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## Imagining Articles: What a and the Can Tell Us About the Emergence of DP

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## Imagining Articles:

### What *a* and *the* Can Tell Us About the Emergence of DP

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#### 1. Introduction: DP or NP

When does a nominal phrase project only to an NP category, and when does NP project to DP? Traditionally this was thought to be largely determined by semantics: nominal predicates are NPs and nominal arguments DP. More recently the view has been promulgated that it is some feature such as specificity that distinguishes the two categories: the DP projects if and only if there is referentiality or specificity (Chomsky 1998). We will refer to this as the specificity hypothesis. In this paper we argue against the specificity hypothesis using acquisition data. Particularly we argue that the principle of acquisition that adult-like behaviors indicate adult-like structures cannot be upheld if we assume the specificity hypothesis. We argue that specificity is necessary but not sufficient to the projection of the DP category. The DP category is a projection of a Point of View feature, [ $\pm$  hearer], where [+ hearer] means that the referent is uniquely identifiable by hearer.

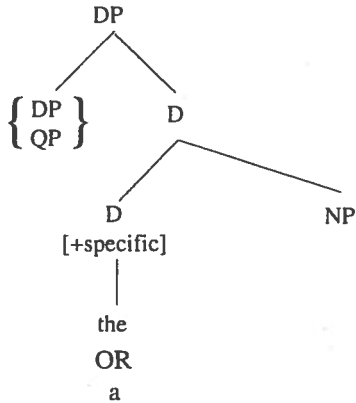
The critical facts are these: According to the specificity hypothesis, specific indefinite and definite determiners project the same structure. They should appear in D and project DP, and non-referential indefinite determiners should not. If mastery of a determiner indicates the grammar contains the adult-like structure which that determiner projects, then mastery of the specific indefinite *a* indicates the grammar contains DP. Since this is also the structure necessary to adult-like distribution of *the*, mastery of the two sorts of determiners should emerge at the same stage in acquisition.

Contrary to this expectation, we establish that children master the specific indefinite well before they master the appropriate use of *the*. We interpret this fact to indicate that their grammar projects an adult-like structure for the specific indefinite, at the same time that it lacks the adult-like structure for the definite determiner *the*. Strictly speaking, this view is not compatible with the specificity hypothesis if we assume the adult-behavior/adult-structure principle.

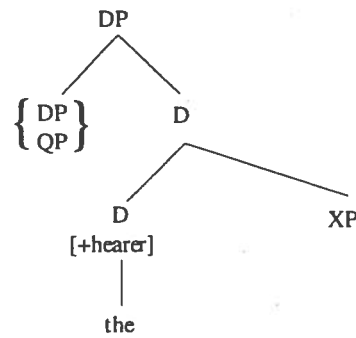
In place of specificity, we will argue that familiarity is what is required for the projection of DP. The notion of familiarity is widely held to be a critical determinant of article selection: familiarity of the referent of the DP correlates with the use of the article *the* in the expression of the DP. Since we explore the possibility that familiarity is critical to the projection of DP, this work also bears on the questions of what syntactic features spell out this notion and how these features emerge in children's nominal structures.

In the adult grammar, we assert that familiarity is captured by a POV feature [ $\pm$  hearer] which projects D. [+hearer] marks nominals whose referent is identifiable by the hearer, and occurs in all D projected by *the*. We refer to this as the familiarity hypothesis (1b) in contrast to the specificity hypothesis (1a).

1) The Adult Grammar



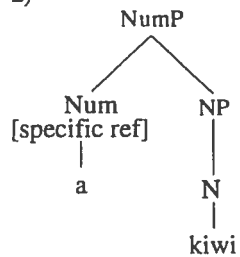
a. Specificity Hypothesis



b. Familiarity Hypothesis

The familiarity hypothesis analyses specific *a* as outside of D, and in this work we entertain the possibility that it is the head of a Number Phrase that projects above NP, as shown in (2).

2)



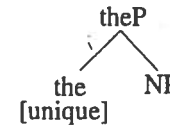
NumP is one value for the XP complement to D in (1b). It is the head of NumP which bears the feature [specific referent]. Thus, because NumP projects DP, all DPs have specific referents, but the expression of a specific referent is not necessarily analyzed in DP by the adult grammar.

Returning to the [ $\pm$  hearer] feature of D in (1b), a cognitive prerequisite to the interpretation of this feature is Theory of Mind. Because the feature [hearer] requires the speaker to access what a hearer believes s/he knows, this feature is interpretable only by a cognitive system including Theory of Mind. So the Familiarity Hypothesis predicts that, lacking Theory of Mind, a young child's

use of determiners like *the* should observably differ from that of adults. Specifically, Theory of Mind failers should use determiners like *the* differently than adults do. This study sets out to probe whether this prediction is borne out, and if so how the difference is realized.

Finally, since young children make use of the determiner *the*, it is clear that *the* projects even in grammars lacking the DP category. We assume that at this stage children are simply merging *the* with an NP, producing thePs, depicted in (3). Furthermore, we assume that the head of theP, *the*, is marked in the child grammar with some precursor to [ $\pm$  hearer] whose interpretation is not dependent upon Theory of Mind. The feature we propose is [unique]. *The*, lexically marked as [unique] occurs with nominals whose referent is uniquely identifiable by the child in the context of the utterance.

3) The Child Grammar



where [unique] = uniquely identifiable by the child in the context of the utterance

When the child arrives at the cognitive stage at which s/he posits the POV feature [+hearer], principles of economy dictate that projection of DP structure is preferred to a grammar including (3). Thus theP is eventually replaced by DP once the child has attained Theory of Mind.

2. Study Design and Methods.

The purpose of the study is to elicit from children noun phrases containing the articles *a* and *the* under conditions that controlled for the maximum number of extralinguistic contributions to familiarity and uniqueness. A total of 37 children and 10 adults participated in the study. The children all attended Fort Hill Preschool, a school affiliated with Smith College in Northampton, MA. The adults were undergraduates enrolled at Smith. Age groups are given in (4).

4) Subjects

Group	Age	Number
I.	3;6 to 3;11.30	12
II.	4;0 to 4;6.26	7
III.	4;7 to 4;11.23	9
IV.	5;0 to 5;5	9
V.	Adults	10

Our analysis of the inadequacies of earlier experiments on this topic (see Cziko 1986 for an overview) lead us to design the task so that no objects relevant to the elicitation were present during the experiment. That is, we remove visual context as a potential source for familiarity or uniqueness. Children were presented with a series of one- to two-sentence long stories, and asked a question after each designed to minimally elicit a DP response. No

contextual supports were used: all aspects of the stories were imagined. After the child answered the questions, they placed a marble on a game board.

There were a total of 40 questions divided into eight conditions. The conditions were designed to elicit distinct types of nominals plus an article *a* or *the*. Our eight conditions are charted in (5). Their labels reflect the anticipated adult response in the condition.

#### 5) Types of *a* and *the*

condition number	condition label	description
COND 1	Part-the:	inherent part of previously mentioned object
COND 2, 7	Familiar-the:	previously mentioned object
COND 3	Specific-a:	referent known to speaker only
COND 4, 8	Multipac-a:	one of a previously mentioned set
COND 5	Non-referential-a:	non-referential, but assumed in situation
COND 6	Predicational-a:	nominal following <i>have</i>

In (6) a representative example of the sort of questions that were asked in each condition is provided.

#### 6) Examples of the 40 questions used in elicitation task.

COND 1: Adrienne got a pet hamster for her birthday and put it in a nice cage.

It tried to escape so she quickly closed something - What did she close?

COND 2 and 7: Emily has two pets, a frog and a horse. She wanted to ride one of them, and so she put a saddle on it.

COND 2: Guess which. COND 7: What was it?

COND 3: I'll bet you have something hanging on the wall of your room at home. What is it?

COND 4 and 8: Three ducks and two dogs were walking across a bridge. One of the animals fell off the bridge and said "Quack".

COND 4: Guess which. COND 8: What was it?

COND 5: Cindy is going to the pond. She wants to catch some fish. What will she need?

COND 6: Think of a baseball player. Can you imagine what one looks like? What does he have?

As indicated in (6), the difference between conditions 2 and 7 and 4 and 8 had to do with the type of question that was asked, whether it contained the WH-word *which* or *what*. In fact, this difference will not play a role in what we report on here. (7) charts our expectations of adult responses as reflected in the condition labels and the actual responses of the adults in our study.

#### 7) Adult responses to the stimuli

Condition	Adult Response	Syntactic Category
1: PART THE	100% the	DP
2,7: FAMILIAR THE	100/94% the	DP
3: SPECIFIC A	97% a	DP or NumP
4,8: MULTIPAC A	50/40% one of the	DP
	20/30% a	ambiguous
	30/30% the	DP
5: NON-REFERENTIAL A	100% a	NP
6: PREDICATIONAL A	100% a	NP

For reasons mostly related to complexity, we expect mastery of nominal categories to follow a certain sequence. At the earliest stage, the child grammar contains only an NP. This is superseded by a stage at which the grammar contains NP, NumP, and theP, which precedes the grammar containing NP plus DP. The adult grammar distinguishes NP, DP and quantificational DPs.

Given that our youngest subject was 3;6, we expected the children to be beyond the earliest stage outlined. Since we are probing whether the child behaviors are compatible with projecting DP, we made no *a priori* assumptions beyond this. So, given the age of our subjects we make the prediction in (8).

8) Prediction independent of hypothesis: All children will exhibit adult-like responses in conditions 5 and 6 which require the projection of NP.

In addition, the specificity hypothesis (1a) predicts that if children perform well on any case involving a specific (and so projecting DP), they will perform well in all the other conditions where the response makes specific reference (9).

9) Prediction of the Specificity Hypothesis: If responses in any of conditions 1, 2,3 or 7 — all requiring the expression of a specific or uniquely referential response — is at mastery, then all will be at mastery.

On the other hand, the familiarity hypothesis predicts that those conditions requiring a *the* response from the children will pattern together because they make use of a similar structure building operation. However, since the Familiarity Hypothesis claims that no single category is projected by specificity, that is children at this stage have no DP, it does not expect uniform mastery of specific-*a* and *the*. Also, as already stated, the familiarity hypothesis predicts Theory of Mind failers should use *the* differently than adults do.

#### 10) Predictions of the Familiarity Hypothesis

- Responses in conditions 1, 2 and 7 — all requiring the expression of a phrase containing *the* — will correlate.
- There is no prediction of uniform mastery of specific-*a* and *the* responses.
- Theory of Mind failers should use *the* differently than adults do.

### 3. Results and Discussion.

In analyzing the results, we considered only responses including an article *a* or *the* or a bare singular. That is, we removed all legitimate uses of bare plurals, names, possessives and so forth from consideration. A chance response containing either *a* or *the* can be calculated at 33%.

The results reported here maintain the separation of subjects into four age groups. However, there are no significant between age group effects: all our children behaved similarly across conditions. There are significant differences between conditions (at the .0001 level), and we will focus upon these.

Results from the children are reported in the charts in (11) through (13) and in (15). The percent of *a*-N, *the*-N and bare singular responses in each condition are presented within four age groups: for 3-1/2, 4, 4-1/2, and 5 year olds.

Consider the chart in (11). Here are displayed the data gathered in conditions 5 and 6, the non-referential and predicational conditions, both cases where an article *a* was used by adults. In the first two rows we report the percent of responses containing the article *a*, in the next two rows, the percent of null singular responses, and in the final two rows the percent of responses which were opposite the adult response, those containing the article *the*.

#### 11) NON-REFERENTIAL A AND PREDICATIONAL A

Adult Response = 100% 'a-N' in both conditions

	Gr1	Gr2	Gr3	Gr4
Same as Adult Response: 'a-N'				
COND5	94	82	83	86
COND6	96	87.5	97.5	95.5
NullSg				
COND5	04	12	14	12
COND6	04	12.5	-	04.5
Opposite Adult Response: 'the-N'				
COND5	02	06	02	02
COND6	-	-	02.5	-

COND5 and COND6 correlate positively,  $r=.374$ ,  $p=.02$

All four groups of children show adult-level mastery in these two conditions as we predicted, (8). In addition the conditions correlate positively ( $r=.374$ ,  $p=.02$ ), an observation we consider consistent with analyzing each as requiring the projection of the same sort of category, namely NP. This finding is consistent with previous studies. Maratsos (1976) reported mastery in these conditions with his three and four year olds: 3=83% and 4=94%.

Chart (12) contains results in the condition designed to elicit the specific *a*. Again the children in all four groups responded as adults. Adult-like responses in this condition did not correlate with success in any other condition. Particularly, there was no correlation between this condition and those requiring any sort of response containing *the*, contra the prediction of the specificity

hypothesis (9) but consistent with those of the familiarity hypothesis in (10). (In fact there is a significant difference at the .0001 level between the children's responses in the four conditions where the responses made specific reference.)

#### 12) SPECIFIC A

Adult Response = 97% 'a-N'

	Gr1	Gr2	Gr3	Gr4
Same as Adult Response = 'a-N'				
COND3	86	96	97	92
NullSg				
COND3	14	04	03	08
Opposite Adult Response: 'the-N'				
COND3	-	-	-	-

In previous work on the Specific A condition, Schaeffer (1999) predicts (and finds) overgeneration of *the* for specific *a*. We attribute this in part to the nature of the task in that study. Children saw Mickey Mouse complete a drawing of a house. They were asked who Mickey Mouse was, and after responding, what Mickey Mouse drew. Since the picture is complete and present, we conclude that either response *a house* or *the house* is possible here. What is important to see here is that the prediction of over-generation is particular to the Specificity Hypothesis: it follows from the fact that specific *a* and *the* are both D, and that Schaeffer predicted that [+hearer] would be acquired before [+speaker]. The Familiarity Hypothesis makes no such prediction, and we find no such pattern in the data. However, it should be noted that her subjects were younger than ours.

Response types in the three conditions through which we expected to elicit nominals plus the article *the* are reported in (13). All three conditions, 1, 2, 7, correlate with each other, conditions 2 and 7 at a highly significant level (1 and 2:  $r=.414$ ,  $p=.01$ ; 1 and 7:  $r=.378$ ,  $p=.02$ ; 2 and 7:  $r=.741$ ,  $p=.0001$ ). We consider this observation consistent with analyzing responses in each of these cases as requiring the projection of the same sort of category, DP or theP.

#### 13) THE: PART THE, FAMILIAR THE

Adult Response = 100% 'the-N' in CONDs 1 and 2

94% 'the-N' in COND 7

	Gr1	Gr2	Gr3	Gr4
Same as Adult Response: 'the-N'				
COND1	96	84	86	90
COND2	67	51	70	64
COND7	64	47	53	53
NullSg				
COND1	04	10	07	10
COND2	30	20	22.5	20
COND7	20	25	22	16

13 con't)	Gr1	Gr2	Gr3	Gr4
Opposite Adult Response: 'a-N'				
COND1	-	06.5	07	-
COND2	03	26	07.5	18
COND7	15	28	24.5	31

All three CONDS correlate: 1 and 2:  $r=.414$ ,  $p=.01$   
 1 and 7:  $r=.378$ ,  $p=.02$   
 2 and 7:  $r=.741$ ,  $p=.0001$

NONE OF CONDS 1, 2 or 7 correlate with COND 3  
 These four CONDS differ significantly at the .0001 level

The two crucial observations are these: First, children do not perform as well in the three conditions in (13) as they did in the Specific A condition reported in (12). This is contrary to the prediction of the Specificity Hypothesis (9). Since children exhibit adult-like responses in one condition involving specificity, and so in principle utilize the adult-like structure in that case, but they do not respond in an adult-like fashion in other conditions involving specificity, we conclude that all articles which combine with nominals to specifically identify some entity do not reside in the same structural position. Given the difference in acquisition of specific-*a* and *the*, we conclude these articles do not bear the same features --- not in the child grammar and not in the adult grammar. The indefinite specific must be in some position other than that occupied by *the*. This result is inconsistent with the Specificity Hypothesis, but is consistent with predictions of the Familiarity Hypothesis.

Second, we find that the children in our study do not master all uses of *the* simultaneously (Compare Condition 1 to Conditions 2 and 7 in (13).) We interpret this as evidence that their grammar does not contain the adult grammar category DP. For the children, neither *a* nor *the* is of the category D. Instead we suggest that uses of *the* licensed by the grammar of these children are analyzed as a head of theP and is marked [unique]; specific-*a* is the head of a Number Phrase, NumP and is marked [specific referent].

Three questions arise at this point: Why NumP? Why theP? And why feature [unique]? In the remainder of this section we address these concerns.

As diagrammed earlier in (2), NumP projects over NP and bears the feature [specific referent]. NumP is a viable option here because it is empirically true that children use number noun phrases and because these noun phrases specifically refer. Num also bears a cardinality feature [ $\pm$  cardinal]. theP is the minimal category that may contain *the*, and so a logical choice for children's first uses of *the* in absence of the adult category DP.

What evidence do we have that the head of theP bears the feature [unique]? The evidence derives from further examination of the results in the Part The and Familiar The conditions (13). The Part The condition -- the one in which the children perform at adult-like levels -- requires an answer that is a part of a previously mentioned object. That part necessarily has a unique reference. However, the object referred to by the response in the Familiar The conditions is unique only by implicature.

When they hear a statement like 'A duck and a pig were in a field', adults use the Gricean maxim of quantity (14a) to make a scalar implicature (14b).

(14)

- a. Maxim of Quantity: Make your contribution as informative as required, and no more informative than is required. (Grice, 1975)
- b. Scalar implicature: Use of a weaker form conversationally implicates that a stronger entailing form does not obtain. (Horn, 1984)

For adults, the speaker's use of the determiner *a* in *a duck* or *a pig* implicates there was only one duck or one pig in the context. While the statement *A duck is walking in the field* is certainly true in the condition that two or three or even an entire flock of ducks were walking in the field, adults reason using (14) that if the speaker is saying as much as s/he can, than if more than one duck or pig were in the context, the speaker would have said *some pigs* or *three ducks* or whatever is true. Since the speaker did not use such stronger entailing forms, then the adult hearer infers that *a duck* refers to one and only one unique duck.

We assert that the calculation of such an implicature involves the assessment of other people's belief perspectives. That is, calculation of implicature requires Theory of Mind.

Lacking Theory of Mind, the children do not make such an implicature. They do not conclude that there is a unique duck in the discourse. They do not deduce the uniqueness of the referent mentioned in any of the stories in the Familiar-The conditions.

Thus, in our study, children's adult-like use of *the* correlates with conditions in which, by hypothesis, they can conclude the uniqueness of the referent. We take this correlation as evidence that in the child grammar the head of the projection containing *the*, namely theP, is marked with the feature [unique].

Notice that when previous mention is bolstered by the presence of the object referred to in the discourse context, children will be able to observe uniqueness without having to infer it. So if we had presented them with a picture of one duck and one pig walking in a field in the Familiar The condition, then said *A duck and a pig are walking in a field*, we expect that the percent of adult-like responses to our study question would have been nearly 100%. But this did not take place in our study.

We have discussed the results primarily from the point of view of the familiarity hypothesis. We could have explored various versions of the specificity hypothesis at this point. We chose not to do so for principled reasons. We can think of only one way to maintain the specificity hypothesis in the face of these data, that is if one proposes that children project DP from different versions of D, each marked with different features in addition to [specific referent], and that they command these different versions of DP to different degrees. However this is equivalent to saying there really isn't a uniform category DP.

The results in our final two conditions, reported in (15), are not directly relevant to the point of this paper. In the Multipac-A conditions (Conditions 4 and 8), subjects are asked to identify one member from a familiar group of

identical individuals. Conditions 4 and 8 correlated with each other at a highly significant level ( $r=.747$ ,  $p=.0001$ ). None of the children were near mastery in this condition.

#### 15) MULTIPAC A

Adult Response = 80% `one of the-N' OR `a-N' in COND 4  
70% `one of the-N' OR `a-N' in COND 8

	Gr1	Gr2	Gr3	Gr4
Same as Adult Response: `one of the-N' OR `a-N'				
COND4	24	28	05	16
COND8	24	26.5	31	24
NullSg				
COND4	27	16	31	29
COND8	27	21	29	19.5
Opposite Adult Response: `the-N'				
COND4	49	56	64	56
COND8	49	53	41	56

CONDs 4 and 8 correlate at a highly significant level:  $r=.747$ ,  $p=.0001$

CONDs 4 and 8 correlate negatively with CONDs 2 and 7:

4 and 2:  $r=-.337$   $p=.04$       4 and 7:  $r=-.390$   $p=.02$   
8 and 2:  $r=-.298$   $p=.08$       8 and 7:  $r=-.420$   $p=.01$

The Multipac Conditions require an operator which will allow choice of (explicitly or freely) one object from a set of like objects. This motivates projection of structure (QP) to house the operator. We attribute the difficulties in these conditions to the inability of the child grammar to handle this complexity.

#### 4 Conclusions

In this study we have argued that the grammar of children ages three to five contains an adult-like NP and NumP category, but that it does not contain the adult-like DP category. Because children at this age use *the* when they are able to identify a unique referent, we have argued that the head of the merged category theP is marked [unique]. In addition, building on the acquisition evidence, we have argued that the adult grammar analyses specific *a* and *the* differently, making use of the head of NumP for specific *a*, and a D[+hearer] to project *the*.

To the extent that the predications of the familiarity hypothesis are borne out and that it successfully accounts for the data observed, it is to be preferred over the specificity hypothesis which fails to account for the pattern in these data.

In addition the familiarity hypothesis neatly converges with two independent lines of current acquisition research: that documenting a lack of DP in the child grammar, and that exploring the emergence of Theory of Mind in children and language specific Point of View features in their speech.

On the first point, de Villiers and Roeper (1995) suggested that children aged four to six do not respect DP as a barrier to wh-movement. This work leads to

the suggestion that the four- and five-year-old child's representation may not yet be a full DP in the relevant conditions. So, children at these ages allow long-distance extraction in sentences such as (16a) as well as in light verb constructions such as (16b) for which long distance extraction is acceptable to adults.

#### 16) From de Villiers and Roeper (1995)

- a. How did the children like the decision to run? (e.g. \*"with bare feet")  
b. How did the children make the decision to run?

These results suggest that children establish a DP in (16a) in contrast to (16b) sometime between 4 and 6 years, at which point (16a) blocks long distance movement. Given these results we would expect uniform mastery across conditions eliciting the article *the* in our study at the same time that children in these studies showed sensitivity to a DP barrier.

On the second point, the familiarity hypothesis in (1b) suggests that DP will emerge with the feature [ $\pm$  hearer], a feature requiring Theory of Mind. Prior work indicates Theory of Mind arises around the age of four. If this is the case then we should expect for the younger two groups of children in our study to perform less well than the older two groups with respect to the article *the*, and for the older children to have a full DP. That we did not obtain such results would seem to present us with a quandary.

However, according to previous research, some grammatical repercussions of Theory of Mind are not observed in the grammar until well over a year after children are passing Theory of Mind tests. This is the case for sequence of tense (Hollebrandse 1997) and referential opacity (de Villiers, Pyers & Broderick 1997). The lack of between subject effects here is consistent with this work. Again we expect clear differences between subjects as we add older children into our study.

Overall, what we have proposed here about DP together with work exploring other functional categories leads us to speculate that CP, IP and DP each require in their fullest adult specification, a feature marking for Point of View (Roeper & Hollebrandse 1998). In the case of DP, this feature is best expressed as [ $\pm$  hearer].

#### Endnotes

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## The Role of the Expletive in the Acquisition of a Discourse Anaphor

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### 1. Introduction

Do children assume a unified analysis for a given phonological unit such *there*? Or do they immediately analyze as virtual homonyms independent uses? In this paper, we raise a third possibility: these uses are not acquired simultaneously, rather they are acquired sequentially and earlier representational triggers trigger later ones.

1) Proposal: Phonological units with distinct functional and referential uses are acquired in triggering sequences.

Traditionally linguistics has assumed that one grammar is replaced another grammar when new input acts as a trigger to force the addition of syntactic structure; thus triggers are elements that force the addition of structure. Some triggers may be specifically linked to lexical items which directly require certain projections. For example, the complementizer *that* requires a CP.<sup>1</sup> In addition, moved constituents, such as fronted VPs (*To go is a good idea*), can trigger the addition of a rule or a structure.

We show here that an abstract relationship can serve as a trigger as well. Specifically we are concerned with the long distance or discontinuous co-referentiality between *there* and its antecedent, (2):

2) John is in the pool; and Bill is in there; too.

We argue here that comprehension of the relationship between an expletive *there* and its associate, *a cat* in (3), triggers the capacity to recognize the relationship between the discourse anaphor *there* and its antecedent in (2).

3) There; is a cat; on the mat.

Thus we demonstrate that the statement in (1) holds and that abstract devices can serve as triggers.