build the discourse and we talked about the way that tenses help you organize the mental spaces. And the way that different space builders *if* and *then* and *maybe, Max believes* and many other different kinds of space builders help you to do that.

Well, the next stage that we talked about was conceptual integration which takes mental spaces further. Instead of just connecting the mental spaces together, you can now integrate them. That is, you can now create novel spaces from inputs, mental spaces that you start out with. And again, over and over again, during these lectures, we showed this basic schema, the case where you have only two inputs. So, here is one input, two inputs, and they project partially and then develop emergent structure into a blended space. But you could have more than two inputs. We saw many examples where you did. And then there were principles that you can find in all the readings with detailed accounts. There are principles on how you actually construct these blends.

Now, in yesterday's lecture, I gave this political cartoon as an example of a very clear case of blending where you took as one input the well-known input of fighting fires and putting out fires and a fireman with water who puts out fires. And then the other input was the George Bush government and administration. In the blended space, you project George Bush, who becomes a fireman

and then in the blended space, strange things happen: George Bush, the fireman, fills the swimming pool of the rich people instead of putting out the fire in the neighborhood, just on the other side of the fence. And in the blended space then, we draw some very obvious and direct human-scale conclusions: we say: "That's not what he's supposed to do. That's giving the rich advantages that they don't even need, because they already have plenty of water in this swimming pool, and they are not even concerned by anything." So that's an inference we get immediately in the blended space because it's completely accessible, human-scale. That of course will project to the interpretation of the government's economic policy. Namely, back in the input of the policy, that somehow there is a bad policy there, that's not been well performed. So, this is an example of a blend. But we have seen that's not the whole point. This is where we get to methods. Where are the generalizations that I evoked at the beginning of this lecture? Well, we saw the generalizations in the various lectures and the fact that this kind of integration operates in a slew of different areas—we detailed examples in grammar, and we detailed examples in technology, and examples in mathematics, and on and on.

Today let me take another case of conceptual blending that's extremely interesting. And I am sure that my friend and colleague Leonard Talmy evoked it when he was in Beijing for the previous forum, the forum in October. Leonard Talmy is essentially the discoverer of the phenomenon of fictive motion, and one scholar who has done extraordinary work in understanding the phenomenon of fictive motion. When you look at the phenomenon, you see that it requires also (I say also, because it is like so many other things we've seen in the past week) double-scope blending. And why is that? Well, let's look at these examples.

A typical example of fictive motion is "the mountain range goes from Mexico to Canada." So you have the mountains, and imagine the Canadian border and Mexican border, and in the United States it goes from one border to the other. The mountain range goes from Mexico to Canada. (*speaker points to a piece of art in the room*: Or over here, you could say: "This piece of art does not go all the way to the corner.") Well, of course, literally, whether it is this piece or whether it is the mountain range, they are not going anywhere. They are not moving. But we use fictive motion, as Talmy brilliantly shows. We use fictive motion in order to achieve a description of something that is static. And examples like this: *The fence descends from the plateau to the valley*. The fence is not descending anywhere. What is it that is going, and what is it that is descending? Well, it's a virtual point that, just like my pointer point here, you can move across the object.

So, if you move in your mind, if you scan in your mind, the whole mountain range, the scanning will take you from Mexico to Canada. In the same way, the fence is on the mountain, on the slope, and so a motion that you will imagine along the fence would be the motion going down and descending. Very natural. But, how can a human do that? How can humans describe something that doesn't move in terms of something that moves? Well, again, conceptual double-scope conceptual blending is necessary. Double-scope means things that are very different. So, to get this, you take on the one hand as one input, the static non-moving mountain range or piece of art, or calligraphy, and on the other hand, you take a motion frame from the other input. And that's a motion frame that you know extremely well. You are very used to it. In fact, it's embodied. It's the motion that you do all the time. You go from one place to another. Or you see things moving from one place to another. Or if there's a lot of traffic in Beijing, you see things not moving from one place to another. You build a counterfactual: *I wish they moved*.

In all these cases, you have motion that is a very basic natural schema. This is the so-called path motion schemas that all cognitive linguists, Lakoff, Johnson, Talmy and me and Langacker talk about. Well, if you take those two inputs, the static mountain and the moving schema, you can blend them in such a way that the path is projected to the object. So, the path that you need here is projected to the object itself. The motion then comes from one input, motion on a path frame, and the object of course comes from the other input. So, now in the blended space, you have motion across the object. Why do that? Is it not simpler to describe the static object? Why add motion that is not there? The Human-scale Principle.

Remember that compression is to human-scale. Well, in human life, in the sense of everyday ordinary human life, things are in motion. And of course I use that same fundamental justification for the metaphors of time, saying that when we study the metaphors of *time, time* is not conceived in terms of space in the static fashion. *Time* maps onto motion in space which itself is a subcase of human events in general. And events in human motion are especially important.

So, here in the blended space, we suddenly have human motion coming in and making it more human-scale for us, easier to understand. We scan the object. Now, of course, how we scan can vary. The blend could recruit further inputs. If we say: *The road runs from Beijing to Shanghai*, for example, then for the point that moves, we can easily imagine that point to be a car or a bus. And therefore, we bring in an additional input to structure the motion path itself. So, it's not just an abstract motion path but it's a more concrete motion path.

In the case of *The fence descends from the plateau to the valley*, if it's a wide fence with a kind of slide, you can imagine somebody is sliding down the fence to the valley. So it's possible as in all conceptual blends, to strengthen them, to make them more concrete, by recruiting additional inputs that are compatible with the other inputs. In this case, the input of the car moving on the road is of course compatible with the more abstract path schema.

Other examples of Talmy's are equally good conceptual blends but they are formed differently *The palm trees clustered together around the oasis* is a more metaphorical type of fictive motion and therefore a double-scope blend. And you can imagine the palm tree moving. Right? And they get to the oasis and they cluster around, like people who walk in the desert and are very thirsty and then finally find the oasis where they can drink water.

In the same way, here is an interesting example, again from Talmy: *This rock formation reappears near volcanoes*. This is another compression of analogy into identity and even of identity itself into uniqueness. Because what you really mean is: there is a rock formation of a certain type, and I find it. You know, over here. And then I find the 'same' rock formation over there, near the volcanoes, except that it's not literally the same one. These are two different rocks but of course they are linked by analogy because it is the same rock formation in terms of the category for the geologists. Now, in the fictive motion, you have the rock disappearing, you don't see it for a while, and then suddenly, near the volcano, you see it again. So it is compressed into a scene in which there is a single rock, not two or three analogous-looking rocks but there's a single rock, and it starts over here and then it disappears, you don't know where it is, and then, ah, suddenly, here it is, over here, near the volcano.

These are scenes of magic, actually, that we have in the blended space. Things disappearing and reappearing, but they are used routinely. This is completely ordinary language and when you read it, you don't feel even the slightest literary flourish. It's a completely basic way of talking, but if you think about it, what it is is not a literary description; it's a blended description with fictive motion and appearance and disappearance. So, it's actually a very spectacular cognitive construction, but again entrenched in the language, so we never have to notice it. We've learned it when we were two or three years-old roughly, we learned the principles anyway, and by the time we are reading geology as adults, we are completely super-expert and super-competent with this kind of thing.

Some other cases, different fictive motions. This is *The scenery rushed past us*. This one is interesting because in fact you can have the impression if you are in a moving train. You can change your frames of reference, so that in the moving train itself, cognitively this time, you really experience yourself as

stable and what's outside as moving. The illusion of "it's the other train that seems to be moving" when in fact it's your train that just got out of the station, or again in your car, you feel stable and it really looks like the train is going by. But you can also use this even if you are completely aware that you are the one moving. This is still a very appropriate description. So, again, how can you do that? Well, you have one of these blends that has some mirror properties, by the way, because it's two similar motions in each one of the inputs. You project one of the inputs, a counterfactual input where something is moving past you and the ego is stable, and you project that. And from the other input, you project what is actually there, I mean the scenery. And so the result is you end up with the scenery moving and you not moving. By projecting a different motion frame onto what you are actually experiencing.

These are all very nice variants of Talmy's. And they illustrate, I think, the fundamental coherence of cognitive linguistics, thinking in the way we do. We can indeed achieve on the one hand the empirical coverage: the observations of Tamly are non-trivial. Nobody has noticed this before because those sentences look so ordinary. Nobody has noticed that, actually, very strange things were going on. So he (Talmy) systematically started to look for all the possible fictive motion phenomena and he found quite a range of them, that had not been noticed before. In order to do that, he had to have new empirical data. Like discovering a new star for an astronomer. So empirical data but also scientific generalization. Here is one interesting kind of phenomenon that Talmy talks about. Then here are some other interesting phenomena about conceptual blending. Suddenly, we see the same operation is activating both. We see compression, analogy into identity: *the trees get taller as we go up the mountain*, another one of Talmy's fictive motion examples. The trees get taller. This is again compression of analogous trees into a single tree. And all these examples I just showed you. So suddenly you have a theoretical generalization. You find that facts that either had never been noticed before or had been given completely different labels, turn out to have similar, deeper, scientific principles of operation.

Now, here is an example that I put up on the screen a couple of times in previous lectures but never explained. I just said, in previous lectures: "well, in the basic schema of conceptual blending, you have not just two inputs but many inputs and you've got a lot of recurring blending, blending that happens and then the result is itself blended with something else." And I put on the screen this apparently very simple image of the bird stork, the legend that the stork brings the baby. Now that we have reached the lofty point of the tenth lecture, we can actually go into some of the details here. We can look at this stork and we can see some of the mental spaces that are actually needed in order for this legend of the stork to make any sense.

So, on the one hand, we have spaces here that are very familiar, moving from one location to another again. This is path motion.

Now that movement of location into location is actually blended with existence in order to give us a metaphor commented on by Lakoff and Johnson, the metaphor of coming into existence where existence is a special domain and being born is going into that domain and dying is going out of existence from that point of view. So this is a well-known metaphor I didn't even draw. In order to have that, I should have drawn the previous blend that gives you the metaphor. It's not even on this slide. Now, another mental space has the stork flying, this is again the same location schema. But this time it's the bird going from one place to another. And then another schema that we are very familiar with, is a person carrying a package and going from one place to another to deliver the package. So this is the schema. Again, that's part of our familiar everyday experience.

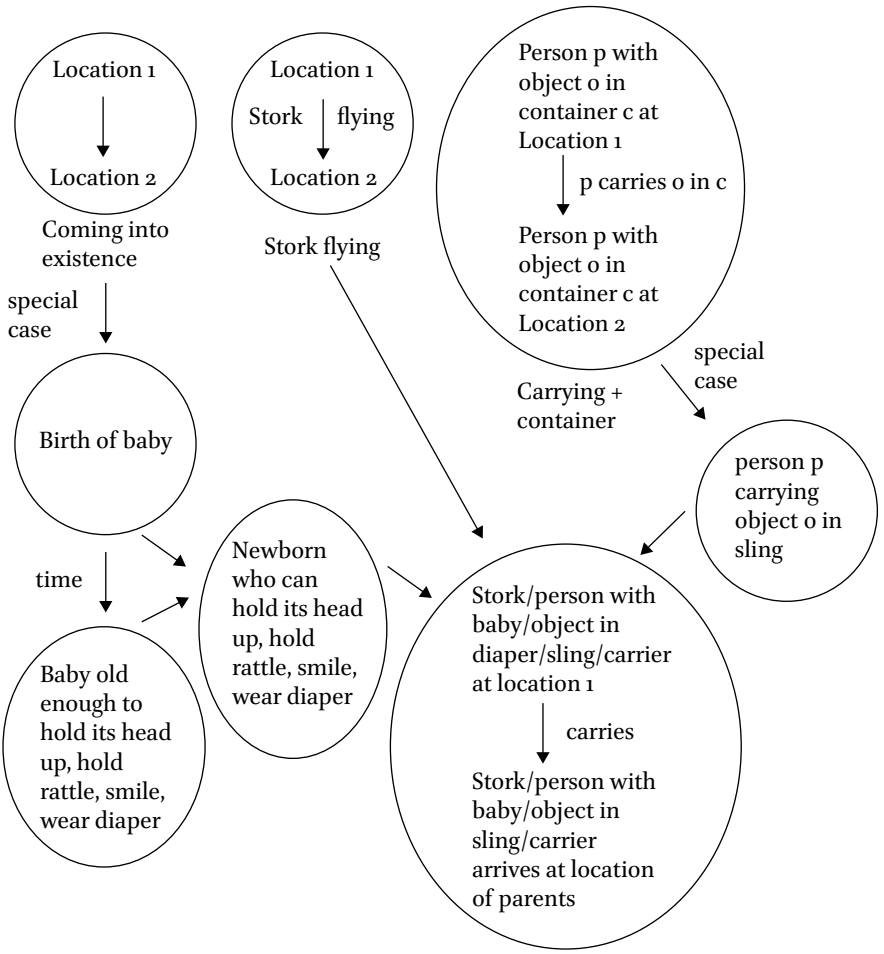
Now, you see, we have these three. This is the metaphorical *being born, coming into existence*, which is location because of the metaphor. This is just the stork moving. And this is people who move but for a certain reason, in order to carry something. Now you can see they all correspond, so they are all good

inputs, because they have corresponding starting points and motion and so on. Now, in the case of the stork flying, we can now blend with the person carrying a package and that will go into what is actually the ultimate blend. The stork will have properties of a person carrying a package. So, that's coming from this input. These are sub-cases that are going be used: one way of carrying a package is on a sling. The stork has a sling which is a piece of cloth. But the piece of cloth is not just any piece of cloth. It's actually the diaper of the baby. Where does this diaper come from?

Bizarre, because babies have not been born in it. So babies just born don't have diapers. So, if you look on this part, you see *coming into existence* will give you birth of the baby. Birth of the baby will then be connected through time with a future baby, a one-year old baby that is old enough to have diapers, but that's also old enough to hold up his head or her head and smile and play with a a rattle. And in fact, notice that the typical image of the stork carrying the baby has a baby that's not at all like a newborn baby. This is a baby that already plays around and is looking with his eyes and this baby is playing with a rattle.

So, these are babies not from the mental space of newborn babies, because newborn babies are not like that. These are babies from this mental space later in time when the baby is the sort of prototypical baby that you play around with. The newborn baby over here and the older baby over here give you a blend. A bizarre blend of newborn baby who can hold up his head and smile, look at you, play with the rattle, have a teddy bear and so on. This is an inexistent baby but it's used in the stork space. That baby wearing the diaper can now be projected to the entire blend and be used opportunistically by the stork. The stork says: "hey, the baby has a diaper, that's how I can carry the baby—in a diaper." So you see that in fact, in order for the story to coalesce into a well-formed, well integrated blend, you have quite a number of mental spaces that will come in. Of course subconsciously, as usual, you have no consciousness of any of this, because most of them are completely entrenched in your mind and they come automatically. Carrying something, carrying a baby and so on, all this is automatically triggered for you. But if you had another kind of animal than us, or if you had a human who has not been exposed to metaphors of existence and to people carrying packages and so on, the stork would not make sense.

This is typical of what happens in blending and in several lectures now I have repeated it. One of the reasons it is so important for humans to do compressions is that they can achieve human-scale, and in achieving human-scale, they can have blended spaces that are manipulable, that they can manipulate. So if you look at your handout, you will find, on page 6 of the handout, a reminder of the example from technology. This is example number 16, the plane



cockpit. In lecture number 8, I spent a little bit of time to show how the various complex operations for the pilot and for the airplane were compressed into a very simple operation for the pilot, namely turning a certain knob in order to make a little blue "hockey stick" move on the screen.

The result of that was phenomenally important for the pilot because the position of that stick will determine where the pilot can land—the landing and all kinds of things that are of extreme importance for the safety of the passengers and for the safety of the airplane itself. But the operation has been compressed to something that even a baby could learn. The baby could learn that by operating the knob you make the stick move. So, it's spectacular to see what is initially a very complex engineering feat being reduced by clever engineering and language compressions into an operation of turning a knob that moves a

little point on a line. A lot of human culture, I would claim, is devoted to doing this kind of thing.

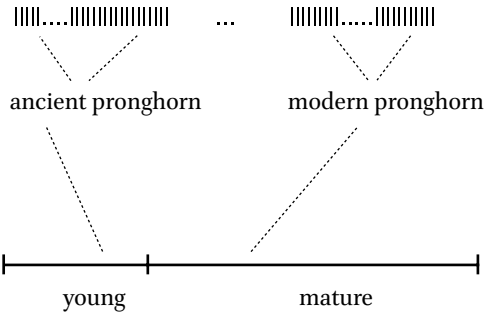
Well, there is an example in our book about the pronghorn and I will go quickly with you over that example because it's worth looking at the details of how compression occurs and how decompression also has to occur. So, this is the actual article in a section of the New York Times, a section on science. It's about science and it's about the theory of evolution and more specifically it's about this animal (that you can barely see). It's a pronghorn; it's like an antelope, *gazelle* in French. The word *gazelle* maybe exists in English. I am not sure. You know that it can run very very fast. This little antelope, now, a long long time ago, hundreds of thousands of years ago, this pronghorn, lived in an environment in North America where you had the fierce saber-tooth tigers and fierce hyenas. This is a hyena. And you have other kinds of predators always trying to eat the poor pronghorn. So, as a result of evolution, the pronghorn ended up being a very fast animal in order to be able to escape, to run when the predators chase it.

The scientific question is why the pronghorn is still a very fast animal today, when all of these predators have actually disappeared. Once the predators have disappeared, there is no reason for the pronghorn to run fast. Why didn't evolution then allocate resources in something else that would be more useful for the pronghorn? And the pronghorn would have gotten slower. For the discussion in the newspaper article, I have no personal expertise in biological evolution. So I have no opinion about why the pronghorn stays fast, but the specialists, the experts, gave an account that is contained this particular sentence. It said: "Even when predators, the tigers, the hyenas, have been gone for hundreds of thousands of years, their prey, the pronghorns may not have forgotten them." So, why is the pronghorn running the fast? Because a long time ago, it was chased by all these tigers and other predators and it remembers that, and it says "I had better still run faster in case something else happens. This is like learning to ride a bicycle. It's like saying: "Well, I learned to ride a bicycle when I was six years old and then after that I never had any reason to use a bicycle, but still I am much older and I can still ride a bicycle." So it's the same kind of reasoning.

Well, how is that reasoning humanly possible? Because, of course, the modern pronghorns cannot in their brains remember anything of what happened to earlier pronghorns. That's not the way that evolution works. So, how is this meaning constructed? Well, it is constructed in the ways that we have seen already in many cases. And I will do the diagrams here

Here is how the compression works. In very ancient times, you had lots and lots of pronghorns. On the diagram, all these little sticks stand for hundreds of thousands of pronghorns, some in earlier times, and some in modern

times. Now, language can do a compression. It can take a type of pronghorns in the pre-historical period andcompress it all into one and call that *the ancient pronghorn*. That's the ancient pronghorn. What was the ancient pronghorn like? The ancient pronghorn was fast. Then language can compress the more recent ones into also one single individual *modern pronghorn*. What is the modern pronghorn like? Well, it's also fast. It is just like the ancient pronghorn; the two are fast ...



So, we've got our old friend, compression of analogy into identity and uniqueness. All these analogous pronghorns are now compressed into a single one, the ancient pronghorn and all these other pronghorns are compressed into a single one, the modern pronghorn. Two massive compressions. Now, we've got the two pronghorns. What happens next? They get compressed; those two get compressed into a single one: the pronghorn when it was young, chased by fierce predators and the pronghor today, not chased. Notice the paradox: the ancient pronghorn is mapped on to the young, and the modern pronghorn is mapped on to the mature, because the ordering of events takes from ancient to modern. And here in the life of the human being, it takes from young to mature.

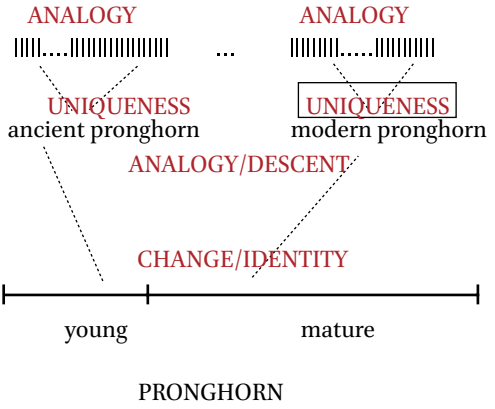
So, that's how the projection works. And once again these two are analogous, the ancient and the modern are similar, and maybe dissimilar other respects, and they get compressed into a single pronghorn. So, what are the compressions involved? That's the important question, in the science of blending, in the detailed theory. How are all these compressions operating? Well, we have analogy that becomes uniqueness. So, we have two unique pronghorns. And then these two are analogous. And they are compressed into, on the one hand, identity, the same pronghorn, and on the other hand change. That's easy.

But notice there are other compressions that are very important here. The magazine article is a science article, which is a serious article. It's not trying to indulge in a fancy metaphor. It's telling you about science, and it is talking about evolutionary times, it's talking about a very long period of time, hundreds of thousands of years.

Well, that part is then compressed into a single animal, the ancient pronghorn. So it's compressed over here: hundreds of thousands of years compressed into the lifetime of a pronghorn, twenty, thirty, forty years. And same thing for this one. This recent part of evolutionary time is compressed into the lifetime of the modern pronghorn. So we have two compressions of time. But now when we look at these two, we decompress them again. We understand the ancient pronghorn lived a long long time ago and the modern pronghorn lives now. So, there is a separation. There's a long time separating the ancient from the modern. Again, compression occurs and when we have a single pronghorn, this evolutionary time over here has once again been compressed to a single lifetime. So, we end up with the pronghorn remembering being chased, and then remembering later that it was chased. So, a massive compression of time going on in this example.

Now, another thing that happens—remember what we just saw in the fictive motion examples. We saw that things that did not have motion like this art piece were suddenly described in terms of motion because that is more human scale. The same thing is happening here with the pronghorn. Over here, you have no memory, because you don't have memory from one of these to one of these; the way evolution works is just some individual reproducing better than others, and their mutations. That's all. No memory link between these two. They don't transmit memory. The pronghorns don't write their diaries and put them in the pronghorn library for the modern pronghorn to look at. That's not what's going on. What's going on is that in the compression you suddenly have a single pronghorn and that pronghorn has human-like features of memory and intentionality. The pronghorn wants to do things and remembers things. The pronghorn remembers being chased and of course the pronghorn wants to be able to escape if the predators ever come back.

So the picture you get here is both completely compressed in time and completely compressed in identity. A single pronghorn, in a very short human-scale period of life. But it is made more complex by adding memory and intentionality, which are of course fundamental human features of anything that we do. Our human-scale interaction depends on having our memory and having some intentions—"I want to do this, I want to do that." This is what happens in the magnificent pronghorn-example.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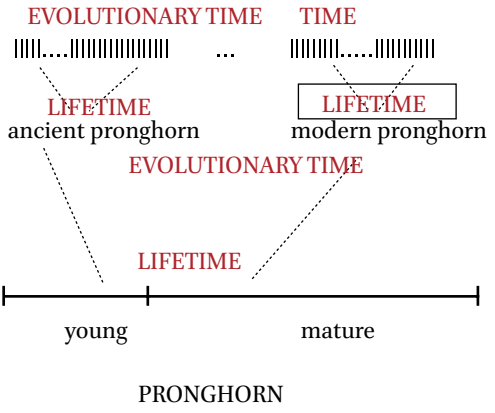
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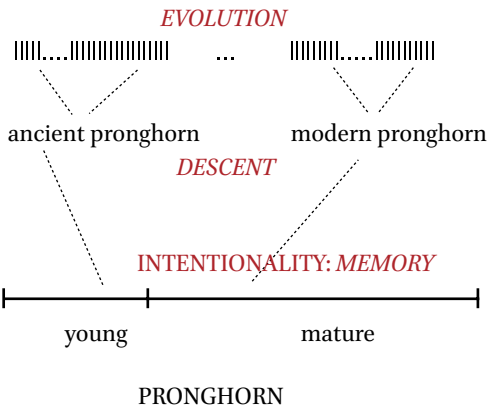
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So the pronghorn-example contains a lot of the fundamental operations that we have seen in the course of all these lectures in many different areas. Well the compressions operate on many of these interrelationships. There is no time to give an example of all of them. But with the pronghorn you've already seen some. In lecture number 3, I believe, we looked at some interesting causal compressions—you can read about this on your handout or in some of the readings. There is one in our book *The Way We Think* that's called 'The Smoking Cowboy.' You can see an interesting compression there. I am short of time. So I won't describe it but you can look at it for your enjoyment. It's an ad. (Smokers again. Remember? I talked about smoking in one of the other lectures. The smoke coming out of the ears.) This is a commercial against smoking. There is a famous Marlboro ad with a cowboy on a horse, a commercial *for* cigarettes. But this one is another commercial that says smoking makes you impotent—it says "don't smoke". In particular, one of the things and it shows is the same cowboy. But instead of being triumphant on the horse, he has a cigarette but the cigarette is drooping like that. The ad says "smoking makes you impotent." Nice compression; you can see the cause-effect compression. The cause is the cigarette and the effect is the impotence and it's a long-term effect and there is a long causal chain in between. And in the ad, it's been compressed: the cigarette contains the image of the impotence. The cause and the effect have been completely fused.

It's appropriate in this highly mathematical and scientific university to emphasize that much interesting work is being done and has been done on the cognitive nature of mathematics. In fact, mathematics is itself a product of the human mind and when you look at mathematical invention and mathematical creation you find the same compressions and the same kinds of blends that we find in other areas of human endeavor.

So, here is one very nice example. Again, we don't have time to really do it justice but I will mention it for you. This is a study by another friend and colleague of mine, Raphael Nunez, who is the co-author with Gorge Lakoff of the book on mathematics, *Where does mathematics come from*?. Nunez is a psychologist who has studied mathematics for a long time, and in particular he has studied the notion of infinity, asking how humans could have the notion of infinity, because it's not a notion that corresponds to real experience. There is nothing infinite in our world or for that matter even in the whole universe; nothing is infinite. Even if you have a great great distance, nothing is ever infinite in the mathematical sense. So how can we have that conception when it's not anything that we ever have direct experience of? As with many other mathematical examples, he proposes a general blending interpretation of this kind, where one of the inputs is what is called a perfective process that ends

at a certain state and has only a finite number of states, and the other input is an imperfective process where you can always do one more step. For example, if you count: one, two, three, four, …, there is always a further number. So, you never reach an infinite number, but you can always go on. You don't have to stop at any given limit.

Well, when you blend the perfective and imperfective inputs, especially when you do the blends in a specific mathematical situation, they are very lovely blends and they give you the notion of infinity. That is, they give you, in the blend, this paradoxical notion of a space in which you have things that can go on over over and over again, and yet they have an end state. Like in the polygons that 'become' a circle: you have a triangle and then a square and then a pentagon and then a hexagon and you have more and more and more sides. Finally, it gets as close as you want to a circle. Now, you never reach the circle itself, because even if you add a zillion sides, you still have a polygon with zillion sides. But it's as close as you like to a circle. So, it's very natural to call the circle the end state of this process and you bring in the circle as the end state, you bring it from this notion of a perfective event that actually stops.

We could illustrate further this really very important idea of Nunez. We could illustrate it with examples from the development of transfinite mathematics and Cantor's transfinite numbers. And we could illustrate it with examples of projective geometries and points at infinity. In geometry, you have a line. Here, a line on the floor I don't know if you can see it. Well, in our mind and in mathematics, and also in stories about ghosts, you can take this line and you can imagine that it goes to infinity, that it never stops. And those are the lines mathematicians actually talk about. But even more bizarre, they also talk about this line having a point at infinity. So, they use the process here with no end. You can travel on the line for ever and ever, you will never reach an end on the mathematical line. And yet the mathematician is going to use a resultant state, a point at infinity. Well, we can map the case of the line with no visible end onto lines on the sphere, which are actually circles in that case. In that case, the parallel lines on the plane, when you have them on the sphere, become circles that meet at the pole. They do have a meeting point, and that point is the projection of the point at infinity on the line. Imagine, if you like, a sphere right here and a little lamp in the middle of the sphere and the lamp is projecting the shadow of a point, of a little fly moving on this sphere. And the lamp here is projecting the shadow, so the shadow of the fly appears on the floor, just like my pointer. So my pointer could be a fly. My pointer is on the sphere. It's the object on this sphere. (Thank you for lending me this pointer. It turns out to be extremely useful.) Notice that, when the object on this sphere, when it does the full circle, when it reaches

here on the sphere, it is just a point on the sphere that meets other parallel circles on the sphere. But on the floor, it's the point at infinity. When you go all the way here, then you have a point at infinity. So, there is a counterpart. The point at infinity which has no reality apparently, on the sphere does have a counterpart, which is this point.

Does that make sense? Can you imagine this sphere that I am talking about? Next time when I come to Beijing, I will bring a sphere. Next time I come to Qinghua University, I will bring apples and oranges to make this point.

This is one example. But many cases of mathematics are like that. In lecture number 4, we talked about the emergent structure of the system of numbers, and complex numbers in particular, so, this is not a special bizarre case. This is the way that mathematics actually gets constructed.

I was going to tell you more stories. I was going to give you some discourse examples. And this was actually an example from *Phèdre*, a very famous play in French that is itself taken from a story of Greek mythology. And I was going to show you the compressions in *Phèdre*. I ran out of time because there were other things that are more important to talk about. You can find this interesting story of Phèdre. I will tell you the story in two minutes. I will not be able to go into the analysis itself.

But here is the idea. In this little passage, Phèdre is the stepmother of Hippolyte and Hippolyte is the son of Thésée. Theseus in English. I only know the French pronunciation actually. So, here is the situation, Phèdre is the queen and Thésée is her husband, the king. And he is gone. He is never home; he is always running after other women, actually. In the palace, you have Phèdre and you have her stepson, the son of Thésée, the prince Hippolyte. And Phèdre is secretly in love with her stepson. But of course she cannot confess that she is in love with the stepson. That would be scandalous.

So she starts to tell this story (which you can appreciate more, of course, in French). But she tells the story in this way. Phèdre starts talking; she says "I am still in love with my husband, but not my husband now, who chases women all the time. I am in love with my husband as I remember him when he was young and he was charming and he was strong and so on," And she says: "exactly as gods are depicted" and then she turns her head towards Hippolyte, and says: "or like you, as a matter of fact," meaning "you are a pretty handsome fellow".

So, she starts to build an analogy between the young husband that she used to love and the stepson who is of course the son of that husband. So, it's normal for them to be similar: one is the son of the other. She goes on and she says "when we were young women …" She and her sister were on the island of Crete, and the hero Thésée, this husband, who is the father of Hippolyte, is well-known in the legend for having conquered and killed a monster, the

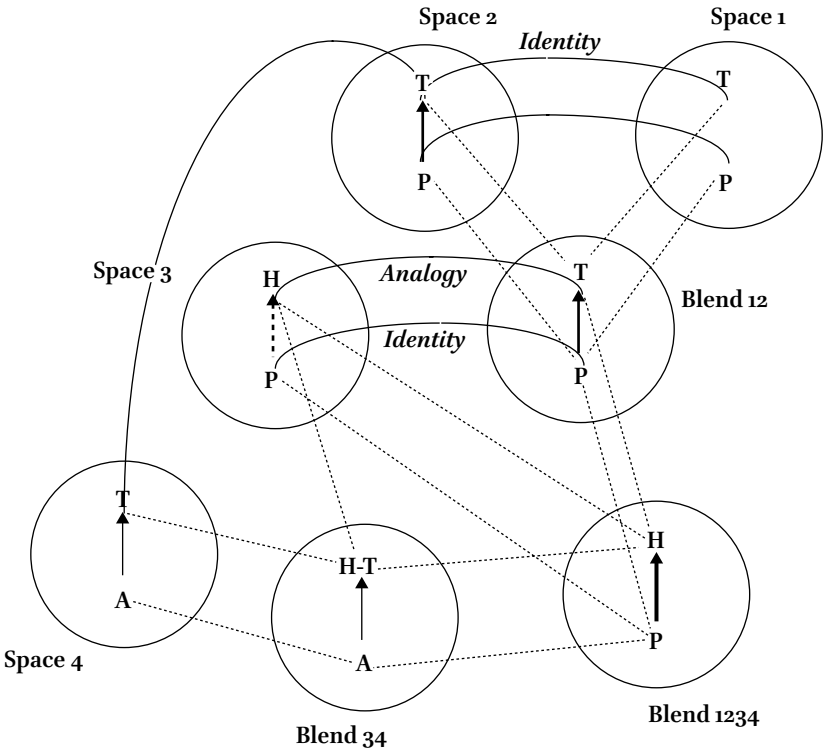
Minotaure, a big bull-like monster that lived in a labyrinth. Do you all know that story? The Labyrinth? You know, a maze?

The monster always demanded to have sacrifices and to have virgin women from Greece and all that. So when people tred to kill the Minotaure, they would go into the maze, into the Labyrinth, but then they could never get out. They could never find the way out. So what happened is Thésée went into the Labyrinthe and he was able to kill Minotaure. But he also had the help of the sister of Phèdre, the sister of the queen we are talking about, whose name in French is Arianne, which is a name linked to the spider in French, araignée. She gave him a thread and she held the other end of the unrolled thread, so that when he had killed the Minotaure, he could then just follow the thread back to the entrance of the Labyrinth and he could find his way out.

Now, what Phèdre says here as she is talking to Hippolytus and she has already built the analogy of Hippolytus with Thésée that she used to love, is that when Thésée came to Crete, "We were in love with him. The daughters of Minos, me and my sister, we were just really, you know, in love with him." And then she turns to the step-son Hippolyte, and she says "What were you doing at that time?" It's a silly question because he was not even born or maybe a baby. Then she says "What were you doing? Why didn't you come with the other heroes to our island? and then why were you too young to come? If you had come to the island, you would be the one to kill the monster. You would be the one that my sister would have helped in order to kill the Minotaure.

So, you can see the analogy with Thésée is now getting stronger and stronger. In fact, there is a replacement: Thésée in the original story is now replaced by his son Hippolyte. This is a counterfactual, remember? Our old friends, counterfactual blends? This is a counterfactual blend. She puts the son in the position of the father. And so now, the son becomes the hero; he can kill the Minotaure, and he has the help of her sister Ariane, but that is not enough. You need one more thing. She says "no, no, no, you would not have had the help of my sister Ariane. I would have helped you." She did not help Thésée at the time. She just stole him from her sister later, actually, in the story. But she did not help him to fight the Minotaure. But here she says: "If it had been you, I would have helped you. And I would have told you how to get out of the Labyrinth." In fact, she says "I would not have just given you a thread, I would have gone with you into the Labyrinth to fight the monster." Which is very stupid because then they couldn't get out. Right? But that would show her love. That would show her greater love and the passage ends and she says "Et Phèdre, au Labyrinthe avec vous descendue, Se serait avec vous retrouvée ou perdue" which means Phèdre would have been with you in the Labyrinth, and either she would have found herself or she would have been lost with you.

Now that the analogy has been compressed into complete identity you can see how the love for the stepson is obvious. And the stepson is suddenly very embarrassed and he says "What are you saying? How can you be saying that?" and of course, Phèdre says "What do you mean, what I am saying? What are you inferring?" So she suddenly puts on him the burden of the meaning construction. She says "I did not say anything explicit, that I love you or anything like that; you are the one who built this meaning" and poor Hippolyte says "Oh, I am so ashamed, I did not mean that. I did not understand what you were saying." He doesn't know what to do.



Anyway this will be my final diagram for the lectures. What happens here is first Phèdre builds identity in the mental spaces. She has her husband Thésée, she blends in order to have Phèdre here being in love with Thésée in the past and then she does other analogies with Hippolyte of the same age today. So that's other mental spaces coming in. Then she does a further blend so that Thésée who fought the Minotaure with Ariane is now projected to Hippolytus

Thésée. Over here, a further blend, blend 34, and Hippolytus Thésée is now fighting the Minotaure and killing the Minotaure with the help of Ariane. And then she does further blends. The analogy of herself and her sister Ariane is again compressed into identity, with, in fact, the total disappearance of Ariane. She, Phèdre, now becomes of course the hero's lover. So we now have this kind of schema and we go on and on like that, building more and more, if we interpret the text. So, this is a fancy discourse analysis. If you want to understand what was going on in this particular kind of discourse, you have to see that this is in fact what is happening. This is in fact the full array of mental spaces that you build and you can see that as you build blend after blend. I put the arrow in there, symbolizing the love of Phèdre for Hippolyte. So, at the beginning, there is love for young Thésée and then there is a little glimmer of love of Phèdre for Hippolyte that you can suspect with the analogy. And then it gets stronger. Then there's the love for younger Thésée which is projected. So of course, at the end, we get a very strong, very strong love of Phèdre for Hippolyte. But it has all been built indirectly through compression.

Final words then. I will stop and then we can have a little more discussion. Final words on all of this. Notice the methodology, you don't just look at two word sentences. Or you don't just look at one single grammatical construction. Or you don't just look at a religious phenomenon. You look at a vast array of superficially very different looking phenomena. And under the dissimilarity of the surface, you look for the unifying fundamental cognitive operations that are working for all of us. So we get in this way maximal empirical coverage, and we get very nice scientific generalization over a variety of areas. And that would be my parting words, thank you!

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Fuyin (Thomas) Li (1963, Ph.D. 2002) received his Ph.D. in English Linguistics and Applied Linguistics from the Chinese University of Hong Kong. He is professor of linguistics at Beihang University, where he organizes *China International Forum on Cognitive Linguistics* since 2004, http://cifcl.buaa.edu.cn/. As the founding editor of the journal *Cognitive Semantics*, brill.com/cose, the founding editor of *International Journal of Cognitive Linguistics*, editor of the series *Distinguished Lectures in Cognitive Linguistics*, brill.com/dlcl, (originally *Eminent Linguists' Lecture Series*), editor of *Compendium of Cognitive Linguistics Research*, and organizer of ICLC-11, he plays an active role in the international expansion of Cognitive Linguistics.

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Websites for Cognitive Linguistics and CIFCL Speakers

All the websites were checked for validity on 30 June 2017

Part 1 Websites for Cognitive Linguistics

1. http://www.cogling.org/
   Website for the International Cognitive Linguistics Association (ICLA)

2. http://www.cognitivelinguistics.org/en/journal
   Website for the journal edited by ICLA, *Cognitive Linguistics*

3. http://cifcl.buaa.edu.cn/
   Website for China International Forum on Cognitive Linguistics (CIFCL)

4. http://cosebrill.edmgr.com/
   Website for the journal *Cognitive Semantics* (*ISSN 2352–6408/ E-ISSN 2352–6416*), edited by CIFCL

5. http://www.degruyter.com/view/serial/16078?rskey=fw6Q2O&result=1&q=CLR
   Website for the Cognitive Linguistics Research (CLR)

6. http://www.degruyter.com/view/serial/20568?rskey=dddL3r&result=1&q=ACL
   Website for Application of Cognitive Linguistics (ACL)

7. http://www.benjamins.com/#catalog/books/clscc/main
   Website for book series in Cognitive Linguistics by Benjamins

8. http://www.brill.com/dlcl
   Website for Distinguished Lectures in Cognitive Linguistics (DLCL)

9. http://refworks.reference-global.com/
   Website for online resources for Cognitive Linguistics Bibliography

10. http://benjamins.com/online/met/
    Website for Bibliography of Metaphor and Metonymy

11. http://linguistics.berkeley.edu/research/cognitive/
Website for Cognitive Program in Berkeley

12. https://framenet.icsi.berkeley.edu/fndrupal/
Website for Framenet

13. http://www.mpi.nl/
Website for the Max Planck Institute for Psycholinguistics

14. http://www.mentalspace.net

15. http://blending.stanford.edu

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