

Functional frames in the interpretation of weak nominals¹

running title: Functional frames

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1 Weak definites

Definite noun phrases are usually assumed to have a unique referent (Russell 1905), given in the preceding discourse or in the non-linguistic situation in which it is used (see Hawkins 1978, Abbott 2001, Schwarz 2009 for more recent discussions).² Sentence (1) is only felicitous in a context in which there is exactly one ball.

(1) Anna found the ball.

This ball could have been introduced by a previous sentence, directly (*Eve hid a ball*) or indirectly, by bridging (*Eve found a table football game*), or it could be visually present in the situation (for people watching a ball game).

The uniqueness presupposition can be modeled by interpreting the definite

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² That is the formulation for singular definites, which can be generalized to plural and mass definites in terms of maximality, inclusiveness, or exhaustiveness. In this paper, I will discuss singular definites only.

article *the* as a partial function (ι , iota) from noun extensions to individuals, that yields the unique element of a given set if it is a singleton and that is undefined otherwise (Strawson 1950, Partee 1987). The extension of a noun like *ball* will vary across contextual situations, but a noun like *moon* will always correspond to the same singleton (at least, in terrestrial situations). The idea is that *the ball* in (1) refers to the single ball in the situation with respect to which the sentence is interpreted, i.e. that *ball* has a singleton extension in that situation.

However, there are definite noun phrases that do not seem to satisfy the usual uniqueness requirements.³ One major subtype of this larger class of non-unique definites, studied by Carlson & Sussman (2005), can be illustrated by the example (2).⁴

(2) (A: How did you get here?) B: I took the train.

The definite *the train* in (2) does not correspond to one particular individual train given in the context. There are two ways in which *the train* can be non-unique. First, its two occurrences in (3a) below can refer to different trains (allowing sloppy identity), which is not possible in the same way with the regular definite *the truck* in (3b). The definite *the truck* either refers to one

³ See Abbott (2001), Aguilar Guevara (2008,2012), Barker (2005), Birner & Ward (1994), Carlson & Sussman (2005), Carlson, Sussman, Klein & Tanenhaus (2006), Du Bois (1980), Epstein (1999), Ojeda (1993), Poesio (1994), Levinson (2006), Schulpen (2011), Zribi-Hertz & Jean-Louis (2012), and many papers in this volume.

⁴ In the context of this paper, *weak definite* will exclusively refer to this particular subtype of non-unique definites, excluding weak definites like *the bank of a river*.

and the same truck in both of its occurrences, or it might refer to the speaker's unique truck in the first clause and Bob's unique truck in the second clause, if the context specifies that the speaker and Bob each have their own truck. No such requirement is necessary for (3a). In this respect, the definites in (3a) behave like the indefinites in (3c). Second, as (4a) shows, the definite can be used to describe one single event in which two trains are involved. This kind of non-uniqueness is not found with either *the truck* or *a train*. So, the non-uniqueness of weak definites is different from both regular definites and from indefinites.

- (3) a. I took the train and Bob took the train too.
b. I took the truck and Bob took the truck too.
c. I took a train and Bob took a train too.
- (4) a. I took the train, first the ICE from A to B and then the Thalys from B to C.
b. *I took the truck, first one from A to B and then one from B to C.
c. ?I took a train, first one from A to B and then one from B to C.

Here are some more examples of weak definites, collected from the literature, occurring as objects in PPs and VPs:

- (5) a. on the radio, on the saxophone, at the grocery store, at the supermarket, to the store, in the corner, on the computer, at the bank, on the bookshelf, near the cash register, to the beach, to the hospital, at the office
- b. answer the phone, read the newspaper, open the window, check the calendar, switch the light on, take the elevator, take the stairs, take the bus, see the menu, slam the door, see the doctor, get the maid to do it

All these definites can be used out of the blue, without any referent being previously mentioned or in situations in which there may be multiple referents satisfying the description. Following Carlson & Sussman (2005), I will use the term *weak definite* in this paper only for definites like those in (5), acknowledging that there are more non-unique or first-mention definites (discussed in the literature mentioned in footnote 3), to which the analysis of this paper may or may not apply.

2 Weak nominals as referring to kinds

Aguilar & Zwarts (2010) argue that weak definites can be analyzed as uniquely referring, not at the level of individual referents, but at a higher, more general level of *kinds*. While *the ball* in (6a) refers to one particular

individual ball, *the train* in (6b) can refer to the kind of the train in general and *take the train* then describes an activity based on that kind, not on one particular instance.

- (6) a. Anna found the ball.
b. Bob took the train.

This analysis requires that the noun *train* has two different denotations:

- (7) a. **train**_{et}: a situation-dependent individual-level denotation
b. $\lambda x.x=\mathbf{TRAIN}_e$: a constant singleton kind-level denotation

Small capitals are used here for kind-level denotations in distinction from individual-level denotations. The Carlsonian realization relation **R** relates individuals to kinds (Carlson 1977). It seems reasonable to assume that every individual realizing the kind also falls under the corresponding predicate, but the reverse might actually not be true. Even though we can describe a house as a hospital (all the children being in bed with a flue and one of the parents taking care of them) or a prison (when the children are not allowed to go to a party because they are being punished), as in (8a), still (8b) can not easily be used when Bob is one of the children in the situations being described.

- (8) a. Our house is a hospital/a prison.
 b. Bob is in the hospital/in prison.

So, the kind seems to cover a more restricted range of individuals than the corresponding property.⁵

This analysis also requires that certain verbs and prepositions can apply to a kind-level argument. The transitive verb *take*, for instance, has a special interpretation as a relation between persons and the kind of transportation (**TRAIN**, **BUS**, **ELEVATOR**) that they use. The preposition *at* has a kind-level interpretation that relates individuals to certain kinds of institutions (**STORE**, **BANK**, **OFFICE**).⁶ We can represent the regular and weak interpretation of definites as in (i) and (ii), respectively, where **train** and **store** are contextually restricted to singleton denotations, and small capitals are used for kind-level semantics:

- (9) a. Bob took the train.
 (i) $\exists e.\mathbf{take}(e,\mathbf{bob},\iota x.\mathbf{train}(x))$
 (ii) $\exists e.\mathbf{TAKE}(e,\mathbf{bob},\iota x.x=\mathbf{TRAIN}) = \exists e.\mathbf{TAKE}(e,\mathbf{bob},\mathbf{TRAIN})$
 b. Ada went to the store.
 (i) $\exists e.\mathbf{go-to}(e,\mathbf{ada},\iota x.\mathbf{store}(x))$

⁵ This is comparable to the more restricted meaning of bare predicate nominals, which are analyzed as referring to kind-like *capacities* in De Swart, Winter & Zwarts (2007).

⁶ Note that a *kind*-level interpretation of a predicate does not imply a *generic* (i.e. characterizing) interpretation for the whole sentence. Kind-level predicates, like *invent* or *die out*, typically correspond to episodic sentences.

$$(ii) \quad \exists e.\text{GO-TO}(e,\mathbf{ada},\iota x.\text{STORE}) = \exists e.\text{GO-TO}(e,\mathbf{ada},\text{STORE})$$

Since $\iota x.x=\mathbf{TRAIN}$ and \mathbf{TRAIN} are equivalent, I will sometimes use the shorter form, but it is important to remember that the compositional interpretation of the weak definite noun phrase *the train* gives us the longer form, through application of the iota meaning of *the*, $\lambda P.\iota x.P(x)$, to the singleton kind denotation of *train*, $\lambda x.x=\mathbf{TRAIN}$.

Of course, there should be a relation between the two meanings of these verbs, between **take** and **TAKE**, and **go-to** and **GO-TO**. Aguilar & Zwarts (2010) make that relation explicit in the following way. If we take *the hospital* in (10a) below as a weak definite, then sentence (10a) expresses that Ada and Eve are both in a relation **BE-IN** with one and the same **HOSPITAL** kind, see (10b). That kind-level statement implies that there are objects realizing the kind (possibly different!) in which Ada and Eve are physically located and from which they are receiving medical treatment. That is represented in (10c).⁷

- (10) a. Ada is in the hospital and Eve is in the hospital.
 b. $\exists e.\mathbf{BE-IN}(e,\mathbf{ada},\mathbf{HOSPITAL}) \wedge \exists e.\mathbf{BE-IN}(e,\mathbf{eve},\mathbf{HOSPITAL})$

⁷ To simplify matters, this representation assumes that the location event and the treatment event are one and the same. Ultimately, one would like to have two different events here, but with a close mereological relation.

- c. $\exists e. \exists x [\mathbf{R}(x, \text{HOSPITAL}) \wedge \mathbf{be-in}(e, \text{ada}, x) \wedge \mathbf{get-treatment-from}(e, \text{ada}, x)] \wedge \exists e. \exists x [\mathbf{R}(x, \text{HOSPITAL}) \wedge \mathbf{be-in}(e, \text{eve}, x) \wedge \mathbf{get-treatment-from}(e, \text{eve}, x)]$

In this way, the kind-level version of verbs and prepositions is richer than than their object-level version, as observed by Carlson & Sussman (2005) and studied in more detail in Schulpen (2011). For example, if *the store* is a regular definite, referring to a contextually given individual store, then *go to the store* refers only to a journey to that individual, but if *the store* is a weak definite then *go to the store* involves also necessarily the commercial purpose. In some cases, the kind-related activity does not seem to add much beyond what is already part of the predicate (e.g. *open the window*, *read the newspaper*), while in other cases the predicate governing the weak definite seems to have gone its own, almost idiomatic, way (e.g. *see the doctor*, *on the radio*, *take the train*).

Following Aguilar & Zwarts the kind-level meaning of *be in* could then be defined as in (11):

(11) For every kind K , event e , person y ,

$$\mathbf{BE-IN}(e, y, K) =_{\text{def}} \exists x [\mathbf{R}(x, K) \wedge \mathbf{be-in}(e, y, x) \wedge \mathbf{extra}_K(e, y, x)]$$

The **BE-IN** relation holds between an individual y and kind K in an event e , if and only if y is physically located in an instance x of K and y has an additional stereotypical relation with that x based on its kind K . For **HOSPITAL**, that last part, **extra**_{HOSPITAL}, gives us the information that y gets medical treatment there.

Generalizing a bit more, we would like to derive a ‘weak’ version of every regular predicate. The operator in (12) allows transitive predicates to select kinds as their object, ‘incorporating’ the object in a sense (Van Geenhoven 1978, Farkas & De Swart 2003, Carlson 2006).

(12) For every predicate P ,

$$\mathbf{W}(P) =_{\text{def}} \lambda k. \lambda y. \lambda e. \exists x [\mathbf{R}(x, k) \ \& \ P(e, y, x) \ \& \ \mathbf{extra}_k(e, y, x)]$$

However, despite the generality of the rule, there is only a result for a particular combination of kind k and predicate P . Crucially, the predicate P has to be compatible with the stereotypical enrichment **extra** _{k} coming from the kind (that is, e , y , and x have to satisfy both P and **extra** _{k}). This is why the definites in the sentences in (13) can only be regular:

- (13) a. Ada is near the hospital.
 b. Bob watched the radio.

One can only receive medical treatment *inside* a hospital, not in proximity with it and in order to benefit from what a radio broadcasts one has to *listen* to it and not watch it. So, the predicates that govern weak definites are those that are compatible with the stereotypical information coming from the noun.

The analysis of Aguilar & Zwarts can be extended beyond the domain of weak definites. It has been argued (Stvan 1998, Carlson & Sussman 2005, Lucas 2011) that weak definites are closely related to certain determinerless noun phrases, particularly those that can appear in PPs:

(14) at school, at sea, from prison, in bed, in hospital, on campus, outside court, to church, to town

Apart from the presence of a definite determiner, these bare nominals show the same behavior as weak definites. Furthermore, the two are mostly in complementary distribution. When a bare nominal is used to express the stereotypical relation with an institute, like attending a service in a church in (15a), then the definite counterpart only has the regular reading.⁸ On the other hand, there are nouns that do not have a determinerless use but that still allow for a weak definite use, like *pub* in (15b). Within English, we see

⁸ This contrast between bare and full nominals in PPs has been treated as a result of the division of pragmatic labor (Horn 1984), M-implicature (Levinson 2000), or bidirectional optimization (De Swart & Zwarts 2009). The fact that weak definites show the same kind of enrichment contrast with regular definites tells us that the explanation for enrichment needs to go beyond a simple notion of markedness. See section 4 for more discussion.

alternations of bare nominals and weak definite nominals being used in different dialects (16). When we compare English with Dutch, we see that bare nominals in English have corresponding weak definites in Dutch (17a), and vice versa (17b).

- (15) a. Ada is in church – Ada is in the church
b. *Bob went to pub – Bob went to the pub
- (16) a. in hospital (Br) – in the hospital (Am)
b. at university (Br) –at the university (Am)
- (17) a. in prison – in de gevangenis, in church – in de kerk, to town – naar de stad, from hospital – uit het ziekenhuis, at university – op de universiteit
b. op straat – on the street, op kantoor – in the office, op tafel – on the table

This complementary distribution suggests that these bare nominals are actually weak definites, but with the definite article omitted.⁹ The kind-referring analysis of Aguilar & Zwarts (2010) should therefore hold also for these bare nominals. In the remainder of this paper, I will therefore use the term *weak nominal* to cover both weak definites like *the pub* and bare

⁹ To a certain extent one can compare this alternation with the situation of proper names, some of which have a definite article (*the Rhine, the Pacific, the Bronx*), some of which don't (*Utrecht, Atlanta, Tahiti, Venus*). It is not clear however, whether the omission of the article in some weak nominals (like *church*) but not in others (like *pub*) is systematic or idiosyncratic.

nominals like *church*. However, I will not go into the question why only certain nouns can drop their article and what determines this.

There is one thing that remains unclear in the analysis of Aguilar & Zwarts. Why is it that reference to kinds is restricted only to certain nouns, like *radio, television, hospital, church, train*? In Carlson's analysis of bare plurals, *any* bare plural can refer to a kind. Why is reference to kinds in weak nominals lexically restricted? Aguilar & Zwarts suggest a connection with the notion of *well-established kinds* that plays a restrictive role in definite generics (Krifka 2004). However, it remains unclear why one kind is *established* while the other kind is not. In a sense, the notion of kind is too general to give us a good handle on the lexical restrictions. Aguilar & Zwarts might have been right in proposing an abstract type of denotation for weak nominals, but maybe this is not exactly a *kind*, but another abstract and general type of entity, which can give us a better understanding of these restrictions. The next section will consider one possibility.

3 Weak nominals as referring to functions

A robust generalization about weak nominals is that they refer to entities performing their typical *function* (Aguilar 2013). Following Pustejovsky (1995), we can say that the nouns involved have a telic role that expresses

the purpose or function of their referents. In fact, most ‘weak nouns’ that we have seen in section 1 refer to artefacts, objects created for a particular use:

- (18) bank, bookshelf, bus, calendar, campus, cash register, church,
computer, court, door, elevator, hospital, light (in the sense of ‘lamp’),
menu, newspaper, office, phone, prison, pub, radio, saxophone,
school, stairs, store, street, supermarket, table, town, train, university,
window

We also saw nouns like *doctor* or *maid* that refer to humans with a telic role. Nouns like *beach* and *sea* do not refer to artifacts, but to natural objects with a man-made function, for relaxation or transport. The noun *corner* does not clearly fit the generalization, but then, *the corner* probably belongs to another class of definites which are known to have non-unique reference, namely those involving body part and relational nouns (Ojeda 1993, Poesio 1995, Barker 2005, Levinson 2006).

So, it seems reasonable to assume that a weak noun always has a telic role that defines a function with respect to one or two other entities:

- (19) a. *radio*: **radio**(x), TELIC = **receive-broadcast-from**(e,y,x)
b. *prison*: **prison**(x), TELIC = **be-detained-in**(e,y,x)
c. *bus*: **bus**(x), TELIC = **be-transported-by**(e,y,x)

These telic roles also provide us immediately with the enrichments that can *optionally* accompany these nouns, in their non-weak use:

(20) a. Ada listened to a radio.

$\exists e.\exists x.\exists z [\mathbf{radio}(x) \wedge \mathbf{listen-to}(e,ada,x) \wedge \mathbf{receive-broadcast-from}(e,ada,x)]$

b. Bob is in a prison.

$\exists e.\exists x [\mathbf{prison}(x) \wedge \mathbf{be-in}(e,bob,x) \wedge \mathbf{be-detained-in}(e,bob,x)]$

c. Viv took a bus.

$\exists e.\exists x [\mathbf{bus}(x) \wedge \mathbf{take}(e,viv,x) \wedge \mathbf{be-transported-by}(e,viv,x)]$

For weak nominals, this functional enrichment is *obligatory*. Maybe we can say then that the weak definite does not refer to a kind, but rather to a *function*. All of the individual radios share one and the same broadcasting function, so this could then be the general, abstract entity that *the radio* might refer to. In the same way weak *prison* refers to *the* detainment function and *the bus* refers to *the* transport function.

Let us follow this line of reasoning a bit, in order to show that it leads to a dead end. Kinds like **RADIO**, **PRISON**, and **BUS** could then be reinterpreted as ‘reified’ or ‘nominalized’ telic roles, in a sense. A noun *N* with a function (telic role) *F* in its qualia structure is mapped to a denotation

{ \hat{F} } where \hat{F} is the ‘nominalized’ (Chierchia 1982) function that is going to end up as the weak reference of *the N*. For example:

- (21) a. *the radio*: $\iota x.x=\hat{\text{receive-broadcast-from}}$
 b. *(the) prison*: $\iota x.x=\hat{\text{be-detained-in}}$
 c. *the bus*: $\iota x.x=\hat{\text{be-transported-by}}$

The verbs and prepositions that apply to these nominalized functions would have to be able to ‘unpack’ or ‘predicativize’ (\cup) them again in order to relate them to their ‘users’, because a function is not something we can listen to or be located in. In the logical forms in (22), \cup maps the unique function to a three-place relation between an event, an agent and an object:

- (22) a. Ada listened to the radio.
 $\exists e.\exists x [\text{listen-to}(e,\text{ada},x) \ \& \ \cup(\iota x.x=\hat{\text{receive-broadcast-from}})(e,\text{ada},x)]$
- b. Bob is in prison.
 $\exists e.\exists x [\text{be-in}(e,\text{bob},x) \ \& \ \cup(\iota x.x=\hat{\text{be-detained-in}})(e,\text{bob},x)]$
- c. Viv took the bus:
 $\exists e.\exists x [\text{take}(e,\text{viv},x) \ \& \ \cup(\iota x.x=\hat{\text{be-transported-by}})(e,\text{viv},x)]$

For instance, (22b) expresses that Bob is located in an object that also detains him.

There are a number of problems with this approach. By taking the content of a weak definite to be its function only, we predict that the remainder of the noun's lexical meaning does not play a role anymore, as illustrated in (22). But that clearly results in weaker truth conditions than required. (22a) would be true when Ada is listening to a television, (22b) when Bob is having house arrest, (22c) when Viv took a train. Clearly, a weak definite contributes more than just its function. The other problem is that making a weak nominal literally refer to a function requires a roundabout compositional process of first nominalizing and then predicativizing the telic roles, and it is not clear whether and how this can be adequately and naturally done, with all the different argument positions that a telic role has.

But even if these more theoretical problems could be solved, then an approach in terms of functions or telic roles is still empirically insufficient. All weak nominals might correspond to a telic role, but there are many nouns with telic roles that do not allow for a weak use, like *book*, *knife*, *hotel*, *tape recorder*, etcetera. We don't say things like this out of blue, with the definites used as weak definites:

- (23) a. #Ada read the book.
b. #Bob cut the sausage with the knife.

- c. #Eve went to the hotel with the car.

This shows that an account of weak nominals based on function alone does not have sufficient explanatory force. There must be an additional factor that plays a role in this domain. It is that factor that I consider in the next section.

4 Weak nominals as referring to roles in frames

Why can we read the newspaper (in the weak sense), but not the magazine or the book? Why can we take the bus, but not the taxi or the bike? Why can we listen to the radio, but not to the tape recorder? Why go to the hospital, but not to the hotel? A somewhat underexplored answer in the literature is that weak definites refer to *roles in frames* (Löbner 1998, Epstein 1999, Radden & Dirven 2007, Irmer 2009), where a frame is ‘a data-structure for representing a stereotyped situation’ in Minsky’s (1975) terms.

Certain types of objects occur regularly and frequently in particular places and times with rather constant properties. We might say that they are *institutions*. A newspaper appears (or appeared ...) in most households on a daily basis with more or less the same news, but not everyone receives magazines, let alone on the same days. Magazines and books also show much more variety in their content (entertainment, news, study, hobbies).

Most houses have a radio, but not a tape recorder and what comes out of the radio has a more general content than what comes out of the tape recorder. On a somewhat bigger scale we have regular means of transportation in most environments (buses, trains), but taxis, bikes, and cars seem to lack that regularity. We can also imagine an idealized environment which has a hospital, a church, a school, a park. So, when we partition our world into certain temporal units (like days and weeks) or spatial units (like rooms, homes, buildings, towns, countries), or spatiotemporal combinations of these, then we tend to find entities fulfilling more or less the same constant functions across those units. For example, every day has a routine with meals, school, university, work, trains. In our spatial environment we will usually find radios, televisions, mirrors, calendars, and other object with stereotypical and constant functions. The idea is then that weak definites pick up those types of entities that are uniquely given in such general *frames* as *roles* or *slots*.

There is not one, clear notion of frame in linguistic semantics, unfortunately (Fillmore 1982, Barsalou 1992, Petrucci 1996, Gawron 2011 for overviews). The kind of frame that I am interested in here is close to other well-known representations from artificial intelligence (schemata, scripts, scenarios) for situations like birthday parties and restaurants, in which we find relatively many and different objects and events. It is also close to the notion of ‘background of institutions and practices’ (Fillmore 1982) for interpreting the lexical meaning of words like *breakfast* or

orphan. It is ‘bigger’ than (but not unrelated to) the verb frames of FrameNet that in a sense represent single events and their participants and also less detailed than the frames in Barsalou that represent single objects and their attributes and values. It is a global situation or domain in which different things can happen involving multiple objects. Some frames might have a name (like *restaurant* or *birthday*), but others are too global and general to have their own name (like our environment, the media, the public transportation system). Also, frames do not necessarily have clear boundaries and they might overlap and reinforce each other. The television, for instance, might be part of both the ‘home’ frame and the ‘media’ frame, and derive its status from both its spatial regularity (its presence in many homes) and its temporal regularity (its daily programme).

A frame is not one specific situation (like Bob’s home, his residential area, his activities today), but a generic, partial, and stereotypical type of situation that abstracts away from particular people, places, and times. This does not exclude the possibility that frames are specific for a particular culture, of course, but within that culture they are still generic. For example, the boat might be part of the public transport frame of Dutch culture, but not of cultures with less water. In the British frame of daily routine the pub might have a place, but maybe the restaurant in the French frame. In this way, frames allow for a non-linguistic dimension of variation that seems important for weak nominals.

A frame is different from both the *immediate situation* and the *larger situation* that Hawkins (1978) has identified as relevant for certain definite uses. A definite can have a referent that happens to be unique in the immediate concrete situation of its utterance, like when a couple talks about their boat as *the boat*. This is not reference to a role in a general frame, but to a particular object in a situation that is peculiar to that utterance. The larger situation use (*the sun, the pope*) is also not frame-based. Of course, this use requires some general background knowledge about heavenly bodies and church organization, but that knowledge is not a stereotypical generalization over situations with different suns and popes. On the other hand, frames are also involved in bridging or associate anaphora, for instance when earlier mention of *a wedding* allows the definite *the bride* to be used on the basis of our knowledge of weddings. In other words, *wedding* evokes a frame that contains a unique bride that can be picked up in later discourse (see also Irmer 2009). An important difference is that the frames that allow weak definites are always available, independent of any linguistic or even visual trigger, but the frames that allow bridging definites are linguistically evoked.

- (24) a. Ada looked in the mirror.
b. Bob is in prison.

For the interpretation of these sentences no specific frames need to have been activated. We can simply assume that mirrors will be part of most people's personal environment and that there will be a prison role in a larger environmental frame. Whether and how these two types of frames, the ones for weak definites and the ones for bridging definites, differ in other respects is an important question, but one that cannot be explored in this paper.

One might be tempted to say that weak definites like *the radio* or *the hospital* refer uniquely, because they are interpreted against a frame in which there is exactly *one* radio, *one* train, or *one* hospital. Abbott (2001) and Lucas (2011) suggest that the weak definite came up in a period 'when there was commonly only one referent available in context' (Abbott) (one elevator in a building, one lamp in a room, one hospital in a town) and it is this uniqueness that is still represented. However, the problem with this view is that there are cases where this uniqueness does not seem to convincingly hold and one can still use a singular weak definite. Birner & Ward (1994) mention the example of *the cash register* in the context of a super market, which typically has more than one cash register. One can also think of *the shelf* of a bookcase, *the maid* in a hotel, *the store* in a town, *the computer* in an office. It is hard to imagine that all singular weak definites refer to frame referents that have default uniqueness at the level of the referents. The crucial feature of Aguilar & Zwarts' kind-based analysis is still valid here. The uniqueness of a weak definite is not satisfied at the

object or ‘token’ level, but at the higher kind or ‘type’ level. It is the *role* that is unique in a situation, not the object that fulfills that role. Even though a typical bookcase has more than one shelf, there is only one bookshelf *role* and it is this role to which the weak definite *the shelf* refers, independent of the number of its instantiations. So, in all of these cases we are talking about a role that can have one single object as its instantiation, or more. There could be a small hotel with one maid or a shop with one cash register.

Not all roles are like that. What corresponds to the notion of ‘patient’ in the frame of a hospital is not a unique role in this sense, with one or more instantiations. There are always more patients in a hospital, otherwise we would be hard pressed to call it a hospital. In this case there is either a set of roles, or, more likely, a ‘role set’, and we would not be talking about *the patient* (singular) but about *the patients* (plural), but it is not clear whether such plural definites are weak. This is different with plural weak definites like *the mountains, the dishes, the movies*. We can *go to the movies* and still refer only to one film, which suggests that we are dealing with plural noun phrases that refer to singular objects (Aguilar & Zwarts 2010).

Even though frames are general and schematic, they must have particular and concrete instantiations, in two respects. First, there are instantiations at the more global level. Suppose that there is a generic ‘home’ frame, with the notions of inhabitants and rooms, but also the devices that we typically find in a home (like a telephone, radio, television, computer, ...). Many homes will instantiate this frame, but in different

ways, so there needs to be some room for variation and partiality.

Instantiating a stereotyped frame is a bit like being a member of a prototype category (Laurence & Margolis 1999). A frame specifies the properties that an instantiating situation *tends* to have, by default, but instances might lack some of these properties. In this way, the frame creates expectations that are not always borne out:

- (25) a. Q: Where is the television? A: We don't have a television.
b. Q: Where is the park? A: There is no park here.

The definites in the questions in (25) refer to default roles in environmental frames and can therefore be cancelled in specific speech situations.

There is also another, more 'local', way in which a frame can be instantiated. Every event in which a frame object is performing its typical function is an instantiation of that frame. If someone is watching television, or if the radio is broadcasting the news, then those events are instantiations of the media frame. Taking a train instantiates the public transport frame, but driving a truck does not. More specifically, such events instantiate the telic role that an object plays in a frame. This instantiation notion allows us to be more specific about stereotypical enrichments. Consider the examples in (26):

- (26) a. Ada was in a/the hospital.

- b. Bob listened to a/the radio.
- c. Viv took a/the train.

The indefinite version of (26a) describes an event that *could* be an instantiation of a frame involving the hospital in its medical function, but not necessarily. Ada could be delivering mail there, for example, or hide for a heavy rain shower. In that case, I assume, the meaning of the sentence is derived from the ordinary meanings of the words, independent of any frame, in the same way as we would derive *Ada was in a building*. The weak definite version of (26a), however, *must* be an instantiation of a frame. The same distinction is true for (26b) and (26c), although it is somewhat harder to come up with non-frame uses for the indefinite versions. Examples would be Bob's listening to the static noise produced by a radio and Viv's choosing a train instead of a car to escape the country might be examples.

A frame could be seen as a *partial model* of reality, in a sense like a 'box' (a Discourse Representation) in Discourse Representation Theory (Kamp 1981, Irmer 2009). It has a small universe of referents and a set of constraints on the identity of those referents, characterizing in a minimal way what is typically the case in this frame. In DRT, referents are variables in a (mental) representation that mediates between language and the world and this representation is *embedded* in a model by means of a truthful variable assignment of the variables. In this paper, I treat a frame as a model-theoretic object itself. The roles in a frame are not variables, but they are

primitive elements (kinds, types) in the model that can be instantiated through the realization relation **R** by other elements (individuals, tokens). So, what embedding does in DRT is done by the realization relation **R** here.

For the sake of concreteness, let us assume that each frame is a combination of two things. First, a frame has a (finite) set of roles:

- (27) **TOWN** = { **HOSPITAL, CHURCH, PARK, ...** }
HOME = { **TELEPHONE, TELEVISION, RADIO, MIRROR, ...** }
PUBLIC TRANSPORT = { **TRAIN, BUS, ...** }

Second, every role is associated to a function (based on a telic role), which is represented as a two-place relation between a ‘user’ and a ‘usage’ event.

For example:¹⁰

- (28) **FUNCTION(HOSPITAL)** = $\lambda y. \lambda e. \text{GET-TREATMENT-FROM}(e, y, \text{HOSPITAL})$
FUNCTION(RADIO) = $\lambda y. \lambda e. \text{RECEIVE-BROADCAST-FROM}(e, y, \text{RADIO})$]
FUNCTION(TRAIN) = $\lambda y. \lambda e. \text{BE-TRANSPORTED-BY}(e, y, \text{TRAIN})$

¹⁰ For simplicity’s sake, I apply the telic function directly to the role, although we ultimately want it to apply to a realization of that role, e.g. $\lambda y. \lambda e. \exists x [\mathbf{R}(x, \text{HOSPITAL}) \wedge \text{get-treatment-from}(e, y, x)]$.

The telic role that in Pustejovsky's generative lexicon is only part of the noun's qualia structure is in this proposal also part of the global frame structure, at least for those nouns that relate to a frame.

As an informal shorthand we could represent the **TOWN** frame as in (29).

(29) **TOWN FRAME**

<p>HOSPITAL CHURCH PARK ...</p>
<p>GET-TREATMENT-FROM(<i>treatment,patient</i>,HOSPITAL)</p> <p>ATTEND-SERVICE-IN(<i>service,believer</i>,CHURCH)</p> <p>RELAX-IN(<i>recreation,recreant</i>,PARK)</p> <p>...</p>

We have to remember that there are two different roles here: the primary roles that characterize the frame and the secondary roles of user and use event that depend on the primary roles through the functions. The primary roles are types that have realizations, the secondary roles are lambda-bound variables. Note that there might of course be more information in the town frame besides what is represented in (29). Furthermore, humans usually appear as secondary roles, but there are also primary human roles, like

DOCTOR (in an environment or medical care frame) or **MAID** (in the frame of a big house or hotel).

Let us now consider how the VPs in (26) above are interpreted with respect to frames, starting with the indefinite versions. Their interpretations in (30) can be compositionally derived in the ordinary way:¹¹

(30) a. be in a hospital

$\lambda y.\lambda e.\exists x [\mathbf{hospital}(x) \ \& \ \mathbf{be-in}(e,y,x)]$

b. listen to a radio

$\lambda y.\lambda e.\exists x [\mathbf{radio}(x) \ \& \ \mathbf{listen-to}(e,y,x)]$

c. take a train

$\lambda y.\lambda e.\exists x [\mathbf{train}(x) \ \& \ \mathbf{take}(e,y,x)]$

What makes these relations special is that they overlap in a typical way with frame information. The object x in (30a) that is classified as a **hospital**, for example, will usually be a realization of the **HOSPITAL** role and if a person is located in a hospital building, then in many cases this will be because she is being treated there as a patient. With (30b) and (30c) this is even stronger. We can formulate this as a kind of typical regularity:

¹¹ See Winter & Zwarts (2011) for a compositional treatment of events in Abstract Categorical Grammar.

- (31) Typically, for a person p and event e ,
- a. if $\exists x$ [**hospital**(x) \wedge **be-in**(e,p,x)],
then **GET-TREATMENT-FROM**($e,p, \text{HOSPITAL}$)
 - b. if $\exists x$ [**radio**(x) \wedge **listen-to**(e,p,x)],
then **RECEIVE-BROADCAST-FROM**(e,p, RADIO)
 - c. if $\exists x$ [**train**(x) \wedge **take**(e,p,x)],
then **BE-TRANSPORTED-BY**(e,p, TRAIN)

These regularities are so strong that a speaker can actually use the VPs in (30) to convey the functional frame meaning. This can be seen as an R or I implicature in the sense of Horn (1984) and Levinson (2000), respectively. It is therefore also defeasible:

- (32) a. Ada was in a hospital to install a new computer system.
b. Bob listened to a radio producing nothing but static noise.
c. The prisoners took a train and used it to escape to Switzerland.¹²

But in the weak definite versions of (26) the functional enrichment is obligatory and non-defeasible (Aguilar 2013). This requires a direct and semantic connection with the information in the frame, instead of an indirect and pragmatic connection. We can take the proposal of Aguilar & Zwarts

¹² As in the 1965 war film *Von Ryan's Express* starring Frank Sinatra.

one step further and reformulate it in terms of frames. For this purpose, I define an operation on predicates that I call *framing* that takes a transitive verb or verb-preposition combination P and maps it to a frame-based interpretation, by reapplying it to a role in a frame and adding the corresponding functional information.

(33) For every transitive predicate P , $\mathbf{FRAME}(P) =_{\text{def}}$

$$\lambda r. \lambda y. \lambda e. \exists x [\mathbf{R}(x, r) \wedge P(e, y, x) \wedge \mathbf{FUNCTION}(r)(y)(e)]$$

The operator \mathbf{FRAME} applies optionally, like a type-shift function, but its application is necessary if we want to combine a verb with a weak definite noun phrase, so in a sense it is triggered by the noun phrase that it combines with.

Here are some examples:

(34) a. Ada was in the hospital.

$$\mathbf{FRAME}(\mathbf{be-in})(\lambda x. x = \mathbf{HOSPITAL})(\mathbf{ada}) =$$

$$\lambda r. \lambda y. \lambda e. \exists x [\mathbf{R}(x, r) \wedge \mathbf{be-in}(e, y, x) \wedge \mathbf{FUNCTION}(r)(y)(e)$$

$$](\mathbf{HOSPITAL})(\mathbf{ada}) =$$

$$\lambda e. \exists x [\mathbf{R}(x, \mathbf{HOSPITAL}) \wedge \mathbf{be-in}(e, \mathbf{ada}, x) \wedge$$

$$\mathbf{FUNCTION}(\mathbf{HOSPITAL})(\mathbf{ada})(e)] =$$

$\lambda e. \exists x [\mathbf{R}(x, \mathbf{HOSPITAL}) \wedge \mathbf{be-in}(e, \mathbf{ada}, x) \wedge \mathbf{GET-TREATMENT-FROM}(e, \mathbf{ada}, \mathbf{HOSPITAL})]$

b. Bob listened to the radio.

$\mathbf{FRAME}(\mathbf{listen-to})(\lambda x. x = \mathbf{RADIO})(\mathbf{bob}) =$

$\lambda e. \exists x [\mathbf{R}(x, \mathbf{RADIO}) \wedge \mathbf{listen-to}(e, \mathbf{bob}, x) \wedge \mathbf{RECEIVE-BROADCAST-FROM}(e, \mathbf{bob}, \mathbf{RADIO})]$

b'. #Bob watched the radio.

$\mathbf{FRAME}(\mathbf{watch})(\lambda x. x = \mathbf{RADIO})(\mathbf{bob}) =$

$\lambda e. \exists x [\mathbf{R}(x, \mathbf{RADIO}) \wedge \mathbf{watch}(e, \mathbf{bob}, x) \wedge \mathbf{RECEIVE-BROADCAST-FROM}(e, \mathbf{bob}, \mathbf{RADIO})]$

c. Viv took the train.

$\mathbf{FRAME}(\mathbf{take})(\lambda x. x = \mathbf{TRAIN})(\mathbf{viv}) =$

$\lambda e. \exists x [\mathbf{R}(x, \mathbf{TRAIN}) \wedge \mathbf{take}(e, \mathbf{viv}, x) \wedge \mathbf{BE-TRANSPORTED-BY}(e, \mathbf{viv}, \mathbf{TRAIN})]$

The operation **FRAME** is a general operation for verbs and prepositions, but it can only give a result for a given weak nominal if the frame provides a telic function that matches the verb or preposition. This restriction is not explicitly represented in the present formalization in (33) or (34), but an implicit property of it. To see this, consider (34b) and (34b'). The set defined in (34b) is a non-empty set, because there are events of Bob listening to a radio and receiving a broadcast from it (because of the way the

radio broadcasts its information), but the set defined in (34b') is empty because there are no events which satisfy the two conditions. Of course, Bob could be watching the radio and at the same time receive information from it (by listening to it), but then these are two different events. *Listen* and *watch* are two quite restrictive verbs in this respect, allowing only very few direct objects. The predicate **FRAME(be-in)** has a much broader domain, consisting of all those frame roles that one has to be inside in order to use them and therefore allowing a much broader range of objects. This example also illustrates that (in this formalization) **FRAME** does not map a predicate to one single frame, but to a function that can collect roles from many different frames. It is only after the application of the predicate to its argument that the predicates gets attached to one single frame.

5 Weak nominals: Final remarks

Let us take a step back to see what we have gained now. By reinterpreting the notion of kind in Aguilar & Zwarts as a role in a frame we have a much better understanding of what weak nominals are and how they behave. First, the uniqueness of weak definites is tied to the uniqueness of roles in frames, not to their realizations (cf. also Epstein 1999). Second, we can see the beginning of an explanation why only certain nouns can form weak definites: this depends on the existence of (functional) frames in which

certain roles appear, but not others. In this way, the kind-analysis receives an independently motivated conceptual grounding and it makes a connection with similar proposals that involve roles for definites (like Löbner 1998, Epstein 1999, Radden & Dirven 2007, Irmer 2009). Third, using frames and telic roles allows for a natural interpretation of why weak nominals only occur with certain nouns and prepositions. However, there are a few aspects of this proposal that require further attention.

We need to find ways to corroborate the existence of specific frames in an independent way, either by their role in other semantic phenomenon or through non-linguistic experimental methods. The prediction is that certain concepts (like *radio* or *prison*, part of a frame) have a different cognitive status from other concepts (like *tape recorder* or *villa*, not part of a frame), which is something that could in principle be tested. This is also important in order to have a better understanding of certain problematic cases. It is not clear why the definite *the hotel* would not be able to behave like a weak definite in English, because of its typical presence in towns and its clear telic role.¹³ Either the characterization of frame role is not precise enough or there are additional factors that weak nominals have and that *hotel* is lacking. The status of musical instruments (*play the piano*) presents the reverse problem. Each musical instrument can be referred to by a weak nominal (Claessen 2011), but it is not clear what the frame is that supports

¹³ Interestingly, an anonymous reviewer pointed out that in German *hotel* can be used in a weak definite: *im Hotel übernachten* 'stay at a hotel'. This suggests that frames are culture specific, if our proposal is on the right track.

them in such a general way. Clearly, musical instruments do not appear in the same regular fashion as hospitals, radios or trains. Not every house has a piano and not every orchestra has a djembe.

The relation between frames and telic roles also requires more thought. I have proposed that weak nominals refer to roles in functional frames, bringing together two distinct notions from lexical semantics. This raises the question whether there are also *non*-functional frames, that is, representations of stereotypical situations that do not involving people using objects, but stereotypical situations with natural objects or phenomena. There are reasons to believe that most frames will in fact be functional frames. We expect frames to represent situations that are relevant for human beings and therefore human beings will be the primary participants in those situations, interacting with their environment. This interaction is most regular and predictable (and therefore stereotypically representable in frames) when it does not involve natural objects (including most human beings), but artifactual objects. Our interaction with the natural world is simply less constrained because we do not have control over it in the same way as we have control over the non-natural world (the media, transport system, our towns and homes, etcetera). This general pattern is reflected in the distribution of weak nominals across the lexicon.

Nevertheless, some natural phenomena might correspond to roles in frames, like the natural cycles of days and nights and seasons, which seem

to behave like weak nominals with respect to sloppy identity. Dutch can have definite articles here, English sometimes drops the articles.

- (35) a. Eve is in *de* nacht geboren en Otto ook.
Eve was born at night and so was Otto.
- b. Ada is in *de* zomer geboren en Viv ook.
Ada was born in (the) Summer and Viv too.

Maybe we are also dealing with frame-based weak nominals when accidents and diseases of a general nature are involved, like *hit by lightning* (Dutch *door de bliksem getroffen* with a definite article) and *die of the plague/die of cancer*. We can see the same intra- and inter-linguistic variation in article use that we see with weak nominals, but it is not so clear how to define the underlying frame. Frames could also play a role with body parts and other relational nouns that in many respects show the same properties as weak definites, in particular non-unique reference with possessives (*She raise her hand, His son came*).

Some authors have suggested that expressions with weak nominals are idioms (e.g. Abbott 2001). In a sense, the proposal of this paper treats weak definites as idiomatic, but it locates those idioms *outside* the lexicon, in frames. Frames are, to a certain extent, ‘conceptual/cultural idioms’, because they represent something that has to be learned as a fact and can not be derived on the spot from a general rule, namely that in a particular

culture some objects occur in frames and others don't. Still, there also seems to be idiomaticity in the morphosyntax of weak nominals, not only in the determiner system (omission of the determiner), but also in the way the preposition or verb is restricted, for instance in the use of the verb *take* with means of transportation. This suggests that the framed version of the verb *take* is represented in the lexicon, blocking other possibilities to access the same frame.

Another aspect of this proposal that needs to be worked out in future research is the **FRAME** operator. It introduces an existential quantifier that seems to predict that the weak nominal can set up discourse anaphora, which is quite generally held to be impossible. So, one aspect of the weak referentiality remains unexplained in this way. It seems that the existential quantifier introduced by this lexical rule (or by similar incorporation mechanisms) is not the same kind of existential quantifier that is introduced by full noun phrases. I believe that we can only handle this phenomenon if we embed the present theory into a larger dynamic semantics that can distinguish existential quantifiers with different binding possibilities.

The operation **FRAME** is defined in such a way that it combines direct application to a frame role (a 'kind') with addition of a telic function (stereotypical enrichment). But what rules out a version of **FRAME** that does not add the telic enrichment?

(36) For every transitive predicate P , $\mathbf{FRAME}(P) =_{\text{def}}$

$$\lambda r.\lambda y.\lambda e.\exists x [\mathbf{R}(x,r) \wedge P(e,y,x)]$$

The answer has to do with a division of pragmatic labor between synonymous expressions (Horn 1984). Without enrichment, a weak expression like *be in the hospital* would have more or less the same interpretation as *be in a hospital*. If the semantic **FRAME** operation also adds the telic role, as in (33), then the two expressions are clearly distinct. The weak definite expression is stereotypically specialized, while the indefinite expression maintains the general meaning, although we see special pragmatic effects there that still require further study. On the one hand, as we saw, there can be optional strengthening effects with regular nominals (I/R implicature), but on the other hand, an expression like *be in a hospital* will tend to take on a complementary, non-stereotypical interpretation (Q implicature). The conditions under which one or the other implicature applies is still unclear, not only in this domain, but in general.

Finally, the frame-based approach also opens perspectives for understanding the semantics of semantic incorporation in general, including indefinite cases like *smoke a pipe* and *drive a car* that refer to characteristic (nameworthy, typical) patterns of behavior in a society. The counterparts of these cases in Dutch involve incorporation (Booij 2010) with omission of the article (*pijp roken*, *auto rijden*). The indefinite nature of the object suggests that there is not a unique role for pipes or cars in any frame, but

that it is rather the activity as a whole that is represented in the frame. How to integrate both definite and indefinite cases of ‘incorporation’ in one unified framework is one of the challenges for future research, but it seems to me that the notion of functional frames should definitely be the core of this.

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