

Focus, Activation, and *This*-Noun Phrases: An Empirical Study

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Abstract

We report on an analysis of the use of THIS-NPs, i.e., noun phrases with the determiner *this* and the demonstrative pronouns *this* and *these*. We test the THIS-NP hypothesis, a refined and clarified summary of earlier proposals, such as (Linde, 1979; Gundel, Hedberg, and Zacharski, 1993; Passonneau, 1993), by way of a systematic analysis of the uses of these NPs in two different genres. In order to carry out the analysis, we devised a reliable annotation scheme for classifying THIS-NPs in our corpus as *active* or not. 92% of THIS-NPs in our corpus were classified as referring to entities which are active in this sense. We tested three formalizations of the THIS-NP hypothesis. The version that received most empirical support is the following: THIS-NPs are used to refer to entities which are *active* but not the *backward-looking center of the previous utterance*.

1 Motivation

Noun phrases with the determiner *this* and the demonstrative pronouns *this* and *these* (THIS-NPs henceforth)¹ are known to have at least three different functions. In formal semantics / pragmatics, they have mostly been studied for their deictic function: their ability to refer to objects in the visual situation, and particularly to objects the speaker is pointing at (Kaplan, 1979; Jarvella and Klein, 1982; André, Poesio, and Rieser, 1999).

- (1) A [salesman on a car lot, nodding in the direction of a nearby cluster of trucks:]
These vehicles have four-wheel drive. (Roberts, 1999)

¹We will mostly avoid the use of the term 'demonstrative' as the starting point of this research is the realization that not all these uses are 'demonstrative' in Kaplan's sense (Kaplan, 1979). We are concentrating on THIS-NPs because our corpus contains very few cases of *that* noun phrases.

It is, however, well-known that THIS-NPs can be used in other ways as well; and indeed, preliminary analyses of the corpus used in this study suggested that only about 39% of THIS-NPs were cases of visual deixis (Poesio, 2000). A second function of ‘demonstrative’ NPs was studied by Linde (1979), Gundel, Hedberg, and Zacharski (1993), and Passonneau (1993), among others. These authors pointed out that *pronominal* THIS-NPs in particular² are often used to refer to a discourse entity that is discourse-old, but not ‘in focus’. In the following example, Martin Carlin is clearly established as ‘focus’ by the time utterance d is encountered:

- (2)
- a. In spite of his French name, **Martin Carlin** was born in Germany and emigrated to Paris to become an *ébéniste*.
 - b. **He** settled there with other German and Flemish craftsmen and took employment in the workshop of Jean-Francois Oeben, whose sister **he** married.
 - c. Inventories made after **Carlin’s** death show that **the ébéniste** and **his** wife lived modestly in a five-room apartment in THE FAUBOURG SAINT-ANTOINE, an unfashionable quarter of Paris, with simple furniture, a few pastel portraits, and a black lacquer clock.
 - d. Few of **Carlin’s** wealthy clientele would have cared to venture into THIS AREA

the antecedent of the THIS-NP *this area*, the Faubourg Saint-Antoine, is clearly not the main topic of conversation at this point.

Finally, it is also known (Webber, 1991; Asher, 1993) that THIS-NPs can be used to refer to abstract objects such as propositions or plans (Webber used the term DISCOURSE DEIXIS for these cases) as in the following example:

- (3) For example, binocular stereo fusion is known to take place in a specific area of the cortex near the back of the head. Patients with damage to this area of the cortex have visual handicaps but they show no obvious impairment in their ability to think. This suggests that stereo fusion is not necessary for thought. (Webber, 1991)

What the discourse and visual deixis cases, and the cases studied by Linde and Passonneau, have in common is that in all cases, the THIS-NP is used to refer to an entity which, while salient, is not the current ‘topic’ or ‘discourse focus’ (we are deliberately using these terms in a vague way here). This intuition is at the heart of Passonneau’s account of the anaphoric use of demonstrative pronouns, as well as of Gundel *et al.*’s account of the use of THIS-NPs (1993). We concentrate on Gundel *et al.*’s proposal in what follows.

Gundel *et al.*’s theory of the conditions under which referring expressions are used assumes that two factors interact in determining the choice of referring expression.

²Passonneau studied the use of *that* rather than *this*.

The first of these factors is the ACTIVATION HIERARCHY: a speaker’s choice of expression depends in part on assumptions about the ‘cognitive status’ of the referent in the hearer’s information state. Gundel *et al.*’s ‘activation levels’ range from TYPE IDENTIFIABILITY for indefinite NPs, to IN FOCUS for pronouns.

in focus	> activated >	familiar >	uniquely > identifiable	referential >	type identifiable
<i>it</i>	<i>that</i> <i>this</i> <i>this N</i>	<i>that N</i>	<i>the N</i>	indefinite <i>this N</i>	<i>a N</i>

The second factor playing a role in Gundel *et al.*’s account are Grice’s maxims of quantity:

Q1 Make your contribution as informative as possible

Q2 Do not make your contribution more informative than necessary

These maxims prevent the use of referring expressions associated with higher activation levels to refer to entities with a lower status, as we will see in a moment.

Gundel *et al.* propose that the use of THIS-NPs, as well as of pronoun *that*³ requires the referent to be ACTIVATED, which status they characterize as “being represented in current short-term memory.”⁴ This condition would also license the use of THIS-NPs to refer to entities in focus; what prevents this, according to Gundel *et al.*, is Grice’s Q1: because a more specific referring form exists, the use of a demonstrative for entities in focus would implicate a lower activation level.

These claims can be summarized as follows:

The THIS-NP Hypothesis : THIS-NPs are used to refer to entities which are ACTIVATED. However, pronouns should be preferred to THIS-NPs for entities IN FOCUS.

We believe the class of proposals exemplified by Gundel *et al.* can be made at the same time more broad in their coverage and more precise by (i) specifying which entities are supposed to be ‘in focus’ and (ii) by being more explicit about the types of entities that can be ‘in short term memory’ without being ‘in focus’. We carried out a corpus investigation aimed at refining, clarifying and testing these claims.

2 The GNOME corpus

In recent years there has been an increasing interest in corpora as a means to explore linguistic generalizations, and increased sophistication in the methods used. Improvements include better techniques for storing and annotating language corpora, based on

³But not of full *that* NPs, which only require the referent to have the lower ‘familiar’ status.

⁴In fact, for THIS-NPs, Gundel *et al.* claim that the referent has to be speaker-active—introduced by the speaker.

annotation standards such as XML. They also include techniques for measuring the RELIABILITY of a given annotation scheme (Passonneau and Litman, 1993; Carletta, 1996).

One of the main motivations for this work was that we felt that we could improve upon previous analyses of the uses of THIS-NPs by building on the results of our previous corpus-based studies of the uses of referring expressions and of salience (Poesio et al., 2000; Poesio, 2000). One of the useful outcomes of this work is the GNOME corpus, whose NPs, the anaphoric relations between them, and their visual deixis status, have been marked in a reliable way (Poesio, 2000). We discuss the corpus in this section. A second resource that we could use are the methods for tracking the BACKWARD-LOOKING CENTER, or CB (Grosz, Joshi, and Weinstein, 1995; Walker, Joshi, and Prince, 1998)—a well-known formalization of the notion of ‘local focus’—automatically, instead of relying on hand-identification, proposed in (Poesio et al., 2000). These methods also allowed Poesio *et al.* to test several definitions proposed in the literature, among which they were able to find the ‘best’ (i.e., those which resulted in fewer violations of the claims of Centering theory) (Poesio et al., 2000). We summarize this study in the next section. These two previous pieces of work allowed us a more systematic exploration of the conditions under which the use of a THIS-NP was licensed.

2.1 The GNOME corpus: annotation scheme

The annotation of the GNOME corpus followed a systematic manual, available from the GNOME project’s home page at <http://www.hcrc.ed.ac.uk/~gnome>; here, we discuss the most important details of the scheme. All units of text in the GNOME corpus that might be identified with utterances (in the Centering sense) are marked as `<unit>` elements; the attributes of such elements identify finite and non finite clauses, and various other properties. Each NP is marked with a `<ne>` tag and with a variety of attributes capturing syntactic and semantic properties. Important attributes for our purposes are `cat` (specifying the type of an NP), `gf` specifying its grammatical function, `deix` (whether the object is a visual deictic reference or not) and `generic` (whether the NP denotes generically or not).

A separate `<ante>` element is used in the GNOME scheme to mark anaphoric relations; the `<ante>` element itself specifies the index of the anaphoric expression and the type of semantic relation (e.g., identity), whereas one or more embedded `<anchor>` elements indicate possible antecedents (the presence of more than one `<anchor>` element indicates that the anaphoric expression is ambiguous). (See 4.)

```
(4) <unit finite='finite-yes' id='u227'>
    <ne id='ne546' gf='subj'> The drawing of
      <ne id='ne547' gf='np-compl'>the corner
        cupboard, </ne></ne>
    <unit finite='no-finite' id='u228'>or more
      probably
        <ne id='ne548' gf='no-gf'> an engraving of
          <ne id='ne549' gf='np-compl'> it
```

```
</ne></ne>
</unit>,
...
</unit>
<ante current="ne549" rel="ident">
<anchor ID="ne547"></ante>
```

2.2 The GNOME corpus: texts

The GNOME corpus currently includes texts from three domains; texts from two domains were used in this study. The museum subcorpus consists of descriptions of museum objects and brief texts about the artists that produced them.⁵ The pharmaceutical subcorpus is a selection of leaflets providing the patients with mandatory information about their medicine.⁶ Each subcorpus contains about 6,000 NPs; in this study we used texts from the first two domains, for a total of about 3,000 NPs, including 112 THIS-NPs. As for utterances, the corpus includes about 500 sentences, and 900 finite clauses; the actual number of utterances used in the study is one of the parameters that we varied, as discussed below.

3 Methods

For this study, we relied in part on the existing annotation of the GNOME corpus, and did some further annotation. Our approach can be summarized as follows:

1. Provide a characterization of ‘activated’ that can be reliably annotated, and mark all ‘activated’ entities in the corpus, utterance by utterance.
2. Compute all entities which are ‘in focus’ at a given time, using notions from Centering theory (Grosz, Joshi, and Weinstein, 1995) like CB and CP to come up with several alternative definitions of the notion of ‘in focus,’ and previously developed methods for automatically computing the CB and CP in the annotated corpus according to several ways of defining the notions of ‘utterance’ and the ranking function, using the existing annotation.
3. For each THIS-NP, check whether it refers to an entity which is activated, and whether the entity is in focus.

⁵The museum subcorpus extends the corpus collected to support the ILEX and SOLE projects at the University of Edinburgh. ILEX generates Web pages describing museum objects on the basis of the perceived status of its user’s knowledge and of the objects she previously looked at (Oberlander et al., 1998). The SOLE project extended ILEX with concept-to-speech abilities, using linguistic information to control intonation (Hitzeman et al., 1998).

⁶The leaflets in the pharmaceutical subcorpus are a subset of the collection of all patient leaflets in the UK which was digitized to support the ICONOCLAST project at the University of Brighton, developing tools to support multilingual generation (Scott, Power, and Evans, 1998).

3.1 Specifying 'In Focus'

Centering Theory The notion of 'topic' or 'discourse focus' is notoriously difficult to formalize. We used as the basis for our investigation of this notion the terminology and ideas introduced in Centering Theory by Grosz, Joshi, and Weinstein (1995) and Walker, Joshi, and Prince (1998), in particular the notions of Backward-Looking Center (CB) and Preferred Center (CP). In the 'mainstream' version of Centering by Grosz, Joshi, and Weinstein (1995), it is assumed that each UTTERANCE introduces new discourse entities (or Forward-Looking Centers) into the discourse, and in so doing, updates the 'local focus'. It is further assumed that the discourse entities introduced (or better, REALIZED) by an utterance are ranked; the most highly ranked entity in an utterance is called the CP. The CB is Centering's equivalent of the notion of 'topic' or 'focus', and is defined as follows:

CB $CB(U_i)$, the BACKWARD-LOOKING CENTER of utterance U_i , is the highest ranked element of $CF(U_{i-1})$ that is realized in U_i .

It should be noted that Centering provides no definition of the notions of 'ranking', 'utterance' and 'realization'; researchers using the theory have to specify their own. For her comparative study of *it* vs *that*, Passonneau developed her own notion of CB, that she called 'local center'. Poesio *et al.* did a comparative analysis of several ways of 'filling in' Centering Theory's parameters (Poesio et al., 2000; Poesio et al., 2002). One of their results was that Passonneau's notion of local center, while predicting pronominalization well (in the sense that virtually all realizations of discourse entities that were 'local center' in Passonneau's sense were pronominalized), is very restrictive—only about 20 utterances out of 500 in the corpus have a 'local center' in Passonneau's sense. Two instantiations of the notion of CB gave the best (and pretty much equivalent) results. Both of these involved identifying utterances with sentences, and allowing for indirect realization of the CB; they differed in the ranking function: in one case, grammatical function (subjects rank more highly than objects that rank more highly than adjuncts) augmented with a linear disambiguation factor; in the other, Strube and Hahn's (1999) ranking function based on 'information status' (according to which hearer-old entities are ranked more highly than inferrables, which in turn are ranked more highly than hearer-new entities (Prince, 1992)).

Using Centering Theory to specify the notion of 'in focus' There are three natural ways of using Centering theory to formalize Gundel *et al.*'s idea that speakers adhering to Grice's maxims would prefer not to use THIS-NPs to refer to entities 'in focus':

1. THIS-NPs are preferentially used to refer to entities other than $CB(U_i)$, the CB of the utterance containing the THIS-NP.
2. They are used to refer to entities other than $CB(U_{i-1})$, the CB of the *previous* utterance.

3. They are used to refer to entities other than $CP(U_{i-1})$, the most highly-ranked entity of the *previous* utterance.

We considered all three of these possibilities, under all of the 'best' ways of specifying the parameters of Centering Theory identified by Poesio *et al.*: identifying utterances with either sentences or finite clauses; considering both ranking based on grammatical function and ranking based on 'information status'; and allowing for both direct and indirect realization.

3.2 Clarifying 'Activated'

Types of Activated Entities The second aspect of the THIS-NP hypothesis that needs clarification is what it means for an entity to be 'activated'. According to Gundel *et al.*, an entity is 'activated' if it is in 'current short term memory'. But 'short-term memory' could be taken to include all discourse-old entities, or all and only entities in the global focus (Grosz and Sidner, 1986), or all and only entities in the local focus. It's also not clear how discourse-deictic entities could be taken to be part of short-term memory.

Our starting point in attempting to define the notion of 'activated' more precisely was the hypothesis that an entity is 'activated' if it is in the GLOBAL FOCUS and is 'sufficiently salient'. The notion of global focus was introduced by Grosz and Sidner (1986), to characterize the entire set of entities which are in some sense part of the attentional state of the participants of a discourse. Grosz and Sidner do not provide a fully explicit specification of what's in the global focus, but they do introduce a few key ideas useful to make the idea of activation more specific. These ideas were further developed in subsequent research; our proposals here are mostly based on the formalization proposed in (Poesio, 1993; Poesio, 1994; Poesio and Traum, 1997). One contribution of this later work that matters in the context of demonstratives, which often have a deictic interpretation, is the partial clarification of the relationship between linguistic information and visual information in the global focus. Poesio argued that Grosz and Sidner's hypothesis that the entire global focus can be formalized in terms of a single structure, a stack, is probably not right, and it is best to hypothesize separate structures for the 'linguistic' component of the global focus and for its 'visual' component, the former having a stack-like structure and containing every discourse entity introduced by a construction algorithm similar to that of DRT⁷, the latter having a situation-based structure and containing every entity in the visual scene. We will make similar assumptions here, assuming that anaphoric and discourse deictic THIS-NPs take their interpretation from the stack, whereas (visually) deictic THIS-NP get their interpretation from the visual component of the global focus.⁸

⁷Similar proposals are also made in SDRT (Asher, 1993; Lascarides and Asher, 1993).

⁸(Walker, 1998) suggests that the global focus has a cache structure. We will not be concerned with this issue here, except to notice that a cache model doesn't automatically give us a definition of 'activated': we still need to explain how entities in the visual situation enter in the cache.

One of the aspects of Grosz and Sidner's model from our perspective is the idea that the global focus—both in its 'linguistic' and in its 'visual' component—contain implicitly all sort of entities beyond those explicitly mentioned or currently in the visual focus of attention; these entities are added to the global focus either as a result of immediate inference, or as a result of search procedures activated by the use of anaphoric expressions (Haviland and Clark, 1974). Grosz (1977) and Sanford and Garrod (1981) introduced the term IMPLICIT FOCUS to refer to this aspect of the global focus. One of the central functions of THIS-NPs is to introduce into the discourse objects previously part of the implicit focus. The problem is that we don't have a fully worked out theory of which entities are in the implicit focus; the best we can do at the moment is an analysis by cases, as done, e.g., by Byron (2002).

Kamp and Reyle (1993) discuss in some detail one type of entity that can be 'in the implicit focus' in this way, plural entities such as *they* in the following:

- (5) *John met Mary at the movies. They had both gone to see an old French film.*

Webber (1991) and Asher (1993) analyzed in detail a second type of entity that can enter 'implicit focus,' propositions, as seen in example (3). A third type of entity that can enter implicit focus, and not previously discussed (to our knowledge) in connection with uses of THIS-NPs, are *types*, in the broad sense, i.e., references to concepts whose instantiations are explicitly mentioned in the discourse. References to types take a variety of forms, the simplest among which is simply a full demonstrative like *this type* or *this kind*:

- (6) *A great refinement among armorial signets was to reproduce not only the coat-of-arms but the correct tinctures; they were repeated in colour on the reverse side and the crystal would then be set in the gold bezel.*

Although the engraved surface could be used for impressions, the colours would not wear away.

The signet-ring of Mary, Queen of Scots (beheaded in 1587) is probably the most interesting example of this type;

More complex references to types refer to concepts introduced only very implicitly in the text; in this case, the process of adding the antecedent to the implicit focus, to the extent that it actually takes place (Poesio and Reyle, 2001), appears to be driven entirely by the use of the demonstrative:

- (7) *The craftsmen also bent carefully over cheaper metals or glass to create the jewelry that would adorn the arm of the humble servant girl, or the ordinary, insignificant woman, and would accompany her to her final resting place. This yearning for embellishment, this special relationship between a woman and her jewelry emerges quite clearly here*

Certain types of ellipsis can also be considered as references to a type:

- (8) *The cutouts of the first are decorated with griffins set in rectangular panels, and those of the second with large buttons ...*

On the basis of these considerations, we came up with a list of cases in which entities can be considered as being ‘activated’ precise enough that can be reliably annotated. To avoid confusions with Gundel *et al.*’s more general formulation, we introduce a new term, ACTIVE, for our own characterization. An entity is ACTIVE if that entity

1. is in the visual situation; or
2. is a CF of the previous utterance; or
3. is part of the implicit linguistic focus. We only consider as part of the implicit linguistic focus those entities that can be CONSTRUCTED out of *the previous utterance*. An entity can be constructed out of an utterance if:
 - (a) it is a plural object whose elements or subsets have been explicitly mentioned in that utterance; or
 - (b) it is an abstract entity introduced by that utterance. We consider two types of abstract entities:
 - i. propositions
 - ii. types

The Markup Scheme for Active Entities We tested our hypothesis by classifying the THIS-NPs in our corpus as active or not. In this section we discuss the markup scheme derived from the definition of ‘active’ above.

The annotation scheme developed in (Poesio, 2000), together with the focus tracking methods developed in (Poesio et al., 2000), allowed us to classify two of the uses of THIS-NPs discussed in the literature: ‘focus-shifting’ uses and visual deixis. The existing annotation also already identified plural references to entities in the implicit focus. What was missing was a way to identify references to abstract entities in the implicit focus. The problem we had to face was that while developing the GNOME scheme we had found—as others before us (Eckert and Strube, 2001; Navarretta, 2000)—that identifying the antecedents of ‘discourse deictic’ expressions in the broad sense (i.e., expressions referring to—typically, abstract—entities introduced in the discourse indirectly, such as propositions) is very hard, especially when the annotation produces something less than a full logical form in, say, the DRT sense (Kamp and Reyle, 1993). However, we had also found for the case of visual deixis that in some cases while *identifying* the antecedent of an expression is quite hard, *classifying* a NP as deictic is easier. This proved to be the case for discourse deixis, as well. As a result, we developed a scheme for classifying THIS-NPs that does not require the annotators to mark up the ‘antecedent’ of the expression. The annotators are instructed to follow the decision tree below:

1. If (i) an $\langle \text{ante} \rangle$ elements has *not* been marked up specifying an anaphoric relation of type **ident** between a $\langle \text{ne} \rangle$ and a previous entity, and (ii) the $\langle \text{ne} \rangle$ is visually deictic (its **deix** attribute has value **yes**), classify it as **visual deixis**. (And therefore, active.)
2. Else, if the THIS-NP is connected by an $\langle \text{ante} \rangle$ elements to a previous $\langle \text{ne} \rangle$ by an identity relation, mark it as **anaphoric**. (This applies whether the entity is singular or plural.)
3. Else, if the THIS-NP is a plural entity which contains as elements entities previously introduced, mark it as **plural**;
4. Else, if the THIS-NP involves an elliptical reference to a previous entity (as in (8)), mark it as **ellipsis**;
5. Else, if it is a (non explicitly mentioned) temporal entity, mark it as **time**;
6. Else, if the $\langle \text{ne} \rangle$ is marked as generic, and its instances are concrete objects, mark it as **type**;
7. Else, if the NP refers to an abstract object ‘introduced’ only implicitly by the previous discourse, such a proposition or an abstract concept, mark it as **discourse deixis**;
8. Else, mark it as **problem**.

We tested the reliability of this scheme by measuring the agreement among ourselves on about 87 THIS-NPs in the corpus. We disagreed on 3 THIS-NPs and 5 were classified as problematic; with 6 possible values, we get a $\kappa = .82$, significant at the .01 level.

4 Results

4.1 The distribution of THIS-NPs

All THIS-NPs in our corpus were active in the sense above. The observed distribution of THIS-NPs in our corpus is as follows:

Class	Number (Percentage)
Anaphora	45 (40%)
Visual Deix	28 (25%)
Discourse Deix	19 (17%)
Type	9 (8%)
Plurals	1
Ellipsis	1
Time	1
Unsure	5
Disagreement	3
Total	112

4.2 The correlation between focus and THIS-NPs

For each instantiation of the notion of ‘in focus’, described in section 3.1, we observed some variation depending on the values of parameters, but the results were nevertheless clear-cut:

- We found between 8 and 11 violations to the hypothesis that a THIS-NP is used to refer to entities other than $CB(U_{i-1})$, which is therefore verified by 90-93% of THIS-NPs;
- the hypothesis that THIS-NPs are used to refer to entities other than $CP(U_{i-1})$ is verified by 75-80% of THIS-NPs;
- the hypothesis that a THIS-NP is used to refer to entities other than $CB(U)$ is verified by 61-65% of THIS-NPs;

Interpreting ‘not in focus’ as ‘not $CB(U_{i-1})$ ’ leads to better empirical results. (All the differences are significant.)

4.3 Violations of the THIS-NP hypothesis

We analyzed the 13 uses of THIS-NPs that were exceptions to the THIS-NP Hypothesis even under its best-performing version.⁹ All entities referred to by THIS-NPs in the violation examples are IN FOCUS; this is consistent with the proposal by Gundel *et al.*, provided that reasons for violating the Maxim of Quantity are found. We tested whether pronouns could be used in place of THIS-NPs in these cases, and found that they can be divided in three classes: (i) 5 cases in which pronominalization is possible, (ii) 3 cases in which a pronoun would be possible but awkward, and (iii) 4 cases in which a pronoun would seem rather infelicitous. We discuss some of these cases below.

⁹The two instantiations of the ranking function—grammatical role and information status—both resulted in 11 violations, but they differed slightly as to which examples they produced.

In (9), a pronoun could be used instead of *this work*, although a slight change in word order would make the example sound better: replacing *appears twice on this work* with *appears on it twice* rather than *appears twice on it*:

- (9) *The fleurs-de-lis on the top two drawers indicate that the cabinet was made for Louis XIV. As it does not appear in inventories of his possessions, it may have served as a royal gift. The Sun King's portrait appears twice on this work.*

In (9), the last mention of the entity was made via a pronoun, but note that another entity is pronominalized in the same sentence, *his*, i.e., *Louis XIV*, and the focus subsequently shifts to that entity, *the Sun King* in sentence three. By using a demonstrative, rather than a pronoun, the speaker seems to prepare the listener for this shift.

In two examples, pronominalization is possible, even if the referent is mentioned after a paragraph break:

- (10) *Modeled in the form of three of laurel branches tied with a ribbon, these massive wall lights with their detailed chasing and burnishing reveals the extraordinary skill of their maker, a silversmith to Louis XV, King of France. Each wall light is slightly different, and no one model repeats another.*
These four wall lights are among eight made in 1756 ...

In (11), the entity is also mentioned after a paragraph break. A pronoun would be possible but awkward:

- (11) *Do not keep your patches if your doctor decides to stop treatment. Return them to your pharmacist who will arrange for their destruction.*
REMEMBER these patches are only for you.

This example seems to differ from (10) in that there is an implicit argument of the imperative (*you*), which perhaps is more salient than the referent of *these patches*.

Example (12)—note two THIS-NPs—is a quite interesting example for which we do not have a ready analysis:

- (12) *This brooch is made of titanium ... It was made by Anne-Marie Shillitoe, an Edinburgh jeweller, in 1991. It's a good example of a modern material being used in jewelry. In fact, this piece is not one of the very earliest examples of titanium jewelry; The technique for colouring in this piece has already become quite sophisticated.*

We believe that a 'principle of variety' is at play here and interacts with the principle of always using the stronger form possible—for the first instance of *this piece* (see also (Poesio et al., 2002)). But it is not clear why a pronoun would appear awkward in the later occurrence.

In some cases, a pronoun would seem rather infelicitous, in particular if the antecedent of the THIS-NP occurs in a title:

(13) *Has the cream any side effects?*

Most people find using this cream causes no problems when used in the right amount ...

Example (14) shows another infelicitous substitution:

(14) *This piece is also a brooch, but from an earlier period; around 1920. It's particularly interesting because of its colour scheme. Purple, white and green were the colours of the suffragette movement; women would wear a brooch like this to show solidarity or affiliation with the movement.*

We believe that the infelicity here arises from a reference to a type. As we showed in section 3.2, reference to types is one of the conditions that licenses THIS-NPs.

5 Discussion and conclusions

We reported on an empirical investigation into the use of THIS-NPs in two genres: museum descriptions and pharmaceutical texts. The THIS-NP Hypothesis that we tested extends and clarifies previous proposals on the conditions that license the use of THIS-NPs. Specifically, we defined what it means for an entity to be 'in focus' and provided a detailed analysis of a subset of the cases in which an entity can be considered 'activated'; we introduced the term 'active' to refer to these cases. We devised and tested a reliable annotation scheme for classifying THIS-NPs as active. Three instantiations of the THIS-NP Hypothesis were tested on our data. The version that leads to the fewest violations of the Maxim of Quantity is the following:

The THIS-NP Hypothesis : THIS-NPs are used to refer to entities which are ACTIVE in the sense specified above. However, pronouns should be preferred to THIS-NPs for entities other than $CB(U_{i-1})$.

From a semantic perspective, we believe that this work—both the results of our corpus analysis and our 'salience-based' analysis of the use of THIS-NPs—are in agreement with the spirit, if not all details, of recent work challenging Kaplan's 'referential' analysis of demonstratives (Roberts, 1999; Zeevat, 1999). We leave for future work a detailed comparison between the THIS-NP hypothesis and these recent presuppositional accounts.

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