TBTA Tutorial Lesson 11:
Relative Clause Rules
and Collocation Correction Rules

(video: [TBTA-11A Relativization Structures, Strategies, and Hierarchy](#))
(video: [TBTA-11B Collocation Correction Rules](#))

11.0 Introduction

In this lesson we're going to learn about two more types of rules in TBTA's transfer grammar: Relative Clause rules and Collocation Correction rules. TBTA's Relative Clause rules take advantage of the extensive typological research that linguists have done regarding relative clauses and the various strategies employed by the world's languages when constructing them (Comrie 1989:138, Givón 1990:645). Not all languages permit relative clauses, but the languages which do use relative clauses apply a limited number of strategies to a limited number of grammatical relations in what is commonly called the Relative Clause Hierarchy (Keenan & Comrie 1977, Comrie 1989:156). Linguists have found that there are two general types of relative clauses: restrictive relative clauses which serve to identify the nominal being modified (e.g., *The man that I saw yesterday is from Dallas*.), and descriptive relative clauses (also known as non-restrictive relative clauses) which provide additional information about a nominal that has already been identified (e.g., *John, whom I saw yesterday, is from Dallas*.). Relative clauses may be either embedded in the NP that contains the noun they modify, or they may be adjoined. Adjoined relative clauses are moved out of the NP that contains the noun they modify, and are adjoined to the sentence. If a language uses embedded relative clauses, they may be pre-nominal, post-nominal, or circum-nominal. If a language uses adjoined relative clauses, they are either sentence initial or sentence final.

11.1 Relative Clause Rules

To see TBTA's relative clause rules, go to the Lexicon and Grammar Development screen, and double click on the node in the grammar tree labeled 'Relativization Structures, Strategies, and Hierarchies.' You'll see a dialog with two tabs; the first tab is labeled 'Relative Clause Structures,' and the second tab is labeled Relativization Strategies and Hierarchy.' This dialog is shown below in Figure 11-1.
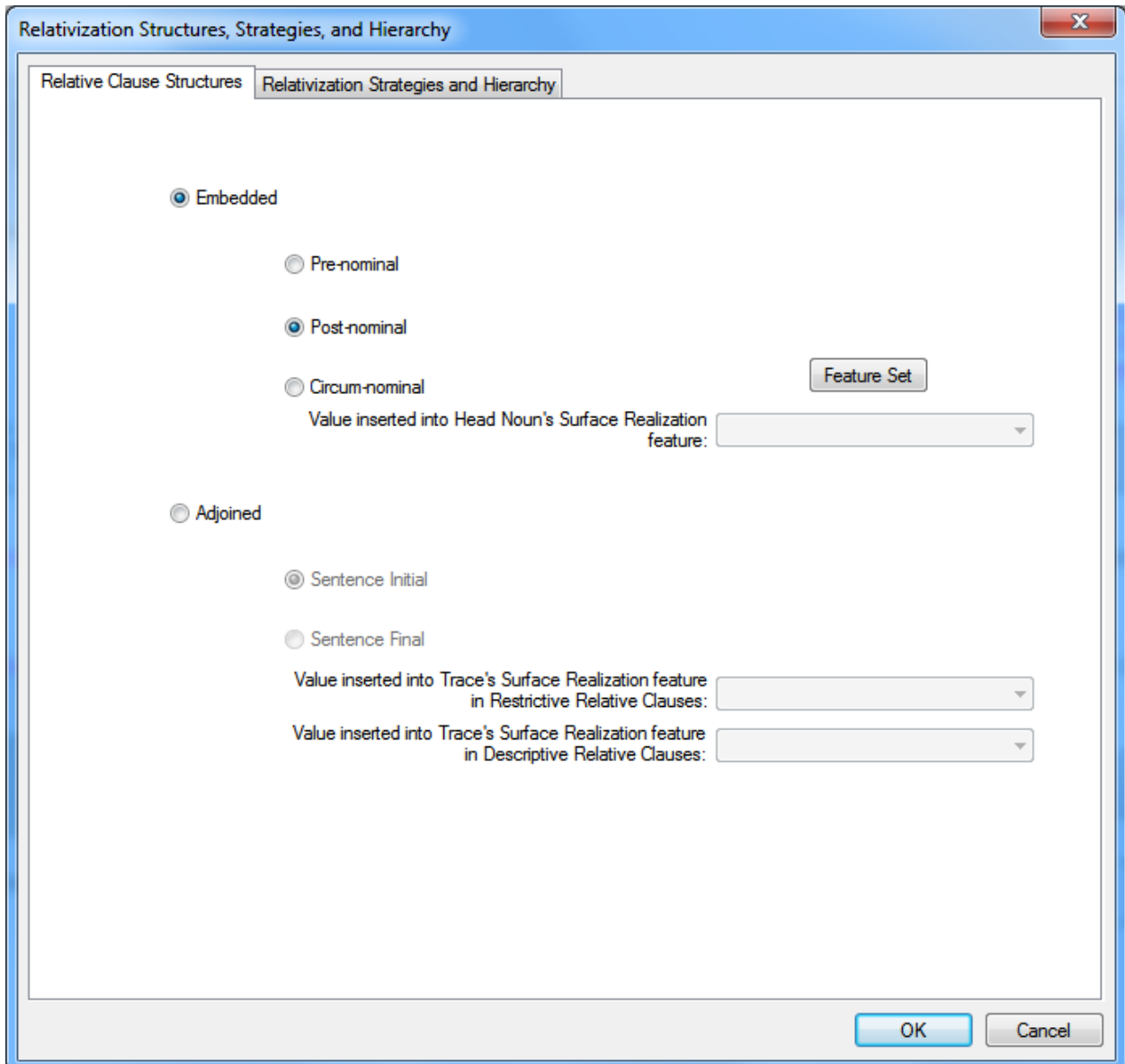
Figure 11-1. The Structures Tab of the Relativization Dialog

As seen in the dialog above, you can describe the type of relative clause that is employed by your language. The dialog shown above has values that have been entered for English relative clauses. As can be seen in this figure, the Embedded option has been selected because English uses embedded relative clauses, and the Post-Nominal option has been selected because English positions its relative clauses after the head noun. However, it's important to note that the phrase structure rules always determine the ordering of the constituents; the Pre-nominal, Post-nominal, Circum-nominal, Sentence Initial, and Sentence Final options on this dialog are here only so that you can accurately describe your language's relative clauses.

Languages that use adjoined relative clauses tend to encode the head nominal (the nominal in the main clause, not in the relative clause) with a special pronoun which is called a "trace." If you select the Adjoined option in this dialog, the two dropdowns

below the Adjoined radio button will be activated. You can then specify a feature value that will be inserted into the head noun's 'Surface Realization' feature. Select the Adjoined option now, and you'll see these two dropdowns activated. We need to define appropriate new values for the noun feature called 'Surface Realization,' so click on the button labeled 'Feature Set.' In the upper left dropdown of the Feature Set dialog, select Nouns, and in the Feature Name dropdown, select Surface Realization. Then enter two values so that your dialog looks like the one shown below in Figure 11-2.

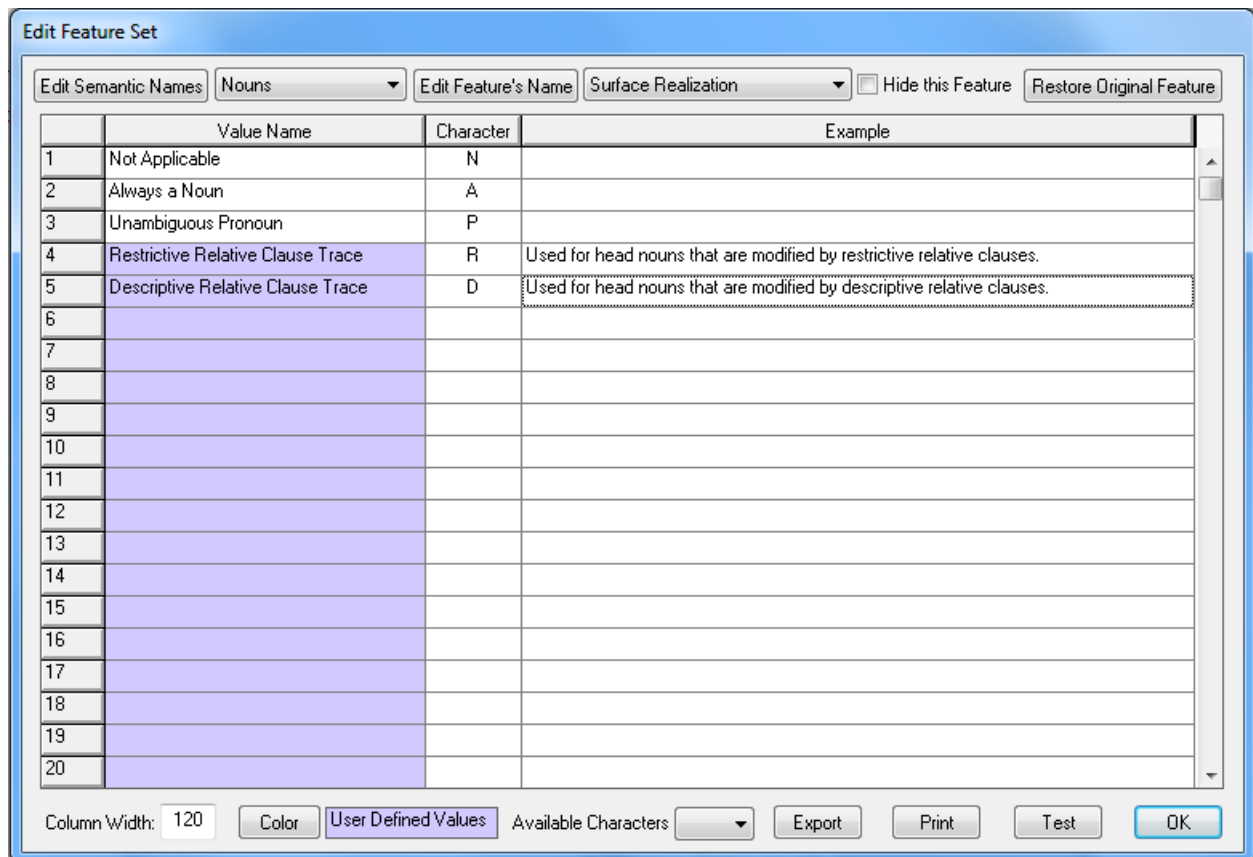|	Value Name	Character	Example
1	Not Applicable	N	
2	Always a Noun	A	
3	Unambiguous Pronoun	P	
4	Restrictive Relative Clause Trace	R	Used for head nouns that are modified by restrictive relative clauses.
5	Descriptive Relative Clause Trace	D	Used for head nouns that are modified by descriptive relative clauses.
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Figure 11-2. Feature Set Dialog with Values for Noun Surface Realization

After entering these two values, close this dialog, and select the two new values for the traces in the Relative Clause Structures dialog. Your Relative Clause Structures dialog should now look like the one shown in Figure 11-3.
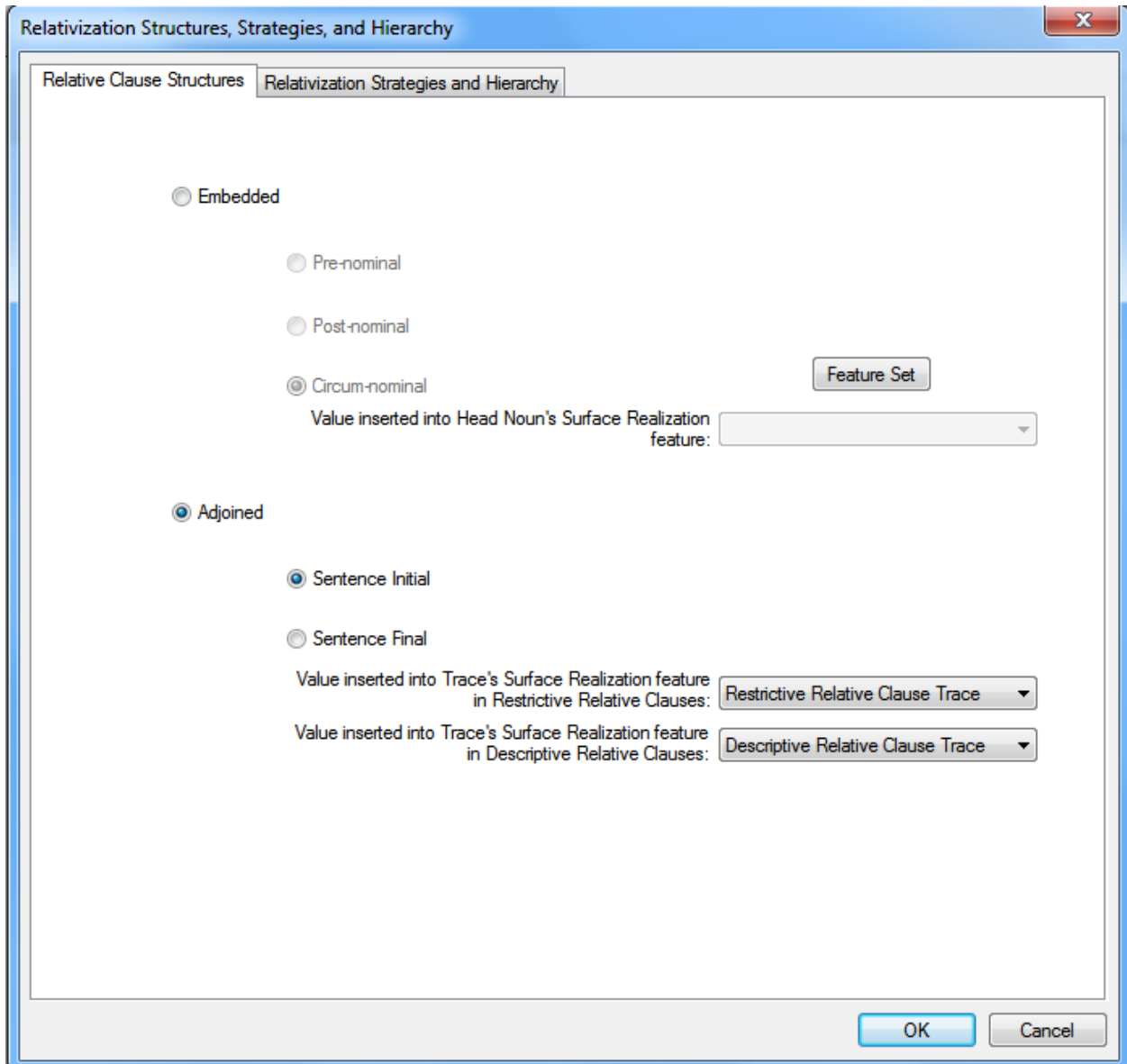
Figure 11-3. The Relative Clause Structures Dialog

Now let's test this rule by going to Clauses 1:35. That verse produces *John, who read a book, saw Mary.* In this sentence, the relative clause is descriptive, and you can see this in the popup when you rest the cursor on the relative clause's opening clause boundary. If you rest your cursor near the bottom of the relative clause's opening clause boundary, the popup will tell you that the relative clause was moved out of the NP to the main clause by the Relative Clause Structure rule. Then if you rest your cursor on the features below JOHN-A in the main clause (not in the relative clause), you'll see that its Surface Realization feature has been set to 'Descriptive Relative Clause Trace'; that's the feature value that you just defined in Figure 11-2 and selected in Figure 11-3. If you rest the cursor below the features, the popup says that the Surface Realization value was changed by the Descriptive Relative Clause Strategies

rule. You can then write a spellout rule for nouns that will use this value of Surface Realization and supply the appropriate morpheme.

After you've described the structure of your language's relative clauses, you're able to specify the strategies by selecting the Relativization Strategies and Hierarchy tab seen at the top of the dialog. The relativization hierarchy and strategies tab is shown below in Figure 11-4. Similar to the dialog above, the dialog below has the pertinent values selected for English relative clauses.
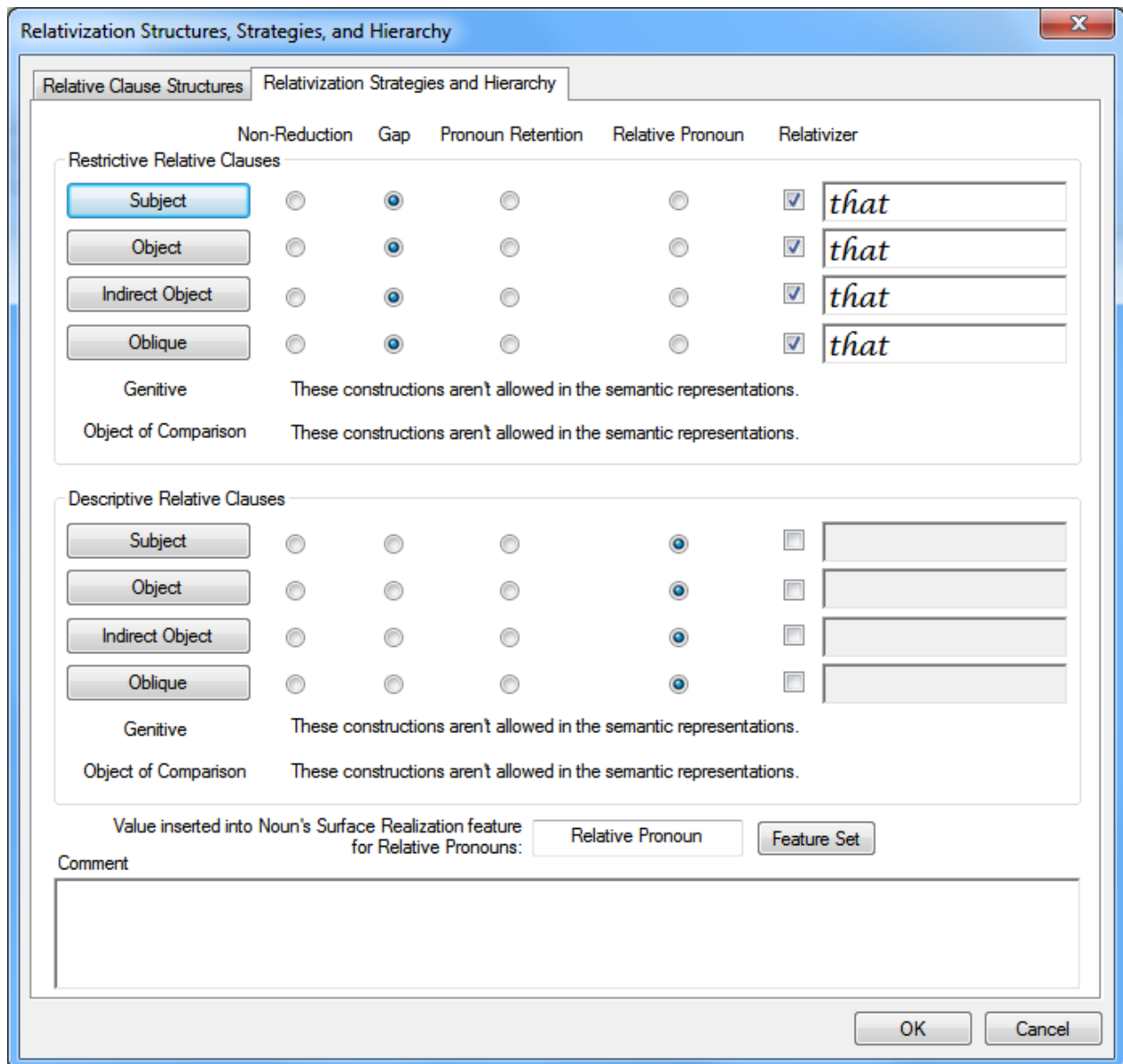

Figure 11-4. The Strategies and Hierarchy Tab of the Relativization Dialog

As seen in the figure above, there are two general categories of relative clauses: restrictive relative clauses, and descriptive relative clauses. Both types of relative clauses can be applied to nominals in the relativization hierarchy which is shown below:

Subject > Object > Indirect Object > Oblique > Possessor > Object of Comparison

The semantic representations in TBTA do not permit relative clauses to be formed on possessors (e.g., *The man whose house I bought lives in Dallas.*) or objects of comparison (e.g., *The man that John is taller than lives in Dallas.*) because many of the world's languages do not permit those constructions.

The typological research done with respect to relative clauses indicates that languages employ four different strategies for encoding NP$_{Rel}$ (NP$_{Rel}$ is the noun in the relative clause that is coreferential with the head noun):

- Non-Reduction strategy,
- Gap strategy,
- Pronoun Retention strategy, and
- Relative Pronoun strategy.

You can see these four strategies at the top of the dialog in Figure 11-4 above. You can specify which strategy is used at each position of the hierarchy for the two types of relative clauses. The dialog above also permits you to insert a relativizer into each relative clause. If you want to insert a relativizer for a particular position in the hierarchy, check the Relativizer box for that row, and then the corresponding text box will be enabled. Then you can enter the relativizer into the text box.

For each position in the relativization hierarchy, you need to specify the grammatical relations that are pertinent[1]. To do this, click on the button labeled Subject under Restrictive Relative Clauses. You'll see a dialog with noun phrase features, and you should select Subject in the Grammatical Relation column (This assumes that you activated the rule that adds grammatical relations to NPs in a previous tutorial. If you didn't activate that rule, close the relative clause dialog, double click on Feature Adjustment Rules in the grammar tree, click on the button labeled 'Add New Features,' and activate rows 1, 2, 3, 5, and 6.). Repeat this process for all of the grammatical relations. For the Oblique row, select Oblique 1, 2, 3, and 4 in the NP features dialog. Then repeat this process with all of the grammatical relations under Descriptive Relative Clauses.

Let's test these rules by going to Clauses 1:24 which produces *The man that saw John saw Mary.* These relative clause rules are executed before the semantic representation is displayed; you don't need to click the Generate button. When you look in the large window that shows the semantic representation, you'll see that the relativizer *that* has been inserted at the beginning of the relative clause. If you rest your cursor on *that*, you'll see a popup which says that the relativizer was inserted by the Subject Descriptive Relative Clause Strategy row. Now rest your cursor on the opening phrase boundary for MAN-A in the relative clause. In the popup you'll see that the feature called Relativized has been set to Yes. Rest your cursor near the bottom of that opening phrase boundary, and you'll see that the Relativized feature was changed from No to Yes by the Feature Adjustment rules. In the semantic representation you'll also

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[1] You may be wondering why this is necessary. Later, after your grammar is well developed, you may have multiple types of Subjects. For example, you might have "Subject of Unergative," "Subject of Unaccusative," "Subject of Transitive," etc. You may also have multiple types of Obliques such as "Temporal Oblique," "Locative Oblique," etc. So you need to specify all of the grammatical relations that you want to participate in each row of the relativization strategies.

see that the target word below NP_{Rel}, which is *man*, has been deleted. If you rest your cursor below the features of MAN-A in the relative clause, you'll see that *man* was deleted by the Subject row of the Restrictive Relative Clause Strategies. If any of your source concepts are not linked to target words, enter the target words and then click the Generate button. You should see *The man see John that see Mary* (you may need to turn off some of your word morphophonemic rules that modify articles from a previous tutorial). If you rest your cursor on the Relativizer, you'll see that it was inserted at the end of the relative clause by the clause phrase structure rule. Let's update our clause phrase structure rule so that it positions the Relativizer at the beginning of the clause. Then generate your verse again, and you should see *The man that see John see Mary.* In order to get the past tense form of *see*, we need to go back and modify our spellout rule that selects the Past Tense form of verbs. Open that spellout rule, and you'll see that it is looking for a verb Time value of Discourse (this rule was written in a previous tutorial). Let's modify this rule so that it is looking for a 'Target Tense & Form' value of Past. To do this, click on the Features button located on the spellout rule, and then select Past in the 'Target Tense & Form column.' Save the rule, and generate this verse again. You should now see *The man that saw John saw Mary.*

In certain cases additional rules are necessary to make very specific changes to particular relative clauses. For example, English relative clauses that modify a place use *where* as the relativizer (e.g., *The hospital <u>where</u> I was born is in Eugene, Oregon*). Similarly English relative clauses that modify a time use *when* as the relativizer (e.g., *The year <u>when</u> Neil Armstrong walked on the moon was 1969*). The dialog shown above inserts only the most generic relativizer *that*, then subsequent rules change the generic relativizer to a specific relativizer.

If your language uses the Relative Pronoun strategy at any point on the relativization hierarchy, you must specify the value that will be inserted into the noun's Surface Realization feature (the value Relative Pronoun has been entered in Figure 11-4). Then when the spellout rules are executed, that feature can be inspected and a rule will generate the appropriate surface form of the relative pronoun.

11.2 Collocation Correction Rules

Collocation deals with how words go together, and how words and phrases attract other words and co-occur with certain grammatical choices. Even though the semantic representations consist of only semantically simple concepts, collocation is still a problem that must be dealt with. Collocation correction rules were added to TBTA in order to handle this issue. The general purpose of collocation correction rules is to change one target word to another target word in a particular context. The most common use of collocation correction rules is with adpositions – changing one target preposition or postposition to another preposition or postposition based on the context.

To enter a collocation correction rule, let's begin by going to Community Documents, Infected Eye 1:2. The last proposition produces *Is some sand in my eyes?* However, the adposition in that proposition is ON-B, which is defined as "on the surface of something (not necessarily the top)." Find the adposition ON-B in that proposition, and rest your cursor on it. The popup will show the definition for ON-B. But English speakers don't generally talk about things being <u>on</u> their eyes, instead we talk about

things being <u>in</u> our eyes, even though the object is literally on the surface of our eye. Link ON-B to *on* because in most cases you'll want ON-B translated with *on*. But now we need to write a collocation correction rule that will change the target word *on* to *in* whenever the context is ON-B EYE-A. To see the collocation correction rule for ON-B, right click on it in the semantic representation, and select the menu option 'Edit this Concept's Collocation Correction Rule.' You'll then see the dialog shown below in Figure 11-5.

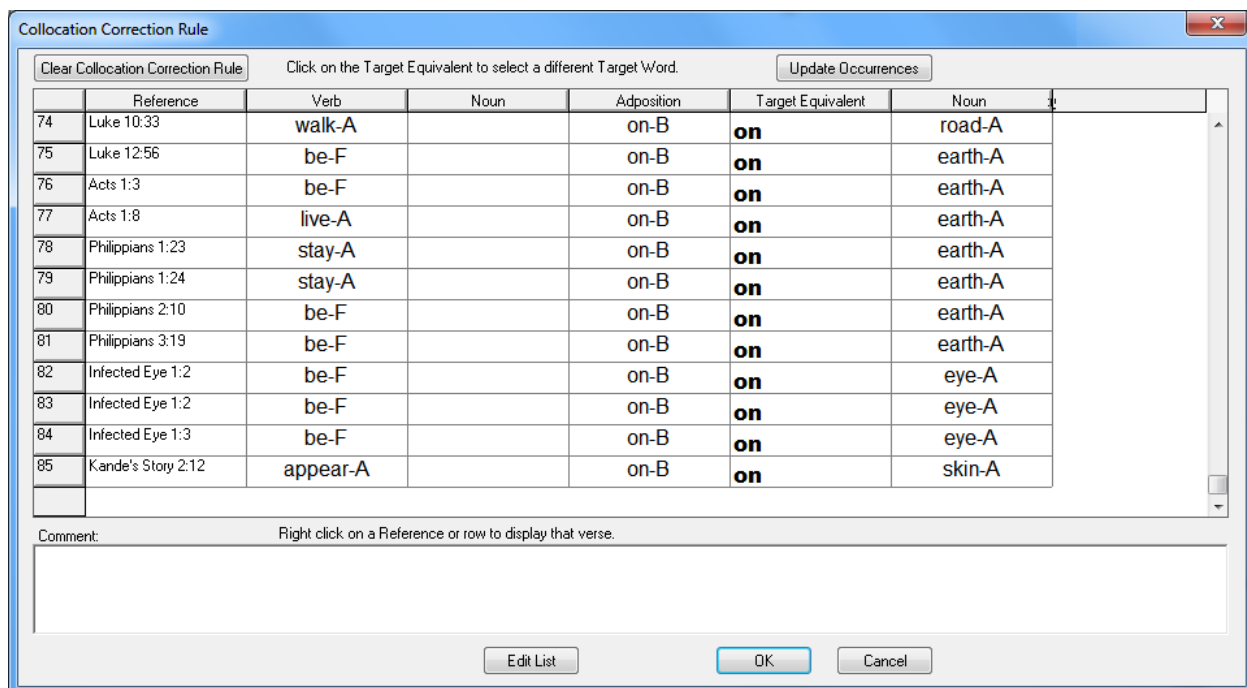|	Reference	Verb	Noun	Adposition	Target Equivalent	Noun	
74	Luke 10:33	walk-A		on-B	on	road-A	
75	Luke 12:56	be-F		on-B	on	earth-A	
76	Acts 1:3	be-F		on-B	on	earth-A	
77	Acts 1:8	live-A		on-B	on	earth-A	
78	Philippians 1:23	stay-A		on-B	on	earth-A	
79	Philippians 1:24	stay-A		on-B	on	earth-A	
80	Philippians 2:10	be-F		on-B	on	earth-A	
81	Philippians 3:19	be-F		on-B	on	earth-A	
82	Infected Eye 1:2	be-F		on-B	on	eye-A	
83	Infected Eye 1:2	be-F		on-B	on	eye-A	
84	Infected Eye 1:3	be-F		on-B	on	eye-A	
85	Kande's Story 2:12	appear-A		on-B	on	skin-A	

Figure 11-5. Collocation Correction Rule for ON-B

The table on this dialog contains an exhaustive list of all the occurrences of ON-B in the semantic representations. In the first column of the table, you see references showing where each occurrence is located. Scroll down to the bottom of the table so that you'll see the occurrences of ON-B in Infected Eye 1:2. You'll see that there are two occurrences of ON-B in this verse, both of them are in propositions with BE-F (the locative sense of BE) and EYE-A. We want to use the English preposition *in* whenever ON-B is in an environment consisting of BE-F and EYE-A. To make this change, simply click on *on* in the Target Equivalent column in one of the rows with BE-F and EYE-A. You'll then see a new dialog asking you to select a target word. If you open the dropdown on that dialog, you'll see that we haven't yet entered the English preposition *in*, so enter it now by clicking the New Word button. You'll then see *in* selected in the dropdown, so click OK. Your collocation correction rule dialog should now look like the one shown below in Figure 11-6.
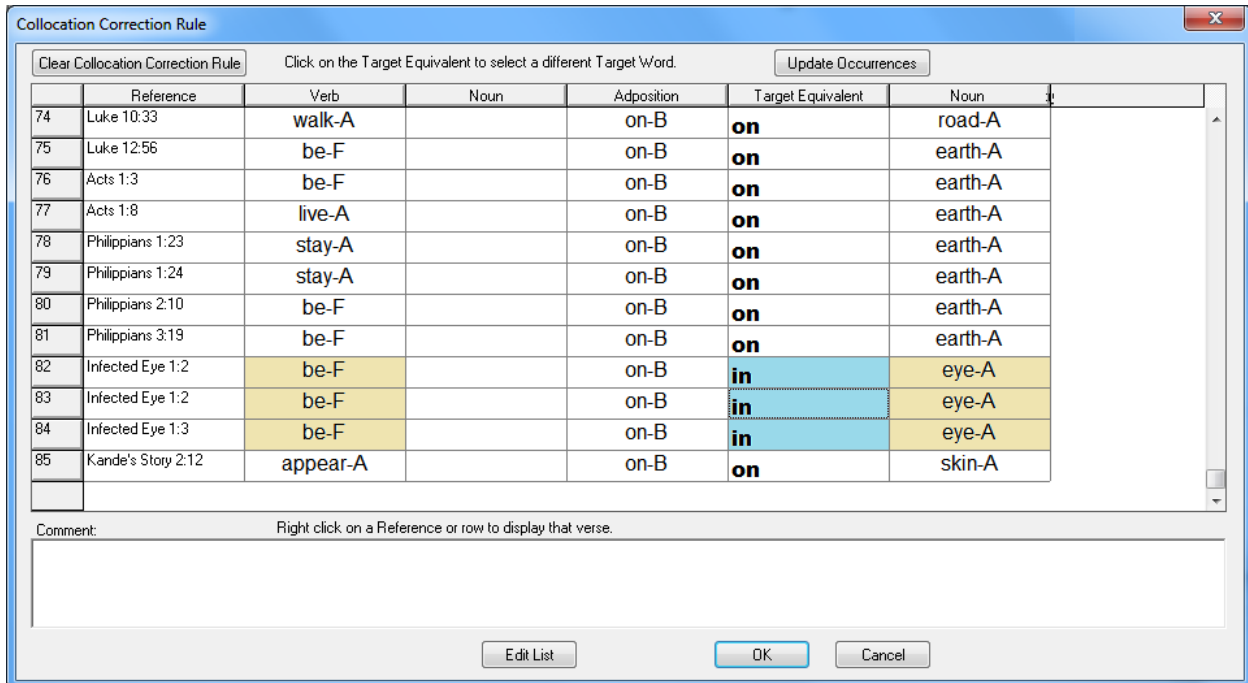
Figure 11-6. Collocation Correction Rule Changes *on* to *in*

You'll see that all three occurrences of *on* that are in the environment BE-F EYE-A are immediately changed to *in*, and you'll see both BE-F and EYE-A highlighted in yellow in all three rows, and you'll see *in* highlighted in blue in all three rows. When you change one target word to another target word, TBTA initially assumes that all the concepts in the row you selected are relevant. So it will highlight in yellow all the concepts in rows that match the row you clicked. Now close this collocation correction rule dialog, and look at the semantic representation for Infected Eye 1:2 again. You'll see that both occurrences of ON-B in this verse are now linked to the target word *in* (you don't have to click the Generate button; the collocation correction rules are executed before the semantic representation is displayed). Rest your cursor on either occurrence of *in*, and you'll see a popup which says that *on* was changed to *in* by the collocation correction rule for ON-B.

Right click on ON-B again, and open the collocation correction rule again. Scroll down to the bottom so that you'll see the three rows that change *on* to *in*. As was mentioned earlier, TBTA assumes that all the concepts in the row that you clicked on are required in order to change *on* to *in*. But suppose that you want to change *on* to *in* whenever the verb is BE-F, regardless of what the accompanying noun is. In order to indicate that EYE-A isn't relevant for this change, click on EYE-A in one of those three rows. Now TBTA will change *on* to *in* whenever the verb is BE-F because now BE-F is the only word highlighted in yellow. You can scroll the table upward and you'll see that whenever BE-F is the verb, this rule will change *on* to *in*. If you now click on an occurrence of BE-F, it will be deselected also, and you'll see that every occurrence of *on* is now changed to *in* throughout the table. Since we don't want this, go back to the bottom of the table and click on both BE-F and EYE-A. You'll then see that only rows containing both BE-F and EYE-A will change *on* to *in*.

Now let's look at a collocation correction rule for a verb such as WALK-A. Go to Verbs 1:21 which produces *John did not walk.* Generally languages use a grammatical process to indicate the negation of a particular action. For example, English inserts the word *not* as in *John did not walk.* But many languages also have a few pairs of verbs for particular events, one verb being used when the polarity is affirmative, the other verb being used when the polarity is negated. Collocation correction rules can handle these situations also. For example, let's write a collocation correction rule that will insert the target verb *notwalk* whenever the polarity of WALK is Negative. In Verbs 1:21, rest your cursor on the features below WALK, and you'll see that Polarity is Negative. Right click on WALK and select the menu option 'Edit this Concept's Collocation Correction Rule.' You'll see a dialog listing all the occurrences of WALK in the semantic representations. In this table you see that WALK always has an Agent, and sometimes it also has a Source and/or a Destination. One column in this table is labeled Polarity. The tables in collocation correction rules for events always include one column for Topic NP and one column for Polarity. If your language uses one verb when a particular event is active, and another verb when the same event is passive, you could write a collocation correction rule for that event and use the Topic NP column. But it's much more common for languages to use a different verb when the polarity is negative, so we'll write a rule for that situation now. Scroll the table downward and you'll see that there is only one occurrence of WALK with Negative Polarity in the semantic representations, Verbs 1:21. Scroll to that row, and then click on the Target Equivalent cell in that row. You'll again see a dialog with a dropdown containing all of your target verbs. For this example, let's enter a new target verb *notwalk* into the lexicon. Click the New Word button and enter *notwalk*. Then close that dialog and you'll see *notwalk* appear in many rows throughout the table. When you specify a new target verb in a collocation correction rule, TBTA initially assumes that you want the change because of the other concepts in the environment. So it will look at the arguments in the row that you selected, and assume that all of those arguments are pertinent to your rule. So in this particular case, TBTA will see JOHN-A in the Agent column, and it will assume that whenever JOHN-A is the Agent of WALK-A, you want to use the target verb *notwalk*. But in this particular situation, we want to change *walk* to *notwalk* only when Polarity is Negative. Therefore this rule doesn't have anything to do with JOHN-A or any other nominal arguments. To correct this situation, click on the Polarity cell that contains the word Negative. Then, to deselect JOHN-A, click on its cell and you'll see its background return to white. TBTA now knows that you want to change *walk* to *notwalk* whenever the Polarity is Negative. Your collocation correction rule should now look like the one shown below in Figure 11-7.

Collocation Correction Rule

	Reference	Topic NP	Polarity	Agent	Verb	Target Equivalent	Source	Destination
25	Verbs 1:12	Most Agent-like	Affirmative	John-A	walk-A	walk		
26	Verbs 1:13	Most Agent-like	Affirmative	John-A	walk-A	walk		
27	Verbs 1:14	Most Agent-like	Affirmative	John-A	walk-A	walk		
28	Verbs 1:15	Most Agent-like	Affirmative	John-A	walk-A	walk		
29	Verbs 1:16	Most Agent-like	Affirmative	John-A	walk-A	walk		
30	Verbs 1:17	Most Agent-like	Affirmative	John-A	walk-A	walk		
31	Verbs 1:18	Most Agent-like	Affirmative	John-A	walk-A	walk		
32	Verbs 1:19	Most Agent-like	Affirmative	John-A	walk-A	walk		
33	Verbs 1:20	Most Agent-like	Affirmative	John-A	walk-A	walk		
34	Verbs 1:21	Most Agent-like	Negative	John-A	walk-A	notwalk		
35	Verbs 1:22	Most Agent-like	Emphatic Affirmative	John-A	walk-A	walk		
36	Verbs 1:23	Most Agent-like	Emphatic Negative	John-A	walk-A	walk		
37	Verbs 1:25	Most Agent-like	Affirmative	John-A	walk-A	walk		

Clear Collocation Correction Rule   Click on the Target Equivalent to select a different Target Word.   Update Occurrences

Comment: Right click on a Reference or row to display that verse.
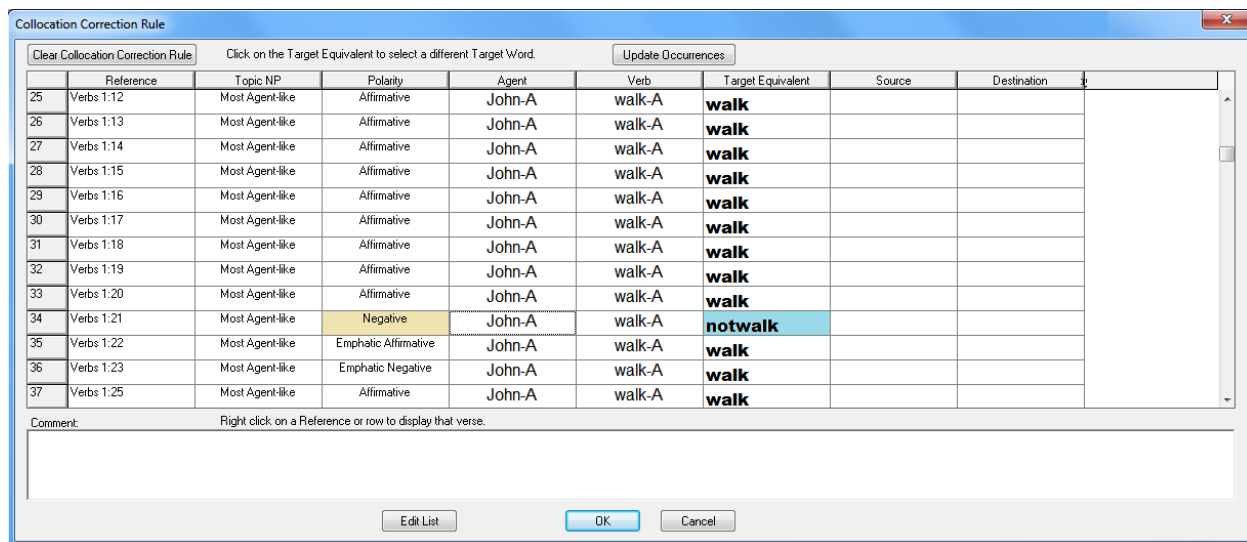
Edit List   OK   Cancel

Figure 11-7. Collocation Correction Rule using Polarity

Close this dialog by clicking the OK button, and you'll see that *notwalk* appears below WALK-A in Verbs 1:21. If you rest your cursor on *notwalk*, you'll see a popup saying that *walk* was changed to *notwalk* by your collocation correction rule.

When you write collocation correction rules for concepts in other semantic categories, the tables will contain information relevant to the particular semantic category you selected. For example, go to Adjectives 1:19, and right click on AFRAID-A. Select the menu option 'Edit this Concept's Collocation Correction Rule,' and you'll see the collocation correction dialog for AFRAID-A. The first column will again contain the Reference of each occurrence of AFRAID-A in the semantic representations. But since AFRAID is an object attribute rather than an event, you'll see one column indicating the Degree, and the other columns will indicate the possible arguments for AFRAID. So the columns in this table are different from the columns you saw when writing collocation correction rules for verbs or adpositions. Although the columns in the tables are different for each semantic category, you always enter collocation correction rules in the exact same way. You begin by clicking in the Target Equivalent cell in a particular row. Then you specify the new target word. Then you select the pertinent cells in that row and deselect the irrelevant cells in that same row. Then when you're at the Lexicon and Grammar Development screen, you'll see that all of your collocation correction rules are executed even before the verse's semantic representation is displayed.

11.3 Conclusions

In this tutorial you learned how to use the Relative Clause rules and the Collocation Correction rules. The Relative Clause rules consist of a single dialog with two tabs. In the first tab, you describe the structure of your language's relative clauses, but it's important to remember that the final word order in your target language sentences is always determined by the phrase structure rules. So if you describe your relative clauses as Embedded and Prenominal, you still need to modify your NP phrase structure rule so that it positions the relative clauses before the head noun. Or if you describe your relative clauses as Adjoined and Sentence-Initial, you still need to modify

your clause phrase structure rule so that it positions the relative clauses at the beginning of the sentence. In the second tab of the relative clause rules dialog, you can specify which strategy is used at each position in the Relativization Hierarchy for both restrictive and descriptive relative clauses. You may also insert relativizers in that tab.

The collocation correction rules are used to change one target word to another target word based on the context. Undoubtedly you'll need to write many collocation correction rules for your adpositions.