

Lecture 19 nov 13

Just in case there are things to tear up about time, let's just have a little discussion while people are drifting in. Am going to keep going straight on from last time from where I got through with this drawing. Is there anything about what was said so far about the naming of parts and the attempt to construct parts so that ~~xxx~~ these 5 patterns would be coherent in respect to each other that you have any questions about.

Question:

Reply: What we were trying to do, remember what these five patterns are, this one says that a window is next to a ~~bath~~ basin ~~a~~ in a bathroom if the bathroom has a bathroom. This is the ~~metal~~ ~~metal~~ metal window detail for a standard domestic window. This is a fact that a living room ~~xxx~~ window bears a certain relationship to a livingroom floor and ~~xxxxx~~ area, it says that livingroom windows have clear glass in them, it says that bathroom windows have obscure glass in them in general and we are trying to figure out a way of connecting ~~xxx~~ these patterns up with one another, so that we don't run into the difficulty of getting obscure glass that pattern associated with this pattern which is the livingroom. and we tried the idea of calling each of those entities and that clearly breaks down and on that basis this would be associated with that. So we now have 3 different kinds of entities: bath window, window and living window. We are going to make a connection - we are going to assume an ordering on the parts like this. On that basis we get a connection between that whole thing and that part of the thing and that part of the whole thing and that part of the whole thing and that part of the whole thing and that part but we don't get the cross connection. Are there any other questions about what has been said so far to explain why ~~was~~ this won't work either.

Alright I'll go straight on now. At this point we do seem to have ^atheory in which the patterns could be considered as combinations of parts and the parts could be separate entities admittedly with some ordering on them where ~~k~~ one is a more

special case than another. Now two difficulties we run into at this point are these:

First of all as we all know we are ~~not~~ able in our own minds to generalize these patterns, that is to extend them to cases different to cases ~~we~~ we have encountered so far. In particular I gave the example of the obscure glass even though we might have learned that particular pattern in connection with bathrooms if someone were now to build a sona in his house and that sona was to have a window in it, we would know that this pattern, to be applied to that extended case. Now under those circumstances it becomes necessary - it would be necessary to keep renaming the parts at the moment this is called bath window. Let me make one thing clear first of all. There is a connection here that I haven't drawn those connections that's living window and that's bath window. Now and that connection goes in both directions. Now suppose that we have a sona and that sona is to have a window in it for some reason. If we were merely to say look - suppose that we try to put bath window in this pattern in order to build up a the pattern that says a sona should have a window such and such dimensions let's say and we try to build that pattern out of the part bath window in order to make quite sure we are getting this detail. We are then going to find an association between this pattern and this pattern which is they both have bath window in them now and that is a completely irrelevant and incorrect association. The sona might very well not have a hand basin in it. So we are ~~soon~~ again running into this transitivity difficulty. Now to overcome it, see what I mean by that put it like that and transitivity would give it that. In order to overcome it the moment we bring this pattern into the system we would now have to rename this component and call it. I'll call it sona or bath window. Imagine that there is now a new part that has been added to the list called sona or bath window, that's all one word. That is a special case of window and bath window ~~and bath~~ will be a special case of it. This would again do the trick since we now have this sona or bath window. The arrow reads like that and similarly the arrow reads in that direction but ~~we~~ we no longer have the difficulty of an association between those two because we have made use of the arrows again.

So we can get rid of the difficulty but we can only get rid of the difficulty by renaming the part. Or in effect by introducing a new part. Now I want that to be very very clear. If we assumed that there was at one time a list of parts from which we build these patterns in order to make this new relationship correct we would have to completely rebuild this pattern and now treat it as a combination arrangement of new parts different from those that it was a combination of before. Now this is a very very serious absurdity since there are constantly new patterns coming into the system it would mean in effect that this thing that I just did on the board would have to be going on in the brain constantly in the memory that is that each pattern in the memory would have to be constantly written as a new combination of new parts. That is I think is fairly clear if you imagine that that multiplied a thousand or a million fold is an unwieldy and pointless business. Not really feasible. So that is the first major difficulty with the apparent success of this new part based approach.

The second difficulty is the following - let me run the sona part of this out now well I can leave that. You remember that when we were discussing intuitively what human memory is capable of remembering about these patterns I pointed out that it is not true that all bathrooms have to have ^{obscure} glass in them if the window is very high up or an alternative if the window looks on to a totally unpopulated forest it isn't necessary in either of those cases to have obscure glass. Now I think that just for simplicity sake I will remove the sona part of this again. Now how are we going to deal with this issue in order - see as these things stand these two parts are the same what we really want to build in now is we want to make a statement in this - we want to make it clear that this pattern only applies to this pattern under the circumstances where the window is below about 5 ft and does view on to a place where there might be strangers. and in deed this pattern would only apply to a window when those circumstances occur. In order to capture that it does not apply to any bath window and in order to capture one would really have to

introduce a new and very special part which is a window connecting a private place where people will be naked to a place where strangers would be and less than about 5 ft off the ground, say 6. Now by the time - I am adding a new window here which is that long thing. It is called a window. That whole thing that I just said that whole sense which will be the definition of a whole window and that would be the part that would truly have to be built into this pattern. Now since that part is - well I ~~would~~ won't say * since let's make the point. That part namely a window connecting a private place where there will be people ~~naked~~ naked to a place where there will be strangers less than 5 or 6 feet off the ground it seems very clear that that part is not going to appear in that form in any other pattern. k Because that designation of the part was appropriate precisely to the functional condition where the use of obscure glass makes sense. So that what happened in order finally to make the connections between these patterns apply only ~~in~~ in the cases where - where patterns are properly to be used together. We ultimately get to the point where we have to name the part so specifically that you can never use the same part in more than one pattern. You saw ~~at~~ the beginnings of this already when ~~you~~ we started having to introduce that rather curious part called ~~xxx~~ sona-bath ~~xxx~~ window. So there are two difficulties now. One difficulty that you would have to keep remaking the patterns out of new parts as you extend the patterns to ~~wider~~ wider and wider uses, and secondly you have the fact that the parts have got to be defined in such a detailed manner that their definition is actually the pattern in which they are imbedded. Now it is not possible to give a rigorous argument that shows that this will always always go on happening. One could claim that the example I have given especially constructed that I have brought to your attention a difficulty that only occurs in a half a percent of all the cases and that the part based approach will really work most of the time. There is no way of making a logical argument to prove that that is wrong. The easiest thing to say is that I've been trying to do this personally with a part based approach for about two years and have constantly run into difficulties of this kind at every turn

and believe that anyone else who tried to do it would run into the same difficulties at every turn but I can't ~~ap~~prove that to you. If you don't believe it, the best thing to do is try.

Now if the part based approach wont work then the question then the question arises ~~xxxxx~~ how is such a memory to be constituted. The association between patterns cannot be based on does the same part occur in two patterns or does the part which occurs in one pattern is it a special case of a part which occurs in another pattern. Those are not adequate - that's not an adequate basis for hooking up the patterns with one another. & So I now have to give a ~~xxxx~~ basis that is adequate and secondly I must also explain what on ~~xxxx~~ earth all these names are doing. Because, Let me just draw attention to a curious thing. It is quite obvious that the words that we use for naming things like window bathroom window stuff like that are playing a very important part in language and human cognition and if it is true that the part based approach is wrong ~~as~~ a way of organizing memory one wants to know how ~~these~~ these words came into existence and what their purpose is. That I must explain ^{so} ~~also~~. Let me first - there is a very simple way of hooking up the memory that is partly implied by what I said already. I'll just draw this whole thing. I am going to distinguish the parts in these patterns as clearly as I can. Now ~~these~~ things still stand for what we have ~~xxxxxx~~ been talking about. This is the sona case. I am not going to put any words on here for a minute. I am going to introduce the following definition. We have had the idea that each pattern has 3 components so that pattern P has components context P, pattern P and problem P and each one of those passes ~~x~~ 5 conditions. Now I am going to say that pattern P and a pattern Q may be associated under the following conditions. Lets say that A is a part in P and B is a part in Q so that for instance this window pattern might be the Part A and ~~this~~ could be P and this could be part A and this thing here - this whole thing which is the window so this could be detailed as this kind of window frame and Part B in the pattern Q. I am going to say that we may identify the part A in pattern P with the part B in pattern Q under the circumstances where the pattern P plus Q with A and P ~~identifying~~ identified

with being Q itself makes sense as a pattern and satisfies conditions 1 thru 3. Now just let me repeat that and I - before I repeat it I will say it ~~intuitively~~ ~~intuitively~~. Obviously what we have been struggling with as I have talked about the memory is the fact that we want 2 patterns to be associated when they can be used together that is super imposed. That is we are interested in an association between that and that because we know that the window ~~x~~ in this pattern can be substituted or identified with the window in this pattern and we know similarly that the window - so that is the floor and that is the window there - the window in this pattern can not be ~~inden~~ identified with the window in this pattern. What we know in effect is that - we know that R plus S with the window in R which is this thing identified with the window in S we know that that is not a legitimate functional pattern. Whereas we know that that thing there is a legitimate functional pattern. Now, let me define that thing just a little bit more carefully. You are defining P plus Q in a new pattern ~~where~~ in which the context of P plus Q is the context of P and the context of Q taken together ~~x~~ in which the pattern of P plus Q is the pattern of P plus the pattern of Q taken together with the appropriate identification and in which the problem is the sum of the two problems. Now that thing meets conditions 1, 2 and - we know it cannot meet conditions 4 and 5 because conditions 4 and 5 have to do - we know condition ~~4~~ 4 isn't met by this thing because condition 4 asks can we split the pattern into two patterns in a reasonable way and of course we can't split that into R and S and also in view of that fact that they have been taken together the chances that the pattern is completely general disappear. So condition 5, even in a megaw way in which it might be holding in the individual cases won't hold for the sum of the two. But remember conditions 1 2 and 3 had to do with the functional ~~validity~~ validity of the patterns, conditions 4 and 5 had only to do with the usefulness and smallness of the ~~xx~~ patterns. I am not talking about those two conditions now. Conditions 1, 2, and 3 which have to do with the fact that that thing ^{solves} ~~falls~~ is a problem which occurs that there are no additional problems that will creep in and mess it up. That must be true of the sum, it is not

true of this thing because we know if we were to put these two together that would give us a livingroom with an obscure glass window and under those conditions there are obviously problems occurring which are not solved ~~by~~ by the pattern and that 20

violates condition 3 and in fact it also violates condition 1 ~~and~~ in a sense that the reason for having obscure glass namely not wishing to be seen ~~xxxx~~ naked does not occur in the context of R and S taken together. It does ~~a~~ occur in the context of R.

We're not going to make any attempt to hook these things up on the basis of what parts they contain or on any logical basis but strictly on a functional basis. When P plus Q with A_p identified in $P-Q$ is a legitimate pattern which does meet conditions 1, 2, and 3 we may then draw a line between A_p-B_q . That means that those two parts of those two patterns are identified. Or may be identified is the correct statement. Now the crucial issue is that this makes no assumptions about transitivity. It is not a case in the same manner we may identify that window with this window in R we may identify this glass which is completely general - this simply says that there is glass held in the frame in a certain way - with the obscure glass that appears in this pattern, in the same way we may identify the window which appears in the living room with this window that has that detail and all those four lines are based on this condition that I gave. The two patterns in question make sense together with the appropriate part identified. There is no transitivity applied. Another word the fact that that can be identified with that and the fact that that can be identified with that does not imply that that may be identified with that.

There is nothing in the logic of this functional association which implies that transitivity would hold and in fact it's clear from the examples that I gave that it can not. Because it's precisely transitivity that breaks down when you try to construct the part based approach in a consistent manner. So, furthermore, this thing which is the bathroom ~~xxx~~ is identify - I'm sorry, I should draw this pattern more subtly - this is between - between where strangers can be and a place where people want to be private and naked, so that is identified like that - similarly this ~~corner~~ ^{corner}

is identified like that - that window is identified like that but again this thing is not transitive and there is no attempt made to - you can't infer that those two ~~xxx~~ may be identified.

So I'm making the very very simple assertion that a memory consists of a set of patterns with the identification of parts in patterns made according to this one criterion which is a purely functional criterion and that ~~xxxxxxxx~~ that identification is not transitive.

I've put no words on here so far. Why do we use words - why does the human memory have words going on in it - what part do they play in organizing this information store. The answer is this: Assume for a moment that this is how memory works, it's clear now that when a new pattern is introduced to the system something very complicated has got to happen. Let's just imagine for a minute that there are 10,000 patterns in this system at some moment - in the memory - and the 10,001 pattern comes in. In the human mind it will come in through the mind and stuff like that or through some other part of the brain, in the case of our memory that we're building it will come in in the formal form that I have described. Since, the identification between parts is non-transitive it means you would have to examine the possibility of an identification between each new part in this pattern and every part in every one of those 10,000 patterns separately and based on a functional argument. Because that is the only way that this hook up can be made.

Now, whereas that is probably possible when you have only let's say 100 patterns in the memory - when you've got 10,000 patterns in the memory the chances of it being done are nil. You couldn't do it in a reasonable amount of time. And this difficulty is characteristic of human memory - equally characteristic of the kind of memory that we're going to be building. Suppose that there was a group of people in charge of such a memory and an architect offers them a new pattern, in order to hook~~xx~~ it up correctly with all the other patterns they would have to examine it in relation to all

10,000 patterns in the store and something else would be in the ~~a~~ mail before they finished. How does the human memory deal with this ~~xxx~~ problem? The answer is it tried to use the part based approach. It attempts to construct a vocabulary with a partile order on it like that where some of the elements in the vocabulary are special cases of some of the others. And it then attempts to give names to all the parts in ~~xx~~ all the patterns - the names being chosen from this vocabulary in such a way that as many of these identifications as possible are preserved.

Now, let's just think about what that means. We know from the argument that I've given if you accept it, it not possible that there could be a perfect success. What ever this vocabulary is ~~thxxx~~ at some moment one's attempt to give each of the parts in the many patterns in the system names and to base the hook up on those names is going to break down in certain cases~~k~~ because there are going to be these intransitivitie which this will not be faithfully reflecting. However, it is clear that this gives you a very very ~~x~~ rapid quick and dirty short cut method of hooking a new pattern into the patterns that are in the memory at any one time - at the time when it comes in. If for instance, suppose that there had been the situation where these patterns and these things called bath window were in memory - remember there in the memory without names but for a short cut method the memory also constructs this list of names one of which is bathroomwindow - it attemtps to reflect all the hook up with these words. It then gets a new pattern - sauna with a window - and there's one or two choices possible. It's going to either have to call that - it's going to have to name immediately the new parts in the pattern - it can either name it window or it could name it bath window - it could name it living room window but that would be even sillier. It it names it window its going to run into some of the difficulties~~k~~ that apparently it doesn't know which of these things apply to it or not. If it names it bath window it will maintain this connection correctly but it will cause that _____ by associating it incorrectly with that pattern. But it does do a

quick job. In other words by nameing the parts here, by temporarily giving all these other parts names it very quickly associates it in this case correctly with this pattern which is the most important one ~~with~~ of the ones we have and it doesn't have to go through the process of making a functional check for each separate case. k Notice one thing that's already better in what I've just described. We're not assuming that the patterns are actually made of parts we're considering the names as temporary identifications of the parts which constantly keep changing in an effort to keep up with the hook up structure which is really in the ~~memory~~ memory so that at that point it would be quite possible to invent a new name "sauna bath window" that will have the structure that I've described over here and that will then improve the situation back here. And one can according to this method keep changing the names of the parts within the pattern.

I'd like you to notice though that the situation will always - suppose that you do a very quick short cut hook up because you have to get that pattern into the memory and you have to have it hooked up as best you can temporarily. We know that there are going to be some mistakes - it's going to mistakenly hooked up with certain patterns that it ~~was~~ ought not to be - I'd like you to observe that this is characteristic of human memory also. It's a well known phenomenon that as we take patterns into our minds we see them in terms of categories that we already have in our minds - those categories correspond to this stuff and we're apt to make functional mistakes because we're using those categories to get the thing into the right part of memory fast but we - but by violating the non-transitivity that's really in the memory we apt to make quite serious mistakes and this is of course what we do. That's what category mistakes are. Where we subject the world or what we see in the world to the constraint of the particular categories that we have in our minds, and are incapable of seeing the functional connections that really exist. So that this memory - I'm saying that because it's important to recognize that the - in so far as we can hope to build in a reasonable structure into the pattern language it is going to be

susceptible to precisely the same difficulty that the human memory is susceptible to. It is also going to be dependent on a particular choice of categories which are used for very quick kinds of hook up and it is going to be liable to error and one is constantly going to have to re-examine pairs of patterns individually whenever you get the time to to see whether or not ~~these~~ ^{they} really are associated differently from what the ~~these~~ categories tell you. And ~~these~~ that in the course of using the system functional hook up based on this criterion will keep changing the internal structure of this memory - that is of this language.

I think it would be best for me to stop here and try - I realize that what I've been saying must be rather obscure. - to try and get you to try and bring out some of this obscurity ~~with~~ with questions because this is no ~~a~~ small matter. It may sound very very unpleasantly abstract but it really isn't going to be possible to build a language of patterns if we hope to base it on a list of parts. In the ~~a~~ patterns that you write for instance you're going to have to make these kinds of identification between parts in patterns in order to make clear how the various patterns fit together and that is what's relevant - that is the only kind of glue which is really going to tie this system together in a meaningful way.

Question:

Reply: Now my guess - I think it is purely the first I'm not too sure about that but as far as I can see it's purely to help you get the patterns into the memory ~~fast~~ fast - it is also - now I shouldn't say purely - there is a second matter which I haven't discussed at all which is the business of getting patterns out of the ~~memory~~ memory and the words also play a part there but they ~~play~~ play no significant part in the internal structure of the memory as it is at any given time except for short cut purposes.

Question:

Reply: No, no, I didn't mean to give that impression at all. The hook that's best on functional arguments is completely permanent as far as I'm concerned. I mean in

other words once you've made the ~~xxxx~~ decision that that - in that pattern that window and that window in that pattern can be identified - see that decision can be made entirely ~~xxxxx~~ without reference to categories. That's a purely function based argument and that structure is permanent. What I'm saying is impermanent is the part named in order to allow you to ~~xx~~ tread your way through this stuff fast. The structure itself is quite permanent. It may change slightly as you get ~~xxx~~ insight. What I'm saying is that you can't build it in a rush when a new pattern comes in your suddenly faced with about 30,000 decisions you can't make 30,000 functional decisions fast enough. For the sake of argument ultimately by the time the thing has been properly understood the 30,000 potential hook ups ~~xxxxx~~ let's say some 300 ought to be there are appropriate - the question is how ~~x~~ do you find those 300. The words give you a way of finding some of them very fast and then you fill ~~x~~ in on the others as you being to have functional insights about which patterns apply to which other patterns. Now let me just give an example here ~~x~~ of an actual case where one might think of this as happening. Out of the street pattern. I'm treating now the street pattern as being seven separate patterns rather than doing them as one. The very first pattern says that - those are freeways and those are arteries in our _____ or streets we're treating that now as a non-named pattern and the seventh pattern says that a street should be ~~xxxxx~~ either below ground and houses facing that way - I mean any buildings facing away from it or the street could have earth mounds to the side of it and buildings facing that way.

Let's not try to name those things but just lets point out ~~xxxxxxxx~~ immediately that the identification which is first made in fact based on the names, is the one thing between these streets and that street. It's saying that that ~~xxxxx~~ and that pattern may be identified with that thing in that pattern. Now after you've sort of thought about it you realize that actually although that's the way that was constructed that this pattern applies equally well to the freeway. In other words one could equally

well say of a freeway it should be sunken or it should have earth mounds along the sides of it and buildings should be oriented away from it. Because the critical issue in this case is that this is simply a high velocity channel with noisy vehicles in it. So at that point you realize you can make an identification between the freeway - what we're treating as a freeway in this pattern and this thing. And that this kind of continual growing insight is what's actually happening in a memory that you do realize that there are identifications that can be made between things which you were not previously aware of.

Similarly, well I don't have to give another example.

Question:

Reply: We're talking about ~~the~~ the criterion for when two parts in two patterns can be identified. I'll take this as a case in point. You treat this as a pattern P, let me just - so as not to confuse the issue - let's not deal with alternatives, we'll just have one version of this. This is pattern Q and the pattern P says that the streets should be parallel with cross freeways running at about 2 to 3 miles intervals and the pattern Q says that there's this channel with high velocity vehicles in it and it should ~~have~~ have mounds to the side and buildings should be ~~oriented away from it~~ oriented away from it.

We're considering whether or not we can make an identification. Let's consider that part I'll call it A and P - I'll call this part X and Q. ~~It~~ It turns out that we can make the identification of A in P and X in Q because that pattern taken together with that pattern form with that identification made form a sensible pattern. The context of this pattern is an urban region with 250 cars per 1,000 per thousand population. The context of this is any street with high velocity traffic on it producing noise. As I say that should be made rather more precise. So the context, you take the two context things together and say that the pattern P plus Q is any case where you have that and you have that the problem, well this has to do with the problem of congestion and this has to do with the problem of noise. So that in the composite problem you have both problems to cope with. The composite ~~pattern~~ pattern with the small p is that thing with this identification

this thing and that thing in other words that with the streets treated in this manner. And it is clear that that composite p plus q is a pattern that is a reasonable functional pattern that does meet conditions 1, 2, and 3 so - it is on those grounds ~~ab~~ that we are able to make that identification. Now actually on the same grounds ~~you~~ are also able to make that identification between that and these freeways.

Question:

Reply: Any relation between - among elements is considered to be transitive~~x~~ if the following thing holds let's have a relation between letters. If we have the a b and we have the relation b c then we have the relation a c. That's what ~~xxx~~ transitivity means. Now in the part based approach as I explained there was an assumption that the identity of parts is transitive in other words this part is identical with this part and this part is identical with this part then that part is identical with that part. In this thing it is not true. Let me give you ~~an~~ example ~~of~~ why not. Consider another subpattern of this series, I've forgotten this number it is the one which says that between the ^{parallel} ~~paralell~~ ~~paralell~~ streets there will be driveways connected in that manner or it also says that they may not face each other. Now we also have a pattern that I ~~have~~ have referred to several times about the entrance sign on the street for a house. Now it is possible to make an identification between that driveway ~~x~~ and that street because it is clearly true that if you get the joint context. In other words you have that situation and you have a house standing on then because these things are operating low velocity vehicles then this pattern makes sense so the two patterns make sense together with that identification. Therefore that is ^a ~~an~~ reasonable identification to make. Now let me just now I was going to show why this is not transitive. I am going to change this pattern slightly. Let's just pretend for a minute that this pattern is stated in such a way to be applicable to vehicles of a wide variety in other words up ~~with~~ with it you remember this stopped at ~~xxx~~ thirty but for the moment up with it. Let's suppose that it is good for speeds up to 45. It would have to be slightly changed. Now under those circumstances it would also be true that to be an identification between these ~~st~~ streets because you have vehicles moving at those speeds and if you ever had a building access at one ~~of~~ of those streets then

this sign detail would make sense in that case also. In other words if there were a building standing there access from that street. Now it is fairly clear that transitivity does not hold in this case because although that may be ~~a~~ identified with that and that may be identified with that it is very obvious that that may not be identified with that because they are functionally quite different and couldn't ~~a~~ under any circumstances be considered as being the same sort of part. So that is the simplest case of non transitivity that I can give you. The thing that I was doing here was also a case of non transitivity the living room window may be identified with window in the ~~metal~~ metal window pattern The window in the metal window pattern may be identified with the obscure glass thing here but that may not be identified with that. That's what non transitivity means those are all cases where this ~~bes bes~~ breaks down that is not ~~ses~~ true.

Question:

Reply: ~~al~~ ~~we~~ don't understand you bring it out. You are say that that is what ~~h~~ is happening here. Well that is the ~~thing~~ same as that. It is not just that that applies to that I mean that when those two patterns are used together that is to be identified with that. I may be - let me back off that. You may be saying something that is true but I don't completely get it. These two patterns are allowed to be brought into coincidence. These two patterns ~~as~~ are not. I have to ~~ssa~~ stop earleytoday because I have to take off. Next time ~~w~~ we will go off this memory thing.