Tallying Reference Errors in Narrative (TREIN): A tool for assessing expressive discourse capacity in children.

The ability to create effective expressive discourse enables children to be successful at many social and academic tasks on a daily basis. The ability to produce grammatically correct sentences is a skill that will support effective expressive discourse, but it is not sufficient for managing the efficient flow of information to meet the processing needs of listeners in many discourse situations. *Tallying Reference Errors in Narrative* (TREIN) is an analysis protocol designed to quantify discourse level behaviors that help or hinder efficient information flow in narrative discourse by children. Two central constructs are quantified by a TREIN analysis: 1) how effectively children manage the *introduction* of concepts into a narrative, and 2) how effectively they maintain *reference ties* (Halliday & Hasan, 1976) to those concepts as the narrative develops. To understand the TREIN, we will first examine the introduction of concepts into a narrative and how to code strategies commonly used by children, and then follow this with a discussion of how reference ties to concept are achieved and coded.

In English, concepts can be *introduce*d into a narrative in a limited number of ways which will vary according to the discourse context in which the narrative is embedded. Likewise, there are a limited number of strategies in English for *making reference ties* to concepts that have been introduced into a narrative that will also vary according to the discourse context. The TREIN protocol utilizes a very carefully specified discourse context in order make the impact of certain introduction and reference strategies predictable. This carefully controlled discourse context allows clinicians and researchers using the TREIN to distinguish between appropriate and inappropriate strategies when they occur in the narratives of children. The pattern of use of appropriate and inappropriate discourse strategies as defined in the TREIN protocol therefore becomes a proxy measure of a child's capacity for producing effective and efficient expressive discourse that can be considered separately from their ability to produce grammatical sentences.

The TREIN narrative Context

The TREIN protocol utilizes a story generation task to generate a narrative discourse for analysis. The task has the child look through a series of wordless story pictures, and then the child uses those pictures as prompts while they tell a narrative to a listener that is (presumably) unfamiliar with the pictures and unable to see them while the narrative unfolds. This discourse context emphasizes the need for the narrator to carefully track the difference between their own knowledge of the story (provided by their access to the story pictures), and that of their listener who only has the verbal narrative produced so far with which to form an understanding of narrative concepts. It requires the narrator to avoid introduction and reference strategies that would only be appropriate in a context where both narrator and listener could see the story pictures (e.g., pointing to pictured concepts). By not allowing both the listener and narrator to have the same degree of access to the story pictures, this task limits appropriate strategies for introduction and reference to concepts to the spoken modality, making it unnecessary to quantify non-linguistic strategies in the discourse.

Table 1. TREIN Codes overview (see glossary for definitions of terms)

Introduction Codes	
+ [indefintro]	Indefinite introduction of concept (explicit addition of concept)
+ [defintro]	Definite introduction of concept with supporting contextual factors. (endophoric, implicit concept made explicit)
+ [possintro]	Possessive introduction of concept. (endophoric)
- [ambigintro]	Ambiguous introduction of concept using a definite form not supported by contextual factors. (exophoric) Also used for an inappropriate use of an indefinite form (aphoric, see example 12b, 18c).
- [pnintro]	Pronominal introduction of concept. (exophoric, or aphoric—see examples 3b.2, and 10)
Reference Tie Codes	
+ [ntie]	Clear referential tie using nominal form. (endophoric, either anaphoric or cataphoric)
- [ambigntie]	Ambiguous referential tie using nominal form. (bi/multiphoric: also mislabeling available concepts: "dog" for FROG)
+ [pntie]	Clear referential tie using pronominal form. (endophoric)
- [ambigpntie]	Ambiguous referential tie using pronominal form. (biphoric/ multiphoric)

+ indicates an appropriate strategy.
- indicates an inappropriate strategy in the TREIN narrative context.

Codes for the process of introducing concepts into the narrative
[indefintro] – used to indicate that an indefinite form has been used to clearly introduce a concept. This is the prototypical introduction format in a TREIN narrative context.

[defintro] – used to indicate that a definite form has been used to *clearly* introduce a concept. *This will always involve contextual support of some type*. This contextual support may include the existence of a strongly associated concept, or the fact that the concept is one that is assumed in most contexts.

[possintro] – used to indicate that a possessive form has been used to *clearly* introduce a concept. *This will always involve contextual support*. This contextual support will be a possessive relationship between the new concept and a concept *already introduced* into the narrative. This code is also used when a verbal concept is introduced using a nominal form (e.g., "the dog's barking," "the boy's yelling," or "the frog's croaking").

[ambigintro] – used to indicate that a full nominal form has been used to introduce a concept in an ambiguous way that creates extra processing for the listener and could reasonably lead to questions of the form "Who is ____?" "Which ____?" "What ____?" etc. This code will be used when definite forms (including proper nouns) are used to introduce concepts into the story without proper contextual support (e.g., exophoric, picture-bound reference). This code is used when the narrator switches to related but non-

equivalent noun forms when referencing (e.g., switching between "Tommy" and a new name, or "jar" and "bottle"). It is also used when an indefinite form is used in an attempt to make a referential tie to an already introduced concept (e.g., "*A boy* has a dog. *A boy* has a frog" with only one BOY). Exophoric, picture-bound reference strategies are the prototypical ambiguous introduction strategy in the TREIN discourse context.

[pnintro] – used to indicate that a concept has been introduced using either a personal or possessive pronoun. This type of introduction is always ambiguous.

Codes for referential ties to concepts already available in the narrative
[ntie] – used to indicate that a nominal form has been used as an unambiguous reference tie to a concept already introduced into the narrative.

[pntie] – used to indicate that a pronominal form has been used as an unambiguous reference tie to a concept already introduced into the narrative

Note: these codes are used for any *clear referential tie* to a concept in the narrative whether or not the *introduction* of the particular concept being reference was ambiguous. If the coder can clearly determine which concept is being referred to, even if that concept's introduction was coded as ambiguous, then the reference is coded using [pntie] or [ntie] (e.g., "The dog[ambigintro] didn't think he[pntie] liked the frog.")

[ambigntie] – used to indicate that a nominal reference tie is ambiguous (e.g.," It was 2 frogs[indefintro]. The frog[ambigntie] ran). This includes mislabeling between two existing concepts (e.g., "the dog escaped the jar" used to tie to FROG when both DOG and FROG exist in the narrative) *The coder should use information available in the story pictures* to determine if a form is an ambiguous reference to an existing concept, or an ambiguous introduction of a new concepts (e.g., does "tree"=TREE? or NEW TREE?).

[ambigpntie] – used to indicate that a pronominal reference to a concept in the narrative is ambiguous.

Note: ambiguous reference ties are ambiguous because they do not form a clear tie to a single existing concept. They form ties to more than one concept without a clear indication of which concept is intended (they are *biphoric* or *multiphoric* since they point to more than one possible referent). This includes mislabeling between two existing concepts (leading to the listener asking, e.g.,"wasn't it the *frog* in the jar, not the *dog*?").

Introducing Concepts into the Narrative in the TREIN task
Each of the appropriate and inappropriate discourse strategies available for narrators in the TREIN task is discussed below with instructions for how to code its use. Concepts will always be written in ALL CAPS. Linguistic forms used to introduce or refer to CONCEPTS will be placed between quotation marks like this: "word." Codes for analysis will appear between square brackets like this: [code]. *Italics* indicate parts of a larger example that demonstrate a particular construct in the TREIN. The glossary at the end of this document provides definitions for important terms in this discussion.

1) Events/processes/attributes can be introduced into a TREIN narrative with a verb or modifier complex. When this strategy is used, there is no need for a special code, but the coder should take note of the processes/events/attributes that have been introduced in this way. These may be referenced later in the narrative and will play a role in the coding of reference ties (see 16 below). Note that there are modifier complexes that contain nominals. Examples include "He looked *everywhere/outside*," which modify the direction, path, or location of LOOK, or "He didn't find *anything*," "There was *nothing* to find," which modify the success dimension of FIND. Since these nonspecific nominals serve primarily to modify the verb, they will not be coded (also, "nowhere," "anywhere," "all around," "anything," etc.).

2) Objects, places, and characters can be introduced into a TREIN narrative using an indefinite nominal complex. These typically involve a determiner (a/this) and a noun (frog/boy); as in the following opening sentence of a narrative.

Example 1: "There was this boy with a frog."

In this example, "This boy" introduces the concept BOY into the narrative, while "a frog" introduces the concept FROG. The use of the indefinite forms here indicates that the child recognizes the need to signal to the listener that these concepts are new concepts and not available in memory. Each concept would be coded as [indefintro], short for *indefinite introduction*. The code would accompany the core noun in each nominal complex as shown below.

Coded example 1: There was this boy[indefintro] with a frog[indefintro].

2.1 More complicated versions of indefinite nominal complexes are possible, but the same principle applies to their coding.

Example 2a: "A little boy was looking at a frog that he kept in a jar."

In this example, BOY is introduced using "a little boy," FROG is introduced using "a frog" with an attached restrictive relative clause "that he kept in a jar." These types of sentences are more complicated because multiple concepts are being introduced in integrated ways. For instance, the concept JAR is introduced as part of the relative clause that restricts the concept of FROG in terms of the concept of KEEPING. These complications do not impact how the introduction code is applied, but allow the more complex concept to be referred to later in the narrative (e.g., a reference tie can be made to FROG KEPT IN JAR, to distinguish it from some other FROG).

Coded example 2a: A little boy[indefintro] was looking at a frog[indefintro] that he kept in a jar[indefintro].

Notice again, that the code accompanies the central noun in each nominal complex.

2.2 Another example of how restrictive relative clauses work involves vague indefinite nominal forms such as “something” or “everything.” Consider this example.

Example 2b: “A little boy was looking at something that he kept in a jar.”

In this case the restrictive relative clause limits what the SOMETHING can be to things that can be KEPT IN A JAR. The example would be coded like this.

Coded example 2b: A little boy[indefintro] was looking at something[indefintro] that he kept in a jar[indefintro].

Notice that “something” has the indefinite determiner morpheme “some” embedded in its form. It is always an indefinite form (as is “everything”).

2.3 Some concepts are introduced using what are known as mass nouns. Mass nouns may or may not have a determiner attached to them when introducing concepts. Example 2c shows both types of mass noun phrases.

Example 2c: “A boy was using some moonlight to look at a frog in a jar. Fresh air was all around.”

The mass noun concept MOONLIGHT is introduced using an indefinite form “some moonlight” in the first sentence. Notice, that the meaning would not be changed very much if the determiner “some” were removed. In the second sentence, the mass noun concept AIR is introduced without a determiner using the form “air.” Both mass noun concepts are clearly introduced using an indefinite form and are coded accordingly.

Coded example 2c: “A boy[indefintro] was using some moonlight[indefintro] to look at a frog[indefintro] in a jar[indefintro]. Fresh air[indefintro] was all around.”

2.4 A number term (one, seven, some, many, lots, dozens) used as a determiner is also indefinite as in example 2c. This is a variation on example 1.

Example 2d: “There was this boy with two pets.”
Coded Example 2d: There was this boy[indefintro] with two pets[indefintro].

3) A character, object, or place may be introduced into the narrative as part of a phrase containing a possessive determiner.

Example 3a: “A boy was looking at *his* frog.”

In this case the concept BOY is introduced as before using an indefinite form, but the concept FROG is now introduced using a definite possessive form “his frog.” Coding will reflect this difference using the code [possintro], short for *possessive introduction*.

Coded example 3a: A boy[indefintro] was looking at his frog[possintro].

3.1 The use of a definite possessive form to introduce a new concept requires that there is some contextual element that will support its use instead of an indefinite form. The contextual element in this case is existence of a BOY introduced earlier in the narrative. Since BOY has been introduced, it can serve as a contextual support for the use of the possessive form that introduces FROG. If BOY has not been introduced, then coding will proceed differently. For this example, assume this is the first sentence in the story.

Example 3b: "His frog is in a jar."

In this example, since BOY has not been clearly introduced, the listener has no contextual support to help determine who the possessor on the other end of the "his" relationship is. This makes the use of the possessive form inappropriate since it creates ambiguity for the listener as they have to ask "Whose frog?" Coding will reflect this ambiguity using the code [ambigintro], short for *ambiguous introduction* (see 7 below for further discussion).

Coded example 3b.1: His frog[ambigintro] is in a jar[indefintro].

Because the form "his" also introduces a concept (however poorly), it too must carry a code to indicate that it has introduced the concept MALE ENTITY THAT POSSESSES. Since "his" is a pronoun form, the code will reflect that using the code [pnintro], short for *pronominal introduction*. Pronominal introduction is an example of an inappropriate ambiguous introduction strategy (see 10 below for more discussion).

Codes example 3b.2: His[pnintro] frog[ambigintro] is in a jar[indefintro].

3.2 A variation on this possessive introduction strategy will involve the use of proper nouns, as in the following example.

Example 3c: "Once there was a boy. Tommy was his name."

In this case, the concept NAME and the concept TOMMY are both introduced in their own right despite the fact that they refer to a single entity BOY NAMED TOMMY. Both forms will carry introduction codes of their own.

Coded example 3c: Once there was a boy[indefintro]. Tommy[defintro] was his name[possintro].

This example requires the use of a new code,[defintro] which is short for *definite introduction*. The use of [defintro] is further explained in 5, below. Notice that you can reverse the order of "Tommy" and "his name" in example 3c. This will not impact the coding of the elements.

Coded example 3d: Once there was a boy[indefintro]. His name[possintro] was Tommy[defintro].

3.3 An indefinite introduction can occur in coordination with a possessive introduction as in the next example.

Example 3e. "A boy looked into a frog's jar."
Coded example 3e: A boy[indefintro] looked into a frog's[indefintro] jar[possintro].

4) Characters, objects, and places might be introduced using an indefinite nominal complex that includes a proper name.

Example 4: "A boy named Tommy had a frog named Froggie in a jar."

These are coded just as the examples in 3.

Coded example 4: A boy[indefintro] named Tommy[defintro] had a frog[indefintro] named Froggie[defintro] in a jar[indefintro].

Notice that the [indefintro] code accompanies the simple noun and the [defintro] code accompanies the proper noun. Since the two forms both relate to the same story character concept BOY NAMED TOMMY, either term, "boy" or "Tommy," may provide a reference tie to that concept later in the narrative.

5) Certain concepts can be assumed in all, or most, contexts and can be introduced unambiguously using a definite nominal phrase (e.g., the sky, the ground, the floor).

Example 5a: "A boy was sitting on the floor looking at his new frog."

In this example, the concept FLOOR is introduced with a definite phrase "the floor," but since there is little chance of ambiguous interpretation (e.g., the listener wouldn't ask "which floor?"), the introduction is not ambiguous making this an appropriate strategy for introduction of the concept FLOOR. Coding simply reflects that a definite introduction has occurred. Like possessive introductions, which are a form of definite introduction, all definite introduction forms require that the context supports their use. For concepts with only one case in the real-world, or for concepts that are ubiquitous across contexts, knowledge of the real world provides sufficient contextual support for the use of a definite introduction strategy.

Coded example 5a: A boy[indefintro] was sitting on the floor[defintro] looking at his new frog[possintro].

5.1 Sometimes mass nouns can be used with a definite determiner to introduce concepts that can be assumed in most contexts. Example 5b is a variation on example 2c that uses a definite determiner with the mass noun "moonlight."

Example 5b: "A boy was sitting in the moonlight looking at a frog in a jar."

Since MOONLIGHT is a concept with, essentially, a single instantiation, the definite form “the moonlight” is not ambiguous and is coded as a definite introduction of the concept.

Coded example 5b: A boy[indefintro] was sitting in the moonlight[defintro] looking at a frog[indefintro] in a jar[indefintro].

6) Some concepts can be assumed in the presence of other concepts (e.g., rooms/doors/windows in a house, bees in a beehive, birds in a nest, water in a pond, trunk of a tree). So in the presence of the appropriate concept, these concepts can be introduced using a definite nominal phrase coded as [defintro].

Example 6a: “A boy was poking a beehive with a stick and got stung by the bees.”

This would be coded like this.

Coded example 6a: “A boy[indefintro] was poking a beehive[indefintro] with a stick[indefintro] and got stung by the bees[defintro].

Notice that coding would be different if the concept BEEHIVE was introduced differently.

Example 6b: “A boy was poking something with a stick and got stung by the bees.”

In this case the concept of BEEHIVE is introduced with the indefinite nominal form “something” which does not carry enough information for the listener to assume that bees will be present. The listener ends up the concept SOMETHING, which is vague or schematic, but not ambiguous (see Talmy, 2000a, p. 461). The sentence would be coded like this.

Coded example 6b: A boy[indefintro] was poking something[indefintro] with a stick[indefintro] and got stung by the bees[ambigintro].

The form “the bees” is ambiguous since the listener might need to ask “Which bees? Where did the bees come from?”

6.1 Mass nouns may also be assumed in some contexts, and may be introduced with either a definite (with “the”) or indefinite form (without a determiner). Example 6c is a variation of 6a that shows this option.

Example 6c: “A boy was poking a beehive with a stick and bees were everywhere.”

Coded example 6c: A boy[indefintro] was poking a beehive[indefintro] with a stick[indefintro] and bees[indefintro] were everywhere.

6.2 Remember that mass nouns without a determiner are always indefinite. Mass nouns may also have indefinite determiners (e.g., “some,” “any”) or definite determiners (e.g.,”the,” “that”), or even possessive determiners (e.g. “his,” “its”) associated with them. The determiner will determine which introduction code is used. If the mass noun has no determiner, it is an indefinite form and will carry the code [indefintro] (e.g., “trees[indefintro] were everywhere.”).

6.3 Some nouns (e.g., “family,” “swarm”) refer to collections without being mass nouns. These are nouns that refer to multipart entities that can be conceptualized as a unit. They take clear plural forms and will be accompanied by a determiner. Sometimes, however, a mass noun is used as a modifier in the nominal complex to help specify the nature of this type of count noun. Example 6d shows how this works with the noun “family.”

Example 6d: “A boy and his dog found a whole family of frogs.”

In this case, “family” introduces the concept of a related group of individuals, while “frogs,” used as a modifying mass noun, specifies the nature of the individual members of the group. Only the word “family’ carries a code despite the fact that both “family” and “frogs” may be used later to make a reference tie to the concept FAMILY OF FROGS without creating ambiguity. The prepositional phrase in “a whole family *of frogs*” is an example of a concept being introduced with a modifier complex. As noted in 1 above, the introduction of concepts in a modifier complex is not coded (see 16 below for more details).

Coded example 6d: A boy[indefintro] and his dog[possintro] found a whole family[indefintro] of frogs.

6.4 Once a group concept has been introduced, foregrounding or introduction of an individual member of that group might involve a numerical (e.g., “one,” “two”) or quantifying (“all,” “some”) form as in example 6e below. Assume that this example follows directly after 6d.

Example 6e: “One of the baby frogs was under a flower.”

The form “one” is used to indicate that an individual from the group has been singled out. The modifier element “baby” further designates which member of the group has been singled out. In the context of FAMILY OF FROGS, the concept BABY FROGS is not ambiguous and can be introduced with a definite form. The example would be coded as follows.

Coded example 6e: One[indefintro] of the baby frogs[defintro] was under a flower[indefintro].

Introducing Ambiguously

Sometimes children use inappropriate strategies for introducing concepts into a TREIN narrative. This will involve definite nominal phrases or pronouns. We have already seen a couple of examples ("His frog" in 3b.2, "the bees" in 6b). This is the behavior we are most interested in for this analysis. When children use definite introduction when an indefinite introduction would be more appropriate, it is coded as [ambigintro], short for *ambiguous introduction*. Notice from the discussion above that it is not always inappropriate to introduce concepts into the narrative with a definite form.

7) Introduction using a definite form asks the listener to move an implicit concept into the narrative explicitly and is appropriate only if there is some reason to assume that the listener already expects the concept being explicitly introduced to be implicit in the environment of the narrative. Definite forms signal the listener to look in memory for the concept rather than creating a new concept. If that concept is not one that can be assumed in the current narrative context, then the use of a definite form to introduce a concept into a TREIN narrative is ambiguous (i.e., exophoric introduction is inappropriate in the TREIN narrative context, while endophoric reference to an implicit concept can introduce that concept explicitly into the narrative). Example 7a demonstrates this with a variation on example 2a, the first sentence in a narrative.

Example 7a: "The little boy was looking at the frog that he kept in the jar."

The use of definite forms indicates to the listener that they should look in working memory for the concepts BOY, FROG, and JAR. If this is the *first* time the concepts of BOY, FROG and JAR have appeared in the narrative, then as the listener searches memory for the concepts they can reasonably ask "Which boy? Which frog? Which jar?" In a TREIN analysis, code this ambiguity as follows.

Coded example 7a: The little boy[ambigintro] was looking at the frog[ambigintro] that he kept in the jar[ambigintro].

It is important to keep in mind that even in the TREIN context the tools for introducing concepts into a narrative are very flexible and that there is not always a clear cut rule for when a particular strategy is appropriate or not. Subtle variations on a strategy can change the degree of ambiguity significantly.

Example 7b: The little boy was looking at the frog that he kept in a jar in his room.

In this example, the restrictive clause attached to "the frog" includes the indefinite form "a jar." It also includes details about the location of JAR. Since this information can be used by the listener to answer the question "Which frog?" (Answer: "The one in *a jar in his room*."), the form "the frog" is not ambiguous, and is simply coded as a definite introduction of a concept with the code [defintro]. The elaborating information in the restrictive clause provides sufficient contextual support for the use of the definite form.

Coded example 7b: The little boy[ambigintro] was looking at the frog[defintro] that he kept in a jar[indefintro] in his room[possintro].

7.1 Notice that in example 7a, the question “Which frog?” can be answered by “The one in *the* jar,” but this answer can lead to the question “Which jar?” It is for this reason that the definite introduction is ambiguous in 7a, but not in 7b. Contextual information of this type will always need to be used by the coder in making judgments about whether a particular definite form used to introduce a concept is ambiguous or not. There will not always be a clear rule that determines what is appropriate. Consider the contrasting examples in 7c & 7d.

Example 7c: “A boy leaned on a deer and got caught in its antlers/the antlers.”
Example 7d: “A boy leaned on a deer and got caught on its horn/the horn.”

These examples are nearly the same. Judgment as to whether “its antlers” is clearer than “the antlers” and if both are clearer than “the horn” is a result of the narrative context up to that point in the story and how that narrative context has shaped the listener’s assumptions about what is associated with a deer when it is introduced into the narrative. In this case, it seems that the possessive form “its antlers” would be difficult to misconstrue (the question “whose antlers?” is unlikely). The form “the antlers” is also supported by the local context since there is a deer present. The form “the horn” is less clear, since deer don’t have HORNS, but rather ANTLERS. The form “its horn” uses the contextual support of the possessive relationship between the deer and the horn to clear up the ambiguity despite the poor choice of HORN instead of ANTLER. Using this reasoning, the two examples would be coded as shown below.

Coded example 7c: A boy[indefintro] leaned on a deer[indefintro] and got caught in its antlers[possintro]/the antlers[defintro].

Coded example 7d: A boy[indefintro] leaned on a deer[indefintro] and got caught on its horn[possintro]/the horn[ambigintro].

7.2 The possessor in a relationship cannot be introduced using a definite form. Example 7e is a variation of 7c that demonstrates how to code possessive introduction when an ambiguous possessor is involved. Assume that DEER has not yet been introduced into the narrative.

Example 7e: “A boy was holding onto the deer’s antlers and got caught.”

Coded example 7e: A boy[indefintro] was holding onto the deer’s[ambigintro] antlers[possintro] and got caught.

This coding parallel’s the use of the pronominal introduction code in example 3b above. Note, however, that since it is a body part (and therefore implied), the possessed concept is NOT considered to be ambiguously introduced.

It should be emphasized that when in doubt, the coder should err on the side of caution and code questionable cases as ambiguous. Ambiguous forms cause increased processing

demands for listeners, even if they can be resolved by that additional processing. Coding of ambiguous introduction reflects the increased processing needed to resolve the ambiguity, not whether or not the ambiguity can be resolved.

8) Proper names are a definite form and cannot be used to introduce a concept unambiguously unless the person or character is universally recognizable (e.g., Santa Claus, or George Bush). For example, unless the character TOMMY has already been introduced into the narrative, it is unreasonable to assume the listener knows who TOMMY is. So, an indefinite form like "a boy named Tommy" can be used unambiguously, but the definite form "Tommy" by itself is probably ambiguous as in the following example, a variation on example 4 above.

Example 8a: "Tommy had Froggie in a jar."

Since the listener does not yet have the contextual support to answer the questions "Who is Tommy?" or "Who is Froggie?" this sentence would be coded as follows.

Coded example 8a: Tommy[ambigintro] had Froggie[ambigintro] in a jar[indefintro].

8.1 Since characters in a story sometimes address each other using proper names, it is not uncommon for proper names to first appear in character speech. In a TREIN analysis this will be considered an ambiguous introduction of the concept in keeping with the above example. If a proper name first appears in isolation in character speech (i.e. without an introductory phrase like "this is my frog Floppy.") it will be considered ambiguous and will carry the code [ambigintro]. Examples 8b.1 & 8b.2 demonstrate this distinction.

Example 8b.1: "A boy lost his frog and yelled 'Tommy come back?'"
Example 8b.2: "A boy introduced his new pet to his dog Spot saying 'Meet my frog Floppy.'"

Coded example 8b.1: A boy[indefintro] lost his frog[possintro] and yelled "Tommy[ambigintro] come back."
Coded example 8b.2: A boy[indefintro] introduced his new pet[possintro] to his dog[possintro] Spot[defintro] saying "Meet my frog[possintro] Floppy[defintro]."

8.2 If a noun is used without a determiner of some type, then it is either a mass noun or a proper noun (which are count nouns). Mass nouns are used for substances or collections of identical objects. If a child uses a noun without a determiner for a count noun concept the usage will be coded as ambiguous. Example 8b, a variation on example 1, shows how this would work.

Example 8c: "There was this boy with frog."

Since it is not a mass noun (e.g., it is a "count noun"), the lack of a determiner on "frog" requires the listener to determine if the noun is a mass noun (it is not) or a proper noun (it

might be). If it is a proper noun without contextual support from a simple noun (e.g., "his pet named Frog") then it is ambiguous just as the proper nouns in example 8a leading the listener to potentially ask "Who is Frog?" If it is a simple count noun without a determiner, the lack of a determiner leaves the listener to decide its status as definite or indefinite. Since both situations result in an ambiguity, the use of a count noun without a determiner will be coded as an ambiguous introduction.

Coded example 8c: There was this boy[indefintro] with frog[ambigintro].

9) The use of a definite demonstrative form like "that" makes a nominal phrase definite and can lead to ambiguity. This can be seen in example 9 below, a variation on example 1 above.

Example 9: "There was that boy with a frog."

Since "that boy with a frog" cues the listener to look for the concept BOY WITH A FROG in memory, if no memory of the concept yet exists it can lead the listener to ask "Which boy with a frog?" For this reason, it is ambiguous and will be coded as follows.

Coded example 9: There was that boy[ambigintro] with a frog[indefintro].

10) Pronouns cannot unambiguously introduce concepts into a narrative since they *always* cue the listener to search in their memory for an active concept to which they are referring. Their use in introduction of concepts is always ambiguous. As in the following example which is a variation on example 4 above, the first sentence in a narrative.

Example 10: He had it in a jar.

The listener can ask "Who is he?" and "What is it?" so these concepts have been introduced ambiguously. Since a pronoun was used, the coded version of this example would use the code for pronominal introduction, [pnintro].

Coded example 10: He[pnintro] had it[pnintro] in a jar[indefintro].

Use of a pronoun to introduce a concept indicates that the child is not appropriately predicting which information the listener has available in memory. Pronouns, in fact, are not a form that can be used to introduce concepts unambiguously. They are a form used to create a referential tie. The remainder of our discussion will explain how reference ties to concepts that have been introduced into the narrative are handled in a TREIN analysis.

Reference ties to concepts once they are introduce
Once a concept has been introduced into a TREIN narrative, it is reasonable for the story teller to assume that the concept is in the listener's memory and a reference tie can be made using a definite form. Pronouns and definite nominal phrases/clauses are the options available for storytellers in the TREIN narrative context.

11) First let us look at an example of successful introduction of concepts and the creation of clear reference ties to those concepts.

Example 11a: "A boy was sitting on the floor looking at his new frog. The boy thought the frog was happy."

Here the concepts BOY, FLOOR, & FROG are introduced appropriately in the first sentence, and then BOY and FROG are referred to in the next sentence using definite nominal forms. The second sentence cannot be coded correctly without considering the first. The pair would be coded as follows.

Coded example 11a: A boy[indefintro] was sitting on the floor[defintro] looking at his new frog[possintro]. The boy[ntie] thought the frog[ntie] was happy.

The code [ntie] is short for *nominal reference tie* indicating that a definite nominal form was used as a referential tie to an existing concept. Pronouns can be used in these instances just as successfully.

Example 11b: "A boy was sitting on the floor looking at his new frog. He thought it was happy."

In this case the referential ties to the concepts are clear and the sentence can be coded as follows.

Coded example 11b: A boy[indefintro] was sitting on the floor[defintro] looking at his new frog[possintro]. He[pntie] thought it[pntie] was happy.

The code [pntie] is short for *pronominal reference tie* and indicates that a pronominal form was used. Notice that the pronominal form ties to the entire concept whether this concept is introduced with a simple form ("boy") or a more elaborate complex ("his new frog" or even "a new frog he caught at the pond by his house").

Possessive forms can also be used to create reference ties. For example, once a possessive relationship has been created, the possessive form (which is definite) can be used to create a tie to the existing concept. Example 11c shows how this works.

Example 11c: "A boy was sitting on the floor looking at his new frog. He thought his frog was happy."

Since "his frog" clearly ties to the concept HIS FROG, it is an appropriate nominal reference and gets coded with [ntie] as shown below.

Coded example 11c: A boy[indefintro] was sitting on the floor[defintro] looking at his new frog[possintro]. He[pntie] thought his frog[ntie] was happy."

Other contexts might allow for the form “the boy’s frog” to serve as a nominal reference tie.

12) Since pronouns carry very little information themselves, they can become ambiguous quite easily. Example 12, a variation on 11b, shows how easily this can occur.

Example 12a: “A boy was sitting on the floor looking at his new frog. He thought he was happy.”

By changing the pronoun in 11b that refers to the frog from “it” to “he” we have removed important contrasting information that the listener might need. Since it is unusual to refer to a person as “it,” the listener in 11b could easily figure out that it was BOY who thought FROG was happy. In example 12a, since “he” is used to refer to both concepts BOY & FROG, it is impossible to know for sure whether BOY thinks FROG is happy or FROG thinks BOY is happy. For this reason, we will code the pronouns as ambiguous using the code [ambigpntie], short for *ambiguous pronominal reference tie* as shown below.

Coded example 12a: A boy[indefintro] was sitting on the floor[defintro] looking at his new frog[possintro]. He[ambigpntie] thought he[ambigpntie] was happy.

In this example, the pronouns are *biphoric* since they points to two possible concepts and the listener can not be sure which pronoun forms a reference tie to which concept. As with other aspects of language, there are no hard and fast rules for when a pronoun can be used unambiguously. For our purposes, the coder should follow the basic rule that if it is not perfectly clear which concept a pronoun is tied to, then the pronoun is coded [ambigpntie]. When in doubt always err on the side of calling something ambiguous.

12.1 Indefinite forms cannot tie to a concept that is already in the narrative since they are forms used to signal to the listener that a concept is new to the narrative. If an indefinite form is used to refer to an existing concept, the referential linkage will fail (i.e., be *aphoric* since indefinite forms cannot form a reference link to an existing narrative concept). Since upon hearing an indefinite form, the listener is likely to simply add an additional instance of the concept into their memory of concepts in the narrative, this strategy is ambiguous. So, for example, if there is only one boy in the narrative, the use of “a boy” later in the narrative may lead the listener to infer that there are two boys in the story. The use of an indefinite nominal form to refer an existing concept *introduces* an ambiguity into the narrative and will be coded as such using the code [ambigintro]. Consider example 12b.

Example 12b: “A boy was sitting on the floor looking at his new frog. A boy thought he was happy.”

Assuming that there is only one concept BOY to be introduced into the narrative, the second use of “a boy” is ambiguous. As such it will carry the code [ambigintro]. Since “a

boy" signals the listener to create a second boy concept, the pronominal "he" used later in that sentence is also ambiguous and carries the appropriate [ambigpntie] code.

Coded example 12b: A boy[indefintro] was sitting on the floor[defintro] looking at his new frog[possintro]. A boy[ambigintro] thought he[ambigpntie] was happy.

Determination as to whether the second use of an idefinite form like "a boy" is an example of ambiguous introduction requires the extra-narrative information provided by the story pictures. Judges should use the pictures as a yardstick in determining whether indefinite forms are appropriate introduction of a new concept (coded as [indefintro], see also 22.1 below, example 22c), inappropriate introduction of a new concept (coded [ambigintro] – see 13, 14, & 15 below for more discussion), or inappropriate reference to an existing concept (also coded as [ambigintro]).

13) There are times when a storyteller uses the same core nominal form to reference an already introduced concept that they use to introduce a second closely related concept. This new nominal form can be ambiguous if not carefully chosen. This most frequently occurs when there are two objects or characters that belong to the same class or category. Let us look first at an example of a strategy that can avoid this problem. Assume that the concepts BOY and HIS FROG are already part of the narrative.

Example 13: "The boy saw his frog and another frog on a log. The other frog was his frog's wife."

In this case, both concepts are referred to using a nominal complex which includes the term "frog." The first frog is referenced with the possessive nominal reference tie "his frog" while the indefinite form "another frog" properly introduces the new frog into the narrative (think of "another" as "other" with the indefinite determiner "an" attached creating the concept OTHER FROG). The form "other frog" clearly ties to OTHER FROG and a new identifying term, "his frog's wife" is provided for later use. The example would be coded as follows.

Coded Example 13: The boy[ntie] saw his frog[ntie] and another frog[indefintro] on a log[indefintro]. The other frog[ntie] was his frog's wife[possintro].

The form "his frog's wife" introduces a concept that modifies an existing one, OTHER FROG => HIS FROG'S WIFE that can be used later to distinguish easily between the two frogs. Although it relates to the same character in the story as OTHER FROG, the introduction of the concept WIFE is distinct enough to warrant status as a new concept. It also frees up the forms "another frog" and "other frog" for use if additional frogs enter the narrative. This is the reason that "his frog's wife" carries the code [possintro].

14) When a child fails to use the type of strategy shown in example 13 to distinguish between the two frogs, ambiguity is likely because the listener is left with the question "Which frog are we talking about now?" An example of a less successful strategy is provided below. It is a variation on the example from 13 and so we assume that BOY &

HIS FROG are available to the listener. In this case the distinguishing information is missing. We will need to use the code [ambigntie], short for *ambiguous nominal reference tie,* to handle these situations.

Example 14: "The boy saw that frog and the other frog on a log. It was a girl."

By changing "his" to "that" we have taken away the cue for the listener that the first FROG in the sentence is the one that belongs to the boy. By changing "another frog" to the definite form "the other frog" we cue the listener to look in memory for the concept OTHER FROG. If this is the *introduction* of OTHER FROG into the narrative, this is an ambiguous introduction of the concept. Since we have two FROG concepts in the first sentence, the use of "it" to reference one of the frogs is insufficient to distinguish between the two. The change from "his frog's wife" to "a girl" provides less elaborated information to help distinguish between the two, but is not in and of itself ambiguous. The listener hearing these paired sentences in the context of the continuing narrative will learn that there is a girl frog involved (creating GIRL FROG), that there are two frogs on a log and that the boy saw them. The listener is likely to ask the questions "Which frog is 'that frog/the other frog?'" or "Which frog is a girl?" To reflect the ambiguity, these sentences would be coded as follows.

Coded example 14: The boy[ntie] saw that frog[ambigntie] and the other frog[ambigintro] on a log[indefintro]. It[ambigpntie] was a girl[indefintro].

Recall that the code [ambigntie] stands for *ambiguous nominal reference tie* and is used to indicate that the child has not used a strategy that successfully distinguishes between the concept being referenced/introduced and other potential concepts the listener might use in interpretation.

15) In examples 13 & 14 the word "frog" was used to refer to/introduce two separate concepts, HIS FROG and ANOTHER FROG (or HIS FROG'S WIFE). It is also possible to use two different word forms to refer to a single concept. For example, the properly introduced concept BOY may also be referred to using the form "the kid" without fear of ambiguity as long as there is only one young human involved in the narrative (and no young goats). Many terms are referentially equivalent, but only if the equivalence is supported by the context. An example of this is shown below.

Example 15a: "A boy was looking at a frog he captured. The kid wanted the frog to be happy, but it wasn't."

In this example, it is unlikely that the listener would confuse the reference to BOY using "the kid" so the reference is clear. However clear the reference, the form "the kid" back-grounds the BOY's gender which modifies the active concept slightly. This can be seen as a contextually supported definite *introduction* of a new perspective on the concept and is therefore coded as [defintro] as shown below. The fact that the general concept BOY is contained in the even more generic concept KID allows for an automatic linkage to be made between the form "the kid" and the concept BOY in a context where there is only

one concept in memory that falls in within the category KID. If there were two kids in the narrative, the use of KID would not distinguish between them and would be ambiguous.

Coded example 15a: A boy[indefintro] was looking at a frog[indefintro] he[pntie] captured. The kid[defintro] wanted the frog[ntie] to be happy, but it[pntie] wasn't.

15.1 Terms which may be equivalent or close to synonymous according to dictionary definitions are not always equivalent when used in a narrative context. When children switch between these two terms as if they were referentially equivalent, they are using a strategy that can lead to ambiguity for their listeners. Example 15b provides an example.

Example 15b: "A boy was looking at a frog that he kept in a jar. He didn't like being in the bottle."

In this example, the concepts BOY, FROG and JAR are clearly introduced in the first sentence. In the second sentence, however, the concept JAR is referred to using the definite form "the bottle." Since "the bottle" is definite, it signals the listener to look for the concept it refers to in memory (i.e., to create a reference tie). It is unlikely that the listener will *automatically* recognize that "the bottle" is referring to JAR, despite their nearly synonymous dictionary definitions. This is the flipside to the BOY/KID relationship discussed above. In this case, the concept BOTTLE and the concept JAR are at the same level of abstraction. One is not a sub-set of the other. BOTTLES are not kinds of JARS and JARS are not kinds of BOTTLES in the way that BOYS are kinds of KIDS. As such, the listener hearing "the bottle" in this context can reasonably ask "What bottle?" This ambiguity is a variation to that created by "the other frog" in example 14 above and is coded as follows.

Coded example 15b: A boy[indefintro] was looking at a frog[indefintro] that he[pntie] kept in a jar[indefintro]. He[ambigpntie] didn't like being in the bottle[ambigintro].

For the listener, improperly switching to a new definite noun form in an attempt to create a reference tie to an existing concept ends up introducing an entirely new concept into the story without appropriate contextual support (creating two characters/objects in memory) and is coded as an example of ambiguous introduction. This is similar to the improper use of proper nouns seen in example 8a above, or the improper use of indefinite forms seen in example 12b. Also note in example 15b that since the concept BOTTLE is ambiguous, it is unclear who is in the BOTTLE ("Is the boy in a bottle?"). This means the pronoun used to refer to the concept FROG in the second sentence is also ambiguous and it is coded accordingly.

16) Events/processes/attributes that are introduced in the narrative using a verb or modifier complex can be referred to later in the narrative. The reference tie will usually be made using a definite nominal complex. Example 16 provides an example of how this can be done effectively within a narrative. In this example, assume that BOY & DOG have been clearly introduced into the narrative.

Example 16a: "The boy's dog was barking at a beehive he found hanging in a tree. The barking made the bees angry, so they started chasing the dog."

Since the concept BARKING is introduced with a verb, a reference tie can be made using the definite form "the barking." The sentences would be coded as follows.

Coded example 16a: The boy's dog[ntie] was barking at a beehive[indefintro] he[pntie] found hanging in a tree[indefintro]. The barking[ntie] made the bees[defintro] angry, so they[pntie] started chasing the dog[ntie].

Without the first sentence in example 16a, the context would not support the use of "the barking" to introduce or refer to the event. Example 16b provides a modified version of 16a to illustrate.

Example 16b: "They found a beehive hanging in a tree. The barking made the bees angry, so they started chasing the dog."

The concept BARKING here is introduced using a definite form without contextual support to infer that it had happened or whether, for sure, it is the dog included under the term "they" that is barking. It is, therefore coded as [ambigintro] as shown below.

Coded example 16b: They[pntie] found a beehive[indefintro] hanging in a tree[indefintro]. The barking[ambigintro] made the bees[defintro] angry, so they[pntie] started chasing the dog[ntie].

A slight change in form, however, can clear up the ambiguity in this situation. Example 16c is a further modification.

Example 16c: "They found a beehive hanging in a tree. His loud barking made the bees angry, so they started chasing the dog."

In this case, if it is clear that the form "they" includes a dog, it is possible to clearly assign the activity of barking to that dog. The child has changed the focus of the scene to emphasize that a THING = BARKING is making the bees angry and that that THING = BARKING is possessed/perpetrated by the dog. In this sense, the concept BARKING is being introduced into the narrative unambiguously with a definite possessive form and gets the appropriate code. Notice that it is the tie between "his" and the later use of "the dog" that provides the contextual support for unambiguous introduction of BARKING. The order of the forms can be reversed from the typical noun/pronoun order without creating ambiguity as long as there is not too great a distance between the forms (i.e., the form is *cataphoric*).

Coded example 16c: They[pntie] found a beehive[indefintro] hanging in a tree[indefintro]. His loud barking[possintro] made the bees[defintro] angry, so they[pntie] started chasing the dog[ntie].

Again, there are no hard and fast rules for judging when a particular form is ambiguous. Contextual support is required to judge any particular instance, but if in doubt about how to code a particular case, judges should err on the side of calling borderline cases ambiguous (see 6 above for an example of how this works in the case of modifier complexes).

17) The forms “here” and “there” have a variety of uses. The usage of interest in a TREIN analysis involves their use as deictic pronominals that can be used as reference ties to *place concepts* that exist in a narrative context. Example 17a demonstrates the deictic use of “there.” Assume that the concepts BOY & FROG are available to the listener.

Example 17a: “He saw a hole in the ground. The frog was not in there, but a gopher was.”

In this example, the form “there” in the second sentence is used to refer to the concept HOLE IN THE GROUND introduced in the first sentence. It would be coded using the [pntie] code since it is clear and unambiguous.

Coded example 17a: He[pntie] looked in a hole[indefintro] in the ground[defintro]. The frog[ntie] was not in there[pntie], but a gopher[indefintro] was.

17.1 Because deictic forms require that the concept they refer to be readily accessible to the listener, they can easily create ambiguity. Example 17b, a slight modification of 17a provides an example of how this occurs.

Example 17b: “He saw a hole in the ground and another in a tree. The frog was not in there, but a gopher was.”

Because there are two place concepts (HOLE IN GROUND, HOLE IN TREE), the form “there” in the second sentence is ambiguous (i.e., biphoric).

Coded example 17b: He[pntie] saw a hole[indefintro] in the ground[defintro] and another[indefintro] in a tree[indefintro]. The frog[ntie] was not in there[ambigpntie], but a gopher[indefintro] was.

Notice that the code for the concept HOLE IN TREE is attached to the form “another” which is contextually supported by the first use of the form “hole” making the form “another hole” unnecessary in context.

18) Mass nouns may be referenced using definite forms. Example 18 shows an unambiguous use of definite forms to refer to a mass noun concept. Assume the concepts BOY and DOG have already been introduced.

Example 18a: "The boy and his dog fell off a cliff into a pond filled with muddy water. The water splashed everywhere."

The indefinite form "water" is used to introduce the concept while the definite form "the water" is used to refer to it.

Coded Example 18a: The boy[ntie] and his dog[ntie] fell off a cliff[indefintro] into a pond[indefintro] filled with muddy water[indefintro]. The water[ntie] splashed everywhere.

As with all mass nouns, the use of the definite determine is optional in some contexts. Example 18b is identical to 18a except the definite determiner has been removed from the second sentence. Coding is unaffected.

Example 18b: "The boy and his dog fell off a cliff into a pond filled with muddy water. Water splashed everywhere."

Coded example 18b: The boy[ntie] and his dog[ntie] fell off a cliff[indefintro] into a pond[indefintro] filled with muddy water[indefintro]. Water[ntie] splashed everywhere.

A variation on this strategy can lead to ambiguity. If an entity concept has been introduced with an indefinite mass noun, a definite form may be needed to distinguish that entity from the general concept when making a reference tie to the entity later in the narrative. Example 18c demonstrates this with the concept BEES. Assume that "they" refers to BOY & DOG and that HIS FROG is available to the listener.

Example 18c: "**They went to the forest to find his frog, but all they found were bees…** [story continues for several episodes]**... All of a sudden an owl pops out and bees are chasing his dog."**

If the listener hearing the second sentence in 18c is going to automatically assume that "bees" refers to the same group entity BEES introduced in the first sentence from 18c, a definite form will need to be used to create the reference tie (e.g., "the bees," or "some of the bees"). When an indefinite form is used to make this reference tie as in the example, it is unclear if the BEES are the same bees encountered earlier or a NEW GROUP OF BEES. Assuming it is clear from the story pictures that they are indeed the same BEES introduced earlier in the story, this strategy is similar to that seen in example 12b, and "bees" is a case of ambiguous introduction.

Example 18c: They[pntie] went to the forest[defintro] to find his frog[ntie], but all they[pntie] found were bees[indefintro]… [the story continues for several episodes]... **All of a sudden an owl[indefintro] pops out and bees[ambigintro] are chasing his dog[ntie].**

It is worth emphasizing again, that decisions of this kind require that the coder use the information from the story stimulus to determine if the introduction of a second entity is warranted (as the example with BOY in 12b). If there is doubt in the coder's mind as to whether the specific case is ambiguous introduction or not, the coder should err on the side of caution and code the case as [ambigintro] to reflect this uncertainty.

19) Reference ties to characters and places in a narrative that have been associated with a proper noun can be made unambiguously using that proper name. Example 19 gives an example of this type of reference.

Example 19a: "A boy named Tommy had a frog named Froggie in a jar. Tommy loved Froggie, but Froggie hated living in the jar."

This example has no ambiguous reference in it and would be coded as follows.

Coded example 19a: A boy[indefintro] named Tommy[defintro] had a frog[indefintro] named Froggie[defintro] in a jar[indefintro]. Tommy[ntie] loved Froggie[ntie], but Froggie[ntie] hated living in the jar[ntie].

19.1 Sometimes, children assign one name to a character in a narrative, and then forget which name they have used. If they switch names mid-story this creates ambiguity. Since proper nouns are definite forms that can typically only be used as reference ties to concepts, their use signals to the listener to search memory for the concept they indicate. Switching to a new proper noun in an attempt to make a reference tie, however, ends up introducing a new concept into the story (creating two people, or two pets, for instance) and is coded as an example of ambiguous introduction as seen in examples 8a,12b, and 18c above. Example 19b is a variation on 19a that demonstrates this problem.

Example 19b: "A boy named Tommy had a frog named Froggie in a jar. Johnny loved Froggie, but Froggie hated living in the jar."

Since the use of "Johnny" would most likely cause the listener to ask "Who's Johnny?" it is coded as an ambiguous introduction as shown below.

Coded example 19b: A boy[indefintro] named Tommy[defintro] had a frog[indefintro] named Froggie[defintro] in a jar[indefintro]. Johnny[ambigintro] loved Froggie[ntie], but Froggie[ntie] hated living in the jar[ntie].

This is a variation of the JAR/BOTTLE problem discussed in example 15b.

20) Recognize that there are well-formed uses of pronominal reference such as "*It* was scary in the forest" or "*it* seemed hopeless" that are clear in context despite some ambiguity about the exact referent of the pronoun. These types of reference will NOT be coded in this system. They tie to a general conceptualization of the situation as a whole, but not a single referent and, therefore, do not involve the processes the TREIN is

concerned with. Assume the listener has the concepts FOREST, BOY, DOG, & FROG available from the narrative.

Example 20a: "It was so dark in the forest that it seemed unlikely they would see the frog. They were going to have a hard time finding it."

Coded example 20a: It was so dark in the forest[ntie] that it seemed unlikely they[pntie] would see the frog[ntie]. They[pntie] were going to have a hard time[indefintro] finding it[pntie].

20.1 Notice that the phrase "a hard time" in example 20a introduces a temporal component of the narrative as if it were an entity using a nominal complex. It is coded as an indefinite introduction. The indefinite form is the default for this type of construction, so the concept may be referred to again with an indefinite form (e.g., "They were still having *a hard time* finding it"). On each occurrence of this type of indefinite construction (also watch for "it was a total bummer," "a drag," "a waste of time," and similar constructions), the complex will be coded as [indefintro], since each occurrence introduces a new temporal unit. It would be unusual to try and create a reference tie to these concepts, but it could be done. Assume that "they" ties to the concepts FROG & DOG. Example 20b assumes example 20a occurring earlier in the narrative.

Example 20b: "***The hard time*** **they expected just got worse.**"

In those cases, the definite form would be coded as a nominal reference tie [ntie], as long as it was not ambiguous (i.e., the HARD TIME concept should be explicitly tied to a previous use of "a hard time").

Coded example 20b: ***The hard time*****[ntie] they[pntie] expected just got worse.**

It would also be possible to introduce concepts like HARD TIME FINDING FROG with a definite construction. In these cases, the definite introduction would be coded as [defintro] as long as it was not ambiguous in context (i.e., the concept should be implicit based on the narrative up to that point). Assume that "they" ties to the concepts FROG & DOG, and that CLIFF is available to the listener.

Example 20c: "When they fell off the cliff, ***the hard time*** **they were having got a little bit worse.**"

Coded example 20c: When they[pntie] fell off the cliff[ntie], ***the hard time*****[defintro] they[pntie] were having got a little bit worse.**

21) Extra-narrative comments not related to the story will not be included in a TREIN analysis in most instances. For example, utterances such as "This picture's kind of confusing" or "I don't know what to say" or "What are you doing that for?" or "What time is it?" or "I haven't eaten lunch yet," or "…because I can't think of anything else" or

"What're you doing?" or "Once upon a time" or "The end" do not relate to the events in the story being related, and will not be included in the analysis.

Extra-narrative comments that have a direct impact on the information conveyed in the story may impact a TREIN analysis. In the following example assume the concept BOY has already been introduced.

Example 21: "The boy had a frog. His name was Jill no, no, I don't know."

In this case the extra-narrative comment ("no, no, I don't know") has a direct impact on the information conveyed to the listener (conveying that the character's name is not known, and is not "Jill"). This excludes the use of "Jill" in later references. The utterance would be coded as follows.

Coded Example 21: The boy[ntie] had a frog[indefintro]. His name was Jill no, no, I don't know.

Notice that the second sentence does not carry any codes. This indicates the NAME=JILL concept introduced in the beginning of the sentence has been negated by the extra-narrative comment.

22) Hedges will be coded in a TREIN analysis when they introduce concepts into the story. Hedges are statements such as "I think I'll call him Froggie" or "I wasn't sure before, but I think they're bees." Hedges convey the degree of certainty with which the information should be taken, and are therefore part of the story telling process. For instance "I think I'll call him Froggie" informs the listener that this is just one of many frog names that could have been used, rather than the frogs "real" name. Likewise, "I think they're bees" informs the listener that "they" are bees or something very similar to bees. Pragmatically, this gives the parameters the listener should be using in framing an understanding of events. The pronoun "I" refers to the narrator and would not be coded in a TREIN analysis. In example 22 assume that the concept DOG has been introduced.

Example 22a: "There is something chasing the dog. I wasn't sure before, but I think they're bees."

Coded Example 22a: There is something[indefintro] chasing the dog[ntie]. I wasn't sure before, but I think they[pntie] 're bees[indefintro].

Note that this example has the pronominal and nominal order switched without creating any ambiguity (c.f., example 16c, another cataphoric reference tie). In the next example, assume that BOY has already been introduced into the narrative.

Example 22b: "The boy has a frog. I think I'll call him Froggie."

Coded example 22b: The boy[ntie] has a frog[indefintro]. I think I'll call him[pntie] Froggie[defintro].

This example is similar to 3c & 3d above. “Froggie” therefore is coded with the definite introduction code since it introduces the name concept into the narrative and provides the form as a future reference option.

22.1 Negation of a concept can complicate coding decisions. When a concept has been introduced, it can be negated using a phrase of the form “It wasn’t a _____” For the next example assume that the listener knows BOY.

Example 22c: “The boy grabbed a branch/some sticks, but it wasn’t *a branch/sticks* it was a deer’s antlers.”

Coded example 22c: The boy[ntie] grabbed a branch/some sticks[indefintro], but it[pntie] wasn’t a branch/sticks[indefintro] it was a deer’s[indefintro] antlers[possintro].

The constructions take the concept BRANCH and modify it in steps: BRANCH=>NOT BRANCH=>ANTLERS. The second occurrence of “a branch” is introducing the generic concept BRANCH used to create the concept NOT BRANCH. This is a new concept, so it is coded as an indefinite introduction (of NOT BRANCH).

23) Poorly formed utterances as can complicate coding decisions. In these cases, code elements in terms of the concepts they introduce or reference despite the difficulty in organization among the elements. In the following example assume that the concepts BOY and DOG are available in the narrative and are clearly referred to with “they.”

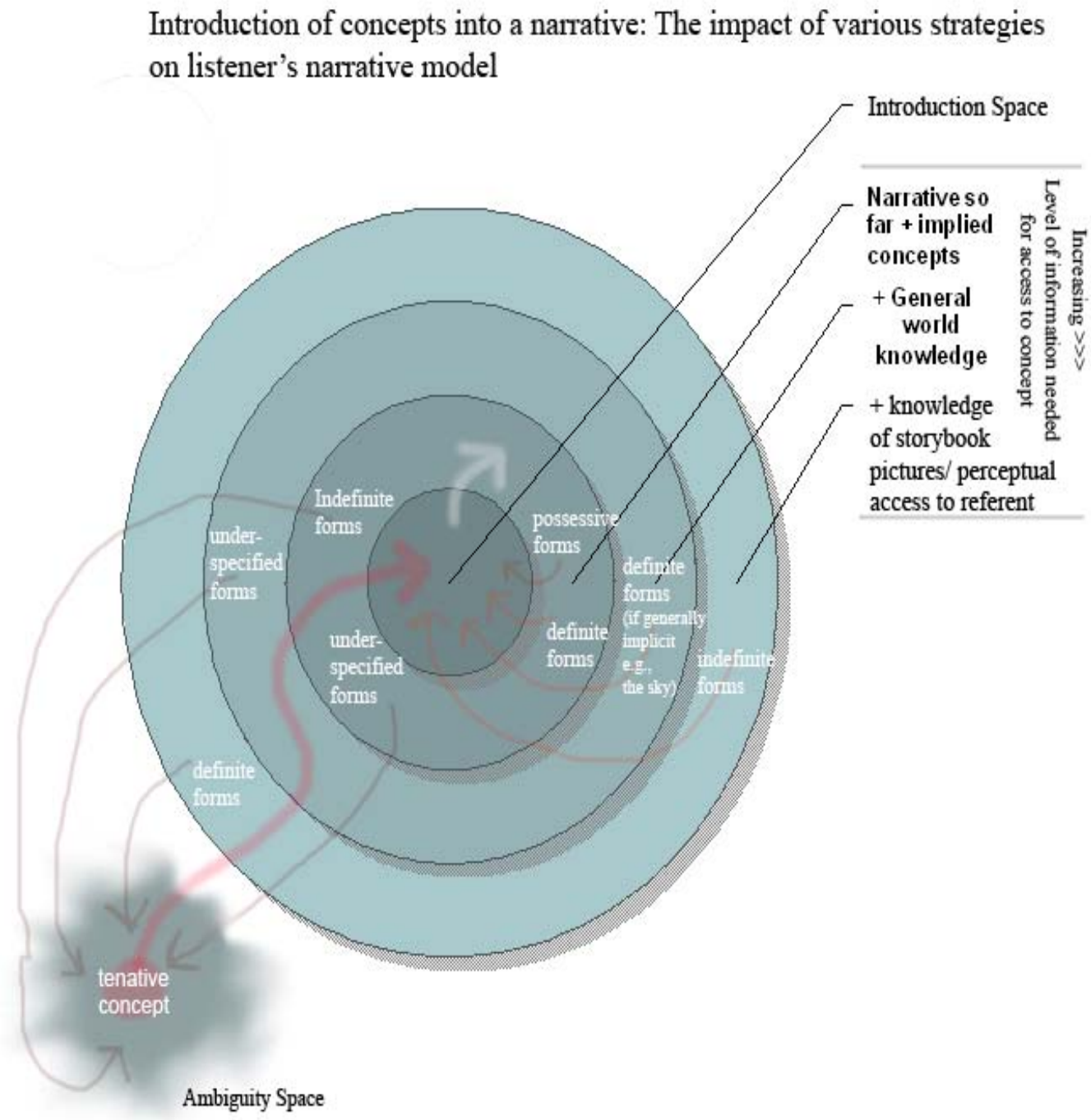
Example 23: "Then a long ways down to get to the water then they fell"

Part of the organizational trouble in this utterance comes from the repetition and poor placement of "then" (and /or the lack of "it was").

Coded example 23: Then a long ways down to get to the water[ambigintro] then they[pntie] fell.

24) Mazes (Loban, 1976) and the words that make them up are not coded in this system. Mazes are defined as false starts and repetitions or revisions in an utterance. In the transcript these will be put inside parenthesis and excluded from analysis.

Figure 1.



If concept can be formed with additional processing in ambiguity space, concept will move into the narrative model through the introduction space. Strategies which require this extra layer of processing by the listener impede effiective communication by increasing the listener's work load.

Figure 2. *Decision Tree for Nominal Complexes in TREIN coding*

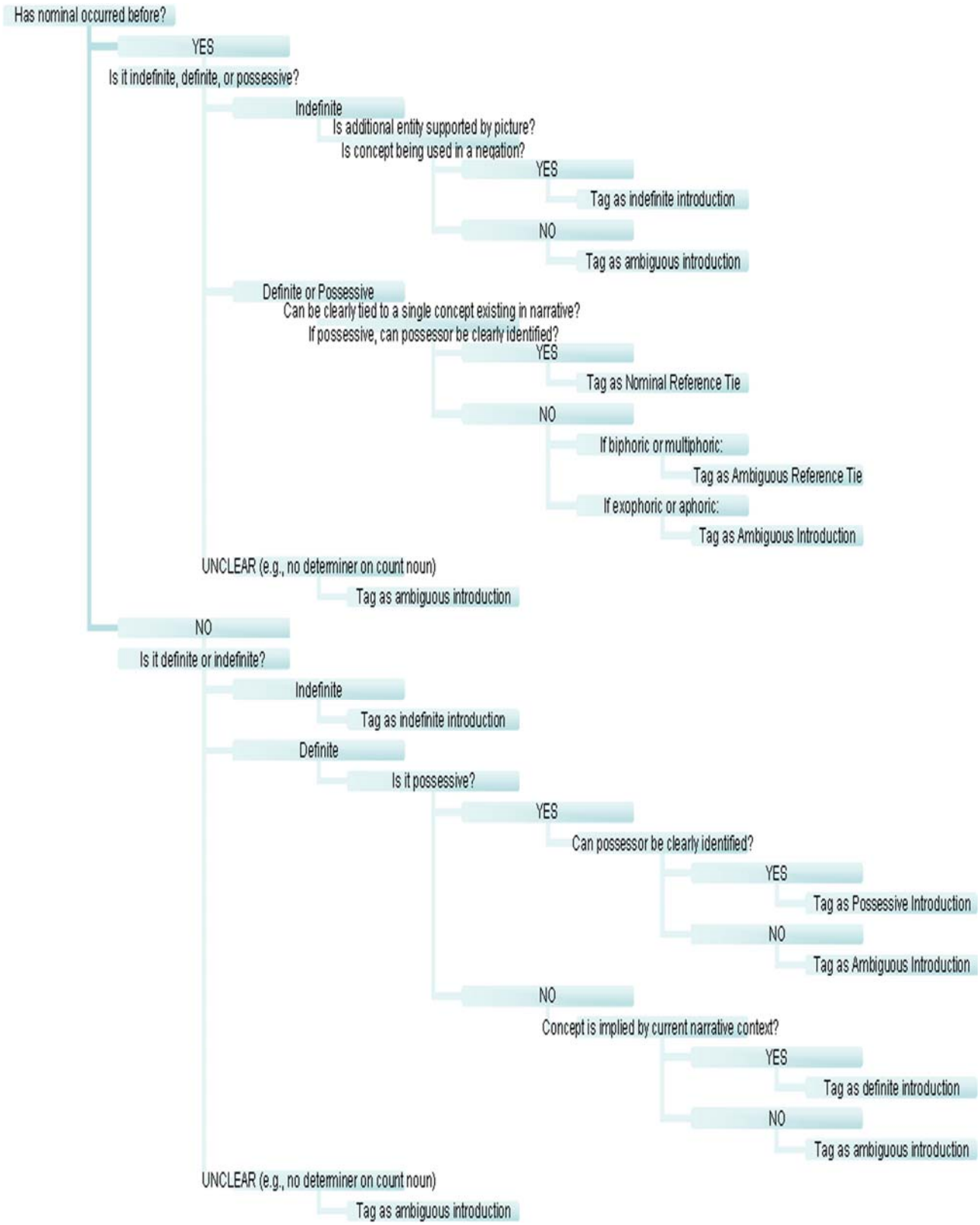
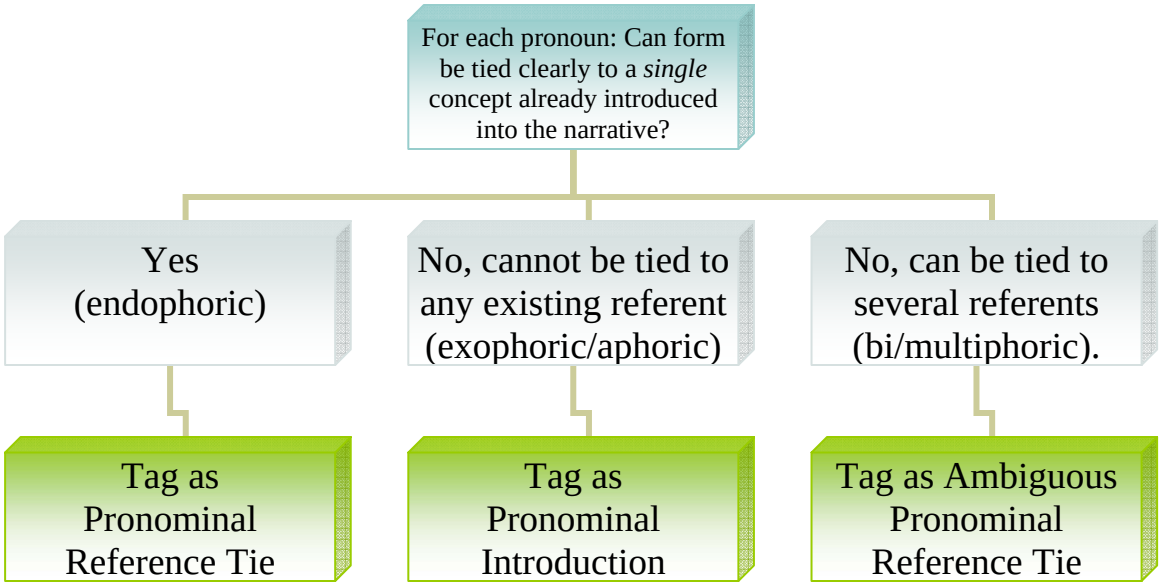


Figure 3. *Decision Tree for Pronominals in TREIN coding*



Applying the TREIN to a complete narrative:

1) Once upon a time there was a young boy[indefintro] and his dog[possintro] and frog[possintro] and his name[ambigintro].

2) And the little boy[ntie] and the dog[ntie] fell asleep and the frog[ntie] got out of his jar[possintro].

3) And (the b*) the little boy[ntie] and the dog[ntie] woke up and the frog[ntie] was gone.

4) The little boy[ntie] and the little dog[ntie] were (looking) looking for the frog[ntie].

5) The little boy[ntie] looked in his boots[possintro] and the dog[ntie] stuck his head[possintro] in the jar[ntie].

6) And the little boy[ntie] screamed out his window[possintro] saying, "Frog[ambigintro], Frog[ntie] Come back".

7) And the dog[ntie] fell out of the window[ntie] and the little boy[ntie] jumped out of his window[ntie] and got the dog[ntie].

8) And (the jar* he left the jar) the jar[ntie] it[pntie] was broken and crashed all over the ground[defintro].

9) They[pntie] went into the forest[ambigintro] and the little boy[ntie] kept on saying "(Come*) Come back Frog[ntie], come back".

10) And the dog[ntie] was looking at the bees[ambigintro] going into their beehive[possintro].

11) The little boy[ntie] looked into hole[ambigintro] saying, "Frog[ntie], come back Come back Frog[ntie]" and the dog[ntie] was messing with the bee's beehives[ntie].

12) And (the dog the*) the little dog[ntie] kicked the beehive[ntie].

13) And the beehive[ntie] fell down and the little boy[ntie] was in the tree[ambigintro] saying, "Frog[ntie], come back, come back".

14) (And the little dog knocked over*, no) The owl[ambigintro] knocked over the little boy[ntie] and the dog[ntie] was running because the bees[ntie] were chasing him[pntie].

15) The owl[ntie] kept on following the little boy[ntie] and dog[ntie].

16) And the little boy[ntie] was on the deer's[ambigintro] horns[possintro].

17) And the deer[ntie] started running with the little boy[ntie] on top of his head[possintro] and he[pntie] came to a hill[indefintro].

18) And (he) he[pntie] nodded his head[ntie] and the little dog[ntie] and the boy[ntie] fell down into a muddy pond[indefintro].

19) And there was a (log) log[indefintro] right in front of him[ambigpntie].

20) The little boy[ntie] told the dog[ntie], "Be quiet" so he[pntie] could look in the log[ntie].

21) And then he[pntie] could see frogs[indefintro] in there[pntie] so he[pntie] looked right behind the log[ntie] and he[pntie] saw (the) the parents[possintro] of Frog[ntie] and the baby frogs[ambigintro].

22) And they [ambigpntie] took one [indefintro] of the baby frogs[ntie] and left.

Glossary:

Anaphora/anaphoric: Anaphoric reference is a sub-category of *endophoric reference* and therefore involves reference ties to concepts within the active discourse model. An anaphoric reference tie ties backwards to a concept previously referred to or introduced into the discourse. Anaphoric reference ties can be achieved with full definite nominal complexes or pronominal complexes. They require that the concept being tied to has been either explicitly introduced (i.e., spoken) into the narrative discourse with a specific spoken nominal, verbal, or modifier complex (an endophoric reference linkage), or that the concept is implicitly available to the listener from conventional inferences regarding the current discourse model (an endophoric introduction moving an implicit concept explicitly into the narrative discourse model). See also cataphora/cataphoric, endophoric, exophoric, (see Halliday & Hasan, 1976) and bi/multiphoric/aphoric.

Biphoric/multiphoric/aphoric: An extension of the concept of anaphora, biphoric or multiphoric reference is created when a complex can be reasonably tied to more than one concept in the active discourse model of the listener and can point forward or backwards in the text. Biphoric and multiphoric reference is referred to in the TREIN as *ambiguous reference ties* (nominal or pronominal). Their impact on the listener is to introduce an ambiguity in the discourse model that needs to be resolved through additional processing. It is possible that the ambiguity can be resolved tentatively or that the ambiguity will never be resolved depending the further development of the discourse text. A form that can not be tied to any concept available and active for the listener may be thought of as *aphoric*. Aphoric references will result in the introduction of a new tentative concept into the discourse model since there is no concept with which to make a tie. Aphoric complexes are instances of *ambiguous introduction* (see examples 12b, and 3b.2).

Cataphora/cataphoric: a cataphoric reference tie is endophoric, is made by a definite complex, usually pronominal, and ties to a concept that occurs later in the text. Examples would include “they” and “there” tying to PEOPLE and CALIFORNIA in “*They* are crazy, those people out *there* in California.” Another example would be “His little dog” in “His little dog was the boy’s favorite dog,” where “his” ties to BOY and “his little dog” ties to BOY’S FAVORITE DOG. Cataphoric devices are counterparts to anaphoric devices: just as anaphoric devices enable backward reference ties, cataphoric devices enable forward reference ties. And just as anaphoric devices mark concepts that have been mentioned before, cataphoric devices mark concepts that are likely to be mentioned again (signaling the listener to watch for elaborating information in soon-to-follow text). To be appropriate, the distance between the cataphoric tie and the grammatical complex which more completely specifies it must be relatively short so that both forms can be kept in working memory at the same time (see Gernsbacher & Jescheniak, 1995; Gernsbacher & Shroyer, 1989).

Complex (i.e. grammatical complex): a group of words that work together to achieve a particular grammatical function or discourse purpose. A complex can be a nominal (e.g., “the little boy with the two pets”), verbal (e.g., “climbed up on top of,” “looked all over

for"), or modifier (e.g., "simply not that happy," "very big angry") complex (see Talmy, 2000b).

Count noun: a noun form that involves concepts that can be counted; defined in opposition to mass nouns which are used to refer to substances. Count nouns can take on clear singular (e.g., "dog") or plural form (e.g., "dogs"). Count nouns require a determiner to indicate indefinite or definite (including possessive) status.

Definite: a grammatical term used to indicate that the concept in a nominal complex is referring to a particular familiar instance of a more general class of concepts (a particular dog with which you are already familiar as opposed to any dog). In English this is primarily done through the use of determiners (e.g., "the," "that"). Proper nouns, pronouns, pronominal forms, and deictic forms are all definite as are nominal complexes involving a definite determiner. Definiteness indicates to the listener that the particular instance of the concept is one that they have available in working memory as a result of the previous discourse context. Typically this will involve concepts that have previously been explicitly introduced into the discourse. Certain concepts are implicit in a context and may take a definite form without a previous explicit introduction. Verbal concepts will be nominalized if discourse requires a definite form of the concept. Possessive forms and proper nouns are sub-classes of definite forms. Pronominal forms are always definite.

Deictic: meaning "pointing to," refers to forms that have limited inherent semantics themselves, and primarily serve as a reference tie to a semantically complete form (see Lakoff, 1987). Pronouns are primarily deictic in English as are some uses of the forms "here" and "there."

Endophora/endophoric: From Halliday and Hasan (1976), the concept of *endophoric reference* distinguishes between references that point to concepts inside the discourse model as opposed to concepts from the environmental context of the discourse participants (i.e., the real world). In the TREIN narrative context, endophoric references can be made only to concepts that have been explicitly or implicitly introduced in the narrative through spoken language. This means that the listener should be able to form a reference tie to a concept they have available in their discourse memory either because it has been explicitly introduced with a spoken nominal, verbal, or modifier complex, or because it is implicit in the discourse due to conventional implications formed by the discourse model up to that point in the narrative. It is the opposite of *exophoric reference* which points to concepts outside of the discourse model (i.e., in the real world).

Entity/nominal: the general term used to refer to "things" in a narrative. This includes both objects and characters. It is defined in opposition to processes/actions/verb/verbal concepts. For some discourse purposes, process concepts can conceptualized as entities (see Langacker, 1991), in which case they take nominal forms (c.f., "Their *search* for the frog was fruitless"—entity concept, with "they *were searching* fruitlessly for the frog"—verbal/process concept, see also examples 20a-c above).

Explicit: having been introduced ostensively into the narrative by the narrator with a spoken nominal, verbal, or modifier complex. Any concept that is explicit in the narrative has a linguistic spoken form directly associated with it (e.g., FROG and "frog").

Exophora/exophoric: From Halliday and Hasan (1976), the term *exophoric reference* denotes reference ties that require information available outside the current discourse text and the resulting discourse model it creates. Exophoric reference ties point to the items in the real world (including the physical storybook) rather than concepts in the discourse model. In the TREIN narrative context, exophoric reference ties point to concepts that are not explicitly introduced into the narrative and are not implicit in the discourse model from conventional inferences that would be expected to exist in the discourse model. **Picture-bound references that require access to the storybook pictures would be the most common example.** In the TREIN, exophoric references are coded as *ambiguous introductions* since they do not create an endophoric reference tie to an existing concept, and are not supported by conventional contextual implications (as is the case with appropriate use of definite introduction of implicit concepts which bring implicit concepts explicitly into the discourse text).

Implicit: a concept that comes into the narrative discourse due to its conventional association with an explicit concept. For instance, if BEEHIVE is explicitly placed into the narrative with the term "beehive" many concepts can be said to be now be implicit in the narrative, such as BEES, HONEY, and HONEYCOMB. Implicit concepts are in the background in the narrative discourse, but can be assumed to be available to the listener with minimal mental effort. It is therefore appropriate to introduce implicit concepts explicitly into the narrative with a definite complex. Some concepts are pervasive, or unique and universally identifiable, and can be assumed to be implicit in (virtually) all narrative contexts. Examples would be SKY, or SUN, or GROUND or FLOOR.

Indefinite: a grammatical term used to indicate that the concept in a nominal complex is referring to an unfamiliar instance of a general class of concepts. In English this is primarily done with the use of determiners (a, some, another, this). Mass nouns without a determiner are indefinite as they refer to the substance in general as opposed to a particular instance of it (e.g., "sand" refers to the general substance, not a particular portion of sand—any sand will do). Indefiniteness signals to the listener to access a general class of concepts, and to place a particular instance(s) of that concept within the narrative. It is the primary grammatical form used in English to *introduce* nominal concepts. Verb forms are also indefinite. Verbal concepts will be nominalized if discourse requires a definite form of the concept.

Introduction: The process of providing an *explicit*, ostensive instruction to the listener to create a particular concept in their narrative model, or to move an implicit concept explicitly into the narrative model. The degree to which the concept can be inferred from the current narrative model will determine the appropriateness of a particular strategy to achieving introduction of a concept. Definite forms are appropriate for moving concepts that have inferential ties to the current narrative model from the implicit realm of the discourse model to the explicit. Indefinite forms are appropriate to introduce concepts

that cannot be inferred from the current narrative model. In practice in the TREIN context, indefinite forms are needed for introduction of forms that would require both general world knowledge and specific knowledge of the story stimulus pictures to be inferred from the current narrative model. Definite forms are appropriate if the concept is implicit without direct access to the information provided by the story pictures (see figure 1 above).

Mass noun: a noun form that involves concepts that can be considered substances. They are defined in opposition to count nouns which refer to individual instances of a concept. Mass nouns prototypically do not have clear plural and singular forms (e.g., sand, water, sunlight, ground) but require a phrase to identify the singular instance of the concept (e.g., "a grain of sand," "a molecule of water," "a beam of light," "a piece/patch of ground"). In some cases nouns that are typically count nouns can be used as mass nouns when conceptualizing a large group of individuals as a substance (c.f., "he saw a bee/the bees"—count noun, with "he ran into a swarm of bees"—mass noun, with "bees were everywhere"—mass noun). Mass nouns can take any type of determiner including indefinite ("a," "some"), definite ("the," "that"), and possessive ("his" "their"). If a mass noun does not have a determiner, it is indefinite.

Modifier/ Modifier Complex: general terms used to indicate a concept that is a feature of a more complete entity or verbal concept. For entities this will include things like color, size, shape, while for verb concepts it will include things like speed, path of motion. Although certainly concepts in their own right, they will typically be used as part of a verbal or nominal complex to help elaborate it or distinguish it from other concepts. Modifiers can be single words (e.g., adjectives/adverbs, verb particles), phrases (e.g., prepositional phrases) or clauses (e.g., adjectival/adverbial clauses). Modifier concepts can take center stage for certain discourse purposes when the speaker wants the listener to focus on a particular aspect of an entity or process. This will typically involve nominalization of the modifier (c.f., "He ran quickly from the bees"—QUICKNESS modifies RUNNING, with "His quickness helped him escape the bees"—emphasizes the QUICKNESS). In the TREIN, only nominalized modifier concepts will be coded.

Nominal: Nominal = name, indicates a term that serves to name a concept.

Noun/nominal complex: a group of words including a noun that characterize (i.e., provide a name for) a concept. A noun complex will typically (but not always) include a determiner, and adjectives or modifying phrases/clauses (e.g., "a boy," "a little boy," "a boy that was little," "a little boy with a frog"). Nominal complexes may be quite large and have noun complexes embedded in them (e.g., "A little boy that had a frog he caught in the pond near his house")

Place concept: a concept that provides a location for an event, object, or character (e.g., "hole," "forest," "room," "jar," "beehive").

Pronominal: a reduced form that serves as a reference tie to a nominal complex, does not provide a name for a concept, but indicates to the listener that the most active nominal in

their memory is still the focus of attention (Cornish, 1999; Van Hoek, 1997). Pronominals can be used to establish a possessive relationship.

Proper Noun: A definite nominal form that will occur without a determiner. In the TREIN context, must be introduced through direct association with an existing concept (i.e, "a boy *named Tommy"*). In a TREIN analysis, proper nouns are a special sub-class of modifiers treated as a separate concept (indicating the attribute NAME) from the concept for which they provide a name.

Reference: the general term used to indicate the relationship between a word and a concept. There are two basic reference functions distinguished in the TREIN, introduction and reference tying.

Reference tie/referential tie: In the TREIN, the term "reference tie" is used to indicate the process by which a form ties to a CONCEPT that has already been introduced into the narrative. Reference ties cannot be made to concepts that do not yet exist (either through explicit or implied introduction) in the narrative (c.f., Halliday & Hasan, 1976). In the TREIN narrative context, only endophoric reference ties are considered appropriate. Exophoric reference ties that point to real things in the real world are considered inappropriate and are labeled as instances of *ambiguous introduction* (see also, aphoric, anaphoric, biphoric, endophoric, exophoric, multiphoric).

Verb/verbal (action/process): general terms used to indicate that a concept is a process; defined in opposition to entity concepts. For certain discourse purposes, verbal concepts can be conceptualized as entities (see Langacker, 1991) in which case they will take nominal forms (c.f., "the dog *was barking* at the angry bees"—verbal/process concept, with "*The dog's barking* upset the bees"—entity concept, see examples 16a-c).

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