Underspecification of Cognitive Status in Reference Production: Some Empirical Predictions

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Abstract

Within the Givenness Hierarchy framework of Gundel, Hedberg, & Zacharski (1993), lexical items included in referring forms are assumed to conventionally encode two kinds of information: conceptual information about the speaker's intended referent and procedural information about the assumed cognitive status of that referent in the mind of the addressee, which is encoded by various determiners and pronouns. In this paper, we focus on effects of underspecification of cognitive status, establishing that, while salience and degree of accessibility play an important role in reference production and understanding, the Givenness Hierarchy itself is not a hierarchy of degrees of salience/accessibility, contrary to what has often been assumed. The framework is thus able to account for a number of interesting experimental results in the literature without-making additional assumptions about form-specific constraints associated with different referring forms.

1. Introduction

Underspecification may be a property of the lexically encoded content/meaning of a referring expression or of the (mental) representation associated with the intended referent of that expression in a given context of use. For example, a form such as *it* in (1) is lexically underspecified for conceptual content. However, the speaker and addressee's mental representation of the referent would most likely be fully specified as being the addressee's scarf introduced in the first sentence.

(1) Your scarf is beautiful. It really looks good on you.

Within the Givenness Hierarchy framework of Gundel, et al. (1993), this distinction between underspecification of lexically encoded meaning and underspecification of representations associated with the intended referent of an expression is partially explained by the assumption that lexical items in referring forms are assumed to conventionally encode two kinds of information— descriptive information about conceptual content of the speaker's intended interpretation, and procedural information about the cognitive status of that interpretation in the mind of the addressee. The latter information is encoded by various determiners and pronouns. Both conceptual information and cognitive status information can be under- or overspecified. For example, in a situation where a speaker wants an addressee to hand her a particular apple that is on the counter, she could utter (2).

(2) Please hand me the fruit that's on the counter.

Even though *fruit* is underspecified for whether or not it is an apple and *the* is underspecified for whether the referent is in the addressee's current awareness (or even whether it is already familiar to the addressee), the reference would still succeed in context (3a) below. This is so because determiner *the* encodes the information that the addressee is to associate a unique representation with the speaker's intended referent, and the conceptual content encoded by *fruit* allows this because an apple is a fruit. The reference would not succeed, however, in context (3b), because this situation does not allow the addressee to associate a unique representation with the phrase *the fruit* which matches the speaker's intended referent.

(3) a. There is only one piece of fruit on the counter, which is an apple.

b. There are two pieces of fruit on the counter, an apple and a pear.

However, if the speaker had uttered either (4) or (5) instead of (2), the reference would succeed in both context (3a) and context (3b).

(4) Please hand me the apple that's on the counter.

(5) Please hand me an apple that's on the counter.

(4) would succeed because the conceptual content of the intended referent is fully specified by the lexical item *apple* and the addressee could associate a unique representation because there is only one apple on the counter. (5) would succeed because even though the cognitive status encoded in the determiner *a*, unlike that encoded by *the*, is underspecified for whether or not the addressee is to associate a unique (and therefore specific) referent, it does not exclude this

possibility, as it only requires an appropriate type, and anything uniquely identifiable is also type identifiable.

Similarly, as noted above, the lexical item *it* in the second sentence in (1), even though it is underspecified for conceptual content, is sufficient to allow the addressee to associate a fully specified mental representation of the speaker's intended referent, the scarf. This is so because *it* encodes the procedural information that the addressee is to choose an entity in his focus of attention, and the scarf, which was introduced in a syntactically prominent (and therefore salient) position in the immediately preceding sentence, would most likely be the only entity that is in focus at the point when the form *it* is encountered.

However, as discussed in Poesio, Sturt, Artstein, & Filik (2006) among others, a form like *it* which encodes little if any conceptual content, can sometimes result in representations that are underspecified for a specific referent. For example, the interpretation of *it* in (6) may remain underspecified in that the referent could be either engine E2, the boxcar at Elmira, or the composite of the boxcar and the engine, but where the underdetermination/underspecification is irrelevant because the semantic representations that would be associated with the more fully specified representations are similar enough for the communicative purpose.

(6) Hook Engine 2 up with the boxcar in Elmira and send it to Bath.

In this paper, we focus on effects of underspecification of cognitive status in referring expressions, establishing in the process that while salience plays a role in reference production and interpretation, the Givenness Hierarchy itself is not a hierarchy of degrees of salience or accessibility. We begin in §2 with a summary of the Givenness Hierarchy and some of its

predictions. We then turn in §3 to a discussion of some results in the experimental psycholinguistic literature on reference production and interpretation, showing that the Givenness Hierarchy and its predictions are not only consistent with these results but make possible a principled explanation of them. Finally, in §4, we summarize our arguments and conclude.

2. The Givenness Hierarchy

The major premise of the Givenness Hierarchy theory (Gundel et al., 1993) is that different determiners and pronominal forms encode, as part of their conventional meaning, information about the assumed cognitive status of the speaker's intended referent in the mind of the addressee. The hierarchy encodes an implicational relationship among six cognitive statuses as shown in (7), along with the English forms that are hypothesized to encode each status.

(7) Givenness Hierarchy

in focus	> activated	> familiar	> uniquely identifiable	> referential	> type identifiable
{*it*}	{*that*, *this*, *this* N}	{*that* N}	{*the* N}	{indefinite *this* N}	{*a* N}

Forms that encode statuses on the hierarchy help guide the addressee in identifying the intended interpretation, by providing procedural information about where and how a mental representation of the referent is to be accessed, as described in (8).

(8)

it	associate representation in focus of attention	(in focus)
this/*that*/*this* N	associate representation in working memory	(activated)
that N	associate representation in memory	(familiar)
the N	associate unique representation with NP	(uniquely identifiable)
indefinite *this* N	associate unique representation	(referential)
a N	associate type representation	(type identifiable)

A speaker, in using a particular determiner or pronominal form, thus provides a processing signal to the addressee that helps restrict the set of possible referents. The rightmost status on the Givenness Hierarchy, the lowest one, restricts this set the least, and the leftmost status, the highest one, is most restrictive. Thus, the indefinite article in English only signals that the addressee is expected to identify the type of thing described. For example, in (9a), the indefinite article *a* in *a new scarf* signals that the addressee is to associate an appropriate type representation for something that has the property of being new and a scarf. The pronominal *it* in (9b), however, restricts possible referents to something that is currently in the addressee's focus of attention.

(9) a. I bought a new scarf yesterday.

b. It was on sale.

2.1. The Givenness Hierarchy as an Implicational Scale. The Givenness Hierarchy has often been misunderstood as a scale of degrees of accessibility similar to that proposed by Givón (1983) and Ariel (1990). However, the Givenness Hierarchy is fundamentally different from

other referential hierarchies, both with respect to the role that accessibility plays (or doesn't play) in the theory and in the kinds of assumptions and predictions it makes.

Cognitive statuses on the Givenness Hierarchy are part of what Horn (1972) calls an 'implicational scale', a set of items of the same constituent class ordered in terms of their degree of informativeness, as in (10).

(10) all > most > many > some

Each item on the scale entails items to its right. Thus, (11) entails (12a), (12b) and (12c).

(11) All first year students came to the orientation.

(12) a. Most first year students came to the orientation.

b. Many first year students came to the orientation

c. Some first year students came to the orientation.

Use of a less informative form gives rise to a special kind of inference that Grice (1975) calls an 'implicature', by way of the first part of his Maxim of Quantity ("Be as informative as required"). Thus, (13a) implicates that (13b) is not true. If it were, the speaker would have uttered (13b) instead of (13a).

(13) a. Some first year students came to the orientation.

b. All first year students came to the orientation.

The important point here is that 'not all' is not part of the conventional meaning of *some*. Rather the use of *some* gives rise to an implicature in contexts where the information provided by the stronger form (*all*) is relevant. For example, (13a) would not necessarily implicate (13b) in a context like that in (14).

(14) (Context: all first year students came to the orientation.)

Speaker A: If any first year students came to the orientation, we will get reimbursed for the food.

Speaker B. Some first year students came to the orientation.

Such examples show that the quantifier *some* does not conventionally encode the meaning 'not all'; it is simply underspecified for the property 'all'.

The Givenness Hierarchy works in the same way. Anything in focus is necessarily activated (in awareness/working memory), anything activated is necessarily familiar (in memory); anything familiar is necessarily uniquely identifiable (the addressee can associate a unique representation); anything uniquely identifiable is necessarily referential (if the addressee can associate a unique representation, there must be a specific referent that can be represented); anything referential is necessarily type identifiable (the addressee can associate a type representation of which the referent is an instance). Forms that signal a particular cognitive status as part of their conventional meaning are thus underspecified for higher (entailing) statuses; but they do not exclude them.

As with use of *some* implicating 'not all', forms lower on the Givenness Hierarchy are frequently used to implicate that a higher status does not obtain. Thus, a pronominal *that* form, which explicitly encodes the status 'activated', is often used to implicate that the referent is not in focus. An example is given in (15), where the referent of *that* is taken to be the activated but not in-focus closet. Use of *it* here could only mean the in-focus kitchen.

(15) Anyway going on back from the kitchen then is a little hallway leading to a window, and across from the kitchen is a big walk-through closet. On the other side of that is another little hallway leading to a window. [Personal letter]

Similarly, the English indefinite determiner *a*, explicitly signals that the referent is type identifiable, and this in turn often implicates that the referent is not uniquely identifiable and therefore also not familiar, activated, or in focus, as shown in (16), where both the first and second occurrence of *a student* implicate that the referent is not uniquely identifiable or familiar to the addressee.

(16) I met a student before class. And then a student came to see me after class as well. [Adapted from Hawkins 1991]

However, there is ample evidence to show that non-familiarity is not part of the conventional meaning of the English indefinite article, as would be expected if forms that encode a particular status are simply underspecified for higher statuses, rather than excluding them. For

example, the non-familiarity implicature of the second occurrence of *a student* in (16) can be cancelled without contradiction, as in (17).

(17) I met a student before class. And then a student came to see me after class as well. In fact, it was the same student I had seen before.

And in some cases the non-familiarity implicature simply does not arise, as it is irrelevant, as in (18).

(18) I had a meeting with my student, Bill Martin, this morning. Since I already had one meeting with a student today, I'm going home.

For some forms, underspecification of a higher status rarely, if ever, leads to an implicature that the referent does not have a status higher than the one explicitly signalled by this form, since more explicit information about higher statuses is unnecessary for identifying the speaker's intended referent. For example, use of the definite article *the*, which explicitly encodes the status 'uniquely identifiable' does not mean that the referent is not activated or in focus, as shown in (19)-(21).

(19) Mr. Clinton appeared to step on Mr. Bush's dog, Millie, momentarily, then bent down to pet the famous Springer Spaniel.

(20) A1: You've only known the dog how long did you say?

B1: Well, about a year, I guess.

A2: Oh well. It is, uh, how old is the dog?

[Switchboard]

(21) I have a dog and a cat. The dog has been with me for almost ten years.

Thus, while a particular determiner or pronominal form provides information about cognitive status, it does not necessarily provide as much information as possible, i.e., it may be underspecified for cognitive status. The reasons for this may vary. For example, it may be because overtly specifying a higher status is irrelevant, as in (18) and (20). It may be because using a determiner rather than a pronoun allows the speaker/writer to include conceptual content. This may be crucial for disambiguating between two potential referents which are both activated or in focus, as in (21), or it may simply allow the speaker or writer to include additional conceptual information about the referent, as in (19). The Givenness Hierarchy thus constrains the forms that can be used to refer to an entity in a given context, but cognitive status is not the sole determinant of what form is used.

In sum, the use of a form does not entail that the cognitive status associated with a stronger form does not hold. On the other hand, the choice of form is not entirely random either. In referring to an in-focus entity, we don't just randomly pick one of the six form categories. Rather, the selection of form follows from interaction of the Givenness Hierarchy with general cognitive/pragmatic principles and processes that govern language use. For example, that the speaker is being "as informative as required." (Grice, 1975; Gundel & Mulkern, 1998; Sperber & Wilson, 1986/95).

2.2. Why the Givenness Hierarchy is not an accessibility/salience scale. As noted in the previous section, since the Givenness Hierarchy is an implicational scale, the statuses are not mutually exclusive. Thus, referents of forms that explicitly encode higher statuses such as 'familiar' also have all lower statuses, such as 'uniquely identifiable', and may even have a higher status such as 'activated' or 'in focus'. This is so because each status entails all lower statuses, and forms are simply underspecified for higher statuses—they don't exclude them. Moreover, cognitive statuses on the hierarchy encode procedural information about manner of accessibility, how and where a referent is to be accessed; they do not encode information about degree of accessibility. These features distinguish the Givenness Hierarchy from the accessibility scale of Ariel (1990), which directly predicts that referents of expressions higher on the scale have a greater degree of accessibility than referents associated with expressions lower on the scale.

We could look only at the upper bound of each status, for example comparing the accessibility of referents that are at most familiar in a given context (familiar but not activated) with referents that are at most uniquely identifiable (uniquely identifiable but not familiar). However, there is no reason to think that referents attaining the higher status are necessarily more accessible than referents attaining the lower status. Presumably, accessibility involves ease of processing and could be measured by how long it takes to access the referent. To process the meaning of a definite article phrase, which must yield a unique representation, the listener will first have to process the conceptual and procedural meaning encoded in the phrase (which would have to be done in processing any nominal expression), and doing so could yield a unique representation if there is sufficient conceptual content encoded in the phrase. However, to process a phrase headed by the determiner *that*, if the referent is at most familiar, the listener will

also have to search long term memory to retrieve an existing representation of the referent. Although we know of no experimental literature that addresses the issue, it is highly likely that it would be easier to stop after the first step, assuming this results in a unique representation, rather than also searching memory for an appropriate referent, since searching memory requires time and effort.

The example in (22) illustrates a case where listeners/readers might not bother to search memory for a familiar referent since it could be represented adequately simply by creating a representation based on the information encoded in the nominal phrase.

(22) 'At one point, the hijacker fired a shot inside the cockpit, perhaps accidentally,' one of the three pilots aboard said.... [14 sentences later] 'Those aboard the plane did not get a good look at the hijacker, because when he stood up, he told everyone to hide their faces in their laps and not look at him; then he walked to the cockpit,' passengers said in radio reports. [Hijacker Leaps to Safety After Robbing Passengers, Oliver Teves, Associated Press, 25 May 2000]

At the second mention of the cockpit, the cockpit is actually familiar because it had been mentioned 14 sentences earlier. But there is no reason to think that it is easier for the reader to access an existing representation of that referent from memory than to simply create a new unique representation by way of bridging to the activated airplane. The new representation could thus arguably be hypothesized to be more accessible than the representation in memory, since less time would be required to arrive at it. However, the cognitive status that applies—uniquely identifiable—is lower on the hierarchy than the status of the representation in memory—familiar.

Similarly, in a newspaper story we coded in preparation for this article, we found that the most frequent case of underspecification of cognitive status was with definite article phrases that were coded as familiar, 38 out of a total of 198 referring expressions. For example, both annotators coded the phrase *the Labor Department* in (23), as familiar, partly because we judged that most readers would have prior knowledge of the existence of a government department with that name. But it is entirely possible that readers will not bother to access their existing representation of the referent since a unique representation can be constructed based solely on the information encoded in the phrase and the inference that the relevant Labor Department would be the one associated with the United States. It would involve more processing effort than necessary for them to retrieve the existing representation from memory.

(23) On average, only two-thirds of unemployed people received state-provided unemployment checks last year, according to the Labor Department. [The New Poor, Peter S. Goodman, The New York Times, February 21, 2010]

The second most frequent case of underspecification in the newspaper article is the use of an indefinite article phrase for a phrase that we coded as referential. This happened 22 times out of 198. An example is shown in (24), where both annotators coded the phrase *a federal extension* as referential, but there is no need to conclude that readers will necessarily bother to create a representation of the referent, rather than simply processing the conceptual content and thereby constructing a representation of the appropriate type.

(24) Twice, Ms. Eisen exhausted her unemployment benefits before her check was restored by a federal extension. [The New Poor, Peter S. Goodman, The New York Times, February 21, 2010]

Again, we can reason that upon encountering an indefinite noun phrase, the listener/reader must first process the conventional meaning of the phrase (its encoded conceptual and procedural content), which would have to be done in processing any nominal expression. This is all that needs to be done in case of an indefinite article phrase that is at most type-identifiable. To interpret the phrase as referential, additional work is required in that a representation of the referent must also be created and associated with the type information. Thus, the interpretation of an at most type-identifiable phrase is arguably more accessible than that of a referential phrase since it is easier to process, although type identifiable is lower on the Givenness Hierarchy than referential.

3. Psycholinguistic experiments relevant to the Givenness Hierarchy. In recent years, several researchers have argued that forms like demonstrative pronouns (Brown-Schmidt, Byron, & Tanenhaus, 2005; Kaiser & Trueswell, 2008) and indefinite article phrases (Masharov, 2008) do not simply encode lower degrees of salience than personal pronouns and distal demonstrative/definite article phrases, respectively. These authors argue that their results support a form-specific, multiple-factor account of constraints on the use of these forms. We will argue that the Givenness Hierarchy, since it is not a hierarchy of degrees of accessibility/salience, is not only consistent with the experimental results reported in these works, but contributes to a principled explanation for them, without requiring formulation of form-specific constraints

beyond the cognitive status information and person/number/gender constraints encoded in the referring expressions. We begin our discussion with Masharov's findings regarding indefinite phrases because they clearly illustrate the effect of underspecification with respect to the Givenness Hierarchy.

3.1. Masharov: Indefinite article phrases. Masharov (2008) investigated the behavior of English determiners, *a*, *the*, and *that*, through a series of referent selection, scene verification and eye-tracking experiments. In the first three experiments, participants selected a referent in response to an auditory instruction by clicking on an item on a screen at the same time as their eye movements were recorded. Participants were presented with a screen on which drawings of 16 objects in a 4 x 4 grid were arranged. There was a series of three instructions, to which the participant responded. For example, experiment 3 included the sequence of instructions in (25):

(25) a. Click on the heart above the lemon.

b. i. <blank>

OR

ii. Now look at the cross.

OR

iii. Now click on the broom.

c. i. Now click on that lemon.

OR

ii. Now click on the lemon.

OR

iii. Now click on a lemon.

Thus, an example input was, “Click on the heart above the lemon. Now click on the broom. Now click on the lemon.”

In experiment 1, the instruction in (c) referred to an entity of the same type as the theme of (a), a heart; in experiments 2 and 3, the instruction in (c) referred to an entity of the same type as the goal of (a), a lemon. In 1 and 2, two hearts or lemons were given on the screen and in 3, three lemons were given on the screen. Masharov reasoned that in the ‘click’ condition (b.iii), a new referent would be added into the discourse model, thus decreasing the salience of the entities mentioned in (a). It was always the cross that was referred to in the ‘look’ instruction (b.ii), and the cross was the item always used in calibrating the eye-tracker with a ‘look at’ instruction, and it could not be clicked on. Thus Masharov assumed that the cross did not introduce a discourse referent, although he assumed it would decrease the salience of the entities mentioned in (a) more than would the ‘blank’ instruction (bi).

Abstracting over details, the overall proportion of selecting in (c) an item mentioned in (a) (the mentioned lemon) as opposed to an unmentioned item (one of the other lemons) was greater for *that N* then for *the N*, and least for *a N,* with the largest proportion of mentioned items in the ‘blank’ condition and the least in the ‘click’ condition. Approximate percentages of mentioned referent selection with different intervening material conditions from the bar graphs for Masharov’s Experiment 3 are shown in the table in (26). For example, *a N* was taken to refer

to the mentioned item 75% of the time in the 'blank' condition but only 42% of the time in the 'click' condition.

(26)

	Blank	Look	Click
that N	97%	88%	83%
the N	83%	80%	64%
a N	75%	50%	42%

The eye-tracking data basically mirrored the results of the behavioral data. Masharov had expected these differences for the three forms and notes that they support a salience hierarchy account (such as, according to him, the Givenness Hierarchy of Gundel, et al., 1993). However, the results of the '*a N*' condition surprised him because this form also showed a strong preference for the mentioned entity as referent, even though this preference was smaller than with the other two forms. He concludes from this data that the hypothesis, which he takes to be predicted by the Givenness Hierarchy framework, that indefinite article phrases should only be used for non-mentioned—i.e. 'new'—entities, is disconfirmed by his findings, suggesting instead that the behavior of *a N* should be explained as resulting from a form-specific constraint that gives the indefinite article an existential *any* interpretation.

Finally, Masharov conducted a fourth experiment that involved a scene verification judgment task in response to narrative discourse. This experiment confirmed the results of the other three experiments, so we don't discuss it here. Masharov concluded again that it disconfirms the Givenness Hierarchy because participants responded close to 100% of the time

that *a N* sentences matched scenarios in which a previously mentioned item had moved, and that the experiment thus argues for a form-specific constraint.

We agree that Masharov's data disconfirm a strict salience hierarchy interpretation that requires *a N* phrase referents to be low in salience. However, we point out that the Givenness Hierarchy, as it is not a hierarchy of degrees of salience, is consistent with his data and does not predict that referents of *a* phrases will be low in salience or accessibility; and we argue that it actually allows a principled explanation of his findings without appealing to additional 'form-specific' constraints. As discussed in §2.1 above, cognitive statuses on the Givenness Hierarchy are in a unidirectional entailment relation, and forms that encode a particular status are therefore underspecified for higher statuses rather than excluding them. In these cases, the item from the set up (a) sentence (e.g. the referent of *the lemon* in 'Click on the heart above the lemon' was activated at the time of the test sentence in (c) (e.g., 'Now click on the lemon'). The requirement on *a N*, according to the Givenness Hierarchy, is that the referent be at least type identifiable, since this is the status explicitly encoded by the determiner *a*. If a referent is activated, it is type identifiable by definition, and thus is predicted to be available as the referent of an indefinite article phrase. Any referent that conforms to the information encoded in the nominal part of the expression is a potential referent, no matter what its cognitive status.

Contrary to what is often assumed then, the Givenness Hierarchy does not predict that interpretations of *a N* will necessarily be low in salience/accessibility or that it always introduces a new referent into the discourse. What remains to be explained, however, is why such a high proportion of interpretations of the *a* phrase in the test sentence in (c) were taken to be coreferent with the item mentioned in (a) rather than one of the other items in the array whose conceptual content fits the conceptual content encoded in the phrase, e.g. that it is a lemon.

A Givenness Hierarchy account of these facts would go as follows: Both the item mentioned in the lead-in sentence in (a) (e.g., the referent of *the lemon* in 'Click on the heart above the lemon') and the other item(s) in the array which are of the same type would be activated at the beginning of the instruction in (a), since both are in the perceptual environment. Neither one would be in focus, since neither one has been mentioned in a syntactically prominent position.[1] Thus, the Givenness Hierarchy account, contrary to Masharov's assumptions, would not predict that mere mention of an entity would raise its cognitive status beyond that of other activated entities. However, although cognitive statuses on the Givenness Hierarchy (like other meanings encoded by linguistic forms) are viewed as discrete categories which are mapped onto discrete forms that explicitly encode these categories, it is recognized and consistent with the theory that in reality the encoded categories are gradient (similar to the case with colors, numbers, etc.), and that at most activated entities may be more or less activated, just as green apples may be more or less green. It is therefore consistent with the Givenness Hierarchy, and in fact expected, that an activated entity which has been explicitly mentioned will be more activated, and hence more salient and likely to be chosen as the referent of an expression than one that has not.[2]

Thus, although the Givenness Hierarchy, because it is not an accessibility hierarchy, does not directly predict Masharov's results with respect to interpretation of phrases with the indefinite article *a*, it is consistent with these results and allows a principled explanation of them, without

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[1] One of the sufficient criteria for in-focus status given in the coding guidelines of Gundel et al., (2006) is that the referent has been mentioned in a syntactically prominent (e.g. subject or topic) position in the previous sentence.

[2] This would follow from the relevance-theoretic (Sperber & Wilson 1986/95) assumption that addressees will choose the first interpretation which yields contextual effects with minimal processing effort—and the more salient/accessible the referent is, the less processing effort there will be.

assuming any additional form-specific constraint on *a*. With respect to the stronger preference of *that N* for the mentioned entity, our explanation also relies on the assumptions that (i) entities that serve as possible referents of the different forms in this experiment (e.g., the different lemons) are all at most activated; (ii) all three determiners used to refer to these entities (*that*, *the*, and *a*) can be used to refer to activated entities because all three are underspecified for activation; and (iii) the mentioned entity is more activated and therefore more salient/accessible than non-mentioned ones.

Specifically, we propose that given a situation where two or more entities have the same cognitive status, but differ with respect to salience/accessibility within that status, the likelihood that a particular form consistent with (though underspecified for) the cognitive status in question will refer to the most salient entity within a particular status will vary with the degree to which the form is specified for cognitive status. The more specified it is, the more likely it is to refer to the more salient entity. Thus, *that*, which requires familiar status, is more likely to refer to the more salient entity than *a,* which only requires the interpretation to be type identifiable. And *the*, which requires the referent to be uniquely identifiable, will be somewhere in between. This is exactly the situation we find in Masharov's results.

We should note, however, that the the salience-related facts and experimental results do not follow directly from the Givenness Hierarchy, which does not make direct predictions about degrees of salience/accessibility. The explanation requires the assumption that the Givenness Hierarchy interacts with more general cognitive/pragmatic principles that govern interpretation

of language as well as non-linguistic stimuli. This assumption has always been part of the Givenness Hierarchy theory however, and does not require any additional stipulations.[3]

We thus explain the findings with regard to indefinite article phrases without positing form-specific constraints beyond the requirement of type identifiability. In the experimental situations, the hearer understands that it wasn't relevant for the speaker to signal a higher cognitive status with a stronger form, nor was it necessarily relevant for a weak form to be selected in order to signal that a stronger status does not obtain. The *any* interpretation thus falls out of the Givenness Hierarchy approach to the indefinite article without further stipulation.

3.2. Kaiser & Trueswell: Demonstrative and personal pronouns in Finnish. Kaiser & Trueswell (2008) report on a sentence completion study and an eye tracking study aimed at examining the use of two pronominal forms in Finnish—*hän*, a gender-neutral personal pronoun, and *tämä* a gender-neutral demonstrative pronoun that can be used to refer to humans. The authors point out that both Ariel's (1990) Accessibility Theory and Gundel et al.'s (1993) Givenness Hierarchy theory distinguish the two types of pronoun, and they characterize both approaches as claiming that demonstrative referents are less salient than personal pronoun referents. Thus, Ariel treats demonstrative pronouns as signaling a lower level of accessibility

[3] The results with respect to greater preference of *that* vs. *the* for more salient entities do however follow from the Accessibility Hierarchy of Ariel (1990), since within that hierarchy individual forms encode degrees of accessibility, and *that* encodes a higher degree than *the*. It is unclear however why the difference is not greater than it is for these two forms. More importantly, the results with respect to *a* phrases remain surprising within that framework.

than personal pronouns, and Gundel, et al. place (unstressed) personal pronouns under 'in focus' on the Givenness Hierarchy, and demonstrative pronouns under 'activated'.[4]

Finnish has relatively free word order—in particular, both subjects and objects can appear either preverbally or postverbally. In their study, Kaiser & Trueswell compare SVO order with OVS order to determine the effect word order has on the interpretation of *hän* and *tämä.* In the sentence completion study, they examined four experimental conditions: SVO/Hän, OVS/Hän, SVO/Tämä, and OVS/Tämä. They created stories in which the first sentence introduces a character, and the second continues talking about that character and introduces a second character. The third sentence can be either SVO or OVS and refers to the second character in initial position and to a third character in final position. The fourth sentence, which the participant completes, starts out with either *hän* or *tämä*. An example discourse is given in (27):[5]

(27) Nina oli ostoksilla ruokakaupassa
Nina-NOM was shopping-ADDESS grocery-store-INESS
'Nina was shopping at the grocery store.

Jonossa odottaessaan hän näki takanaan valkohattuisen kokin
Line-INESS waiting-INESS-poss she-NOM saw behind-poss white-hatted-ACC cook-

[4] While we don't make cross-linguistic claims for statuses signalled by different forms without investigation, for most of the languages we have investigated, the demonstrative pronouns only require activation and the unstressed personal pronouns require in-focus status.

[5]Nominative (NOM), Accusative (ACC), Genitive (GEN), Partitive (PART), Addessive (ADDESS) and Inessive (INESS) are morphological cases in Finnish.

ACC

'While waiting in line, she saw a cook with a white hat behind her.'

Kokki töni jonon hännillä seisovaa leipuria

Cook-NOM pushed line-GEN tails-ADDESS standing-PART baker-PART

'The cook-SUBJ pushed a baker-OBJ standing at the back of the line. **SVO**

OR

Kokkia töni jonon hännillä seisova leipuri

Cook-PART pushed line-GEN tails-ADDESS standing-NOM baker-NOM

'A baker-SUBJ standing at the back of the line pushed the cook-OBJ . **OVS**

Hän/Tämä…

S/he-NOM/This-NOM

'S/he/This….'

The completed sentences were coded for which referent of the preceding sentence was chosen as the referent of the pronoun. Results are shown in the table in (28).

(28)

	1st mentioned referent	2nd mentioned referent	Other demonstrative interpretation	Unclear/other
SVO/Hän	64% (41)	13% (8)	0% (0)	23% (15)

OVS/Hän	13% (8)	64% (41)	0% (0)	23% (15)
SVO/Tämä	0% (0)	88% (56)	9% (6)	3% (2)
OVS/Tämä	9% (6)	44% (28)	30% (19)	17% (11)

It can be seen that the subject referent of the preceding sentence was most frequently selected as the referent of *hän*, regardless of whether the subject was preverbal or postverbal, while the postverbal referent was most frequently selected as the referent of *tämä*, regardless of whether it was a subject or an object. The postverbal referent was always chosen in the case of postverbal objects, while this preference was slightly weaker but still present for postverbal subjects. In the latter case, participants also interpreted *tämä* quite often as referring to the entire event of the previous sentence. As Kaiser & Trueswell's eye tracking experiment generally supported the results of the sentence completion experiment, we will not discuss it here.

Kaiser & Trueswell conclude from the results of both experiments that a salience difference alone can't explain the choice between *hän* and *tämä* since *hän* is sensitive to syntactic role while *tämä* is sensitive to linear position. They reject single-factor accounts that distinguish the forms solely on the basis of salience in favor of a 'multi-factor, form-specific' account, whereby "each anaphoric form has its own set of weighted constraints that guide its interpretation" (p. 739). They imply that the Givenness Hierarchy is a single-factor account.

We point out again, however, that the Givenness Hierarchy is not a hierarchy of degrees of accessibility/salience, and we dispute the characterization of the Givenness Hierarchy approach as a 'single-factor' account. In addition to the general cognitive/pragmatic factors that interact with the Givenness Hierarchy (see above), an important premise of the theory is that multiple factors contribute to the cognitive status a referent has. The coding guidelines for

cognitive statuses on the Givenness Hierarchy (Gundel et al., 2006) explicitly lay out a variety of factors that contribute to the cognitive status of a referent. For example, a referent is taken to be in focus if it was mentioned in subject or other syntactically prominent position of the immediately preceding sentence or was mentioned in both the preceding two sentences. For a referent to be activated, on the other hand, it need only have been mentioned in one of the immediately two sentences.

Placing *hän* under 'in focus' and *tämä* under 'activated' on the Givenness Hierarchy can explain Kaiser & Trueswell's results if we make certain assumptions about the factors that contribute to cognitive status. In the experimental materials, the preverbal element, whether S or O, was in focus at the point where the pronoun was encountered because the referent was mentioned in both preceding sentences, and also because it was in a syntactically prominent (subject or topic) position. The postverbal subject was also in focus because it was subject. Subjects always bring an entity into focus because they are structurally prominent. Thus all three of those referents are accessible for reference by *hän*, while the postverbal object is less so.

It is puzzling, however, that more preverbal objects were not referenced by *hän* since such objects would seem to be in focus. The high percentage of unclear cases (almost 25%) in both SVO and OVS might account for this, but we might also propose an explanation based on encoding of future topics. It has often been suggested that subject is the position that encodes referents that the speaker intends to continue talking about as the topic of the subsequent sentence (see, for example, Arnold, 2008), possibly because subject position always brings a referent into focus of attention. If we assume that speakers of Finnish use subject position to encode the referents they intend to continue to talk about as topics of subsequent sentences, regardless of whether they are also the topic of the current sentence, and that *hän* in subject

position typically encodes the topic of the sentence because it explicitly encodes the status 'in focus', we can account for why *hän* prefers subject antecedents to object antecedents in a previous OVS sentence.

We can assume, on the other hand, that an initial *tämä* in the completion sentence is used to encode a new topic, i.e., a topic shift—a shift from talking about the cook to talking about the baker. Moreover, it is also used to indicate focus shift—a shift in what is in the focus of attention. Because a previous postverbal object referent meets both criteria (topic shift and focus shift), it is readily encoded by *tämä* because *tämä*, being underspecified for the status 'in focus' implicates both a topic and focus shift. The referent of a preceding postverbal subject, on the other hand, will already have been brought into focus by virtue of its introduction in a structurally prominent, subject position, thus decreasing the need to use *tämä* to indicate a focus shift. *Tämä* could still be used, however, to indicate a shift in topic since postverbal subjects are less likely to be topics than preverbal ones, and in fact are typically indefinite first mentions in these examples. Hence *tämä* prefers both postverbal subjects and postverbal objects as antecedents, but is less likely to be interpreted as having been used to pick up a postverbal subject referent than a postverbal object referent.

This account assumes that *tämä* is underspecified for whether its referent is in focus, and the account allows weaker forms to have stronger statuses. After an OVS sentence in Kaiser & Trueswell's materials, for example, the preferred referent of *tämä* is in focus. This again shows the explanatory value of the Givenness Hierarchy as an implicational scale, from which it follows that forms lower on the hierarchy are underspecified for statuses higher than the one that they explicitly encode.

3.3. Brown-Schmidt, Byron, & Tanenhaus: Demonstrative and personal pronouns in English

Brown-Schmidt, Byron, & Tanenhaus (2005) present the results of a series of eye-tracking experiments where participants manipulated a set of objects in front of them at the same time as their eye movements were being tracked. We focus here on the behavioral results of Experiment 1, which dealt with the difference between the personal pronoun *it* and the demonstrative pronoun *that*. The eye-tracking data supported the behavioral data, so we don't discuss it here.

Participants either manipulated blocks of wood or familiar objects such as cups and saucers. They were told to either put one object (the theme) next to another object (the goal), or to put it on top of another object. Then they were told to move 'it' or 'that' to another location. A sample instruction is given in (29).

(29) a. Put the cup on the saucer.

b. Now put it over by the lamp.

c. Put the table next to the lamp.

d. Now put the cup in front of the table.

(Display includes: cup, saucer, table, and lamp.)

Crucially, in the 'on top of' condition, as in (29a) above, the instruction creates a composite entity, which can be manipulated as a group. Thus, a cup on a saucer is a meaningful object in its own right, and can be treated as such by language users.

The results of the object manipulation are shown in (30), where the percentage reflects the number of times the pronoun (*it* or *that*) was interpreted as the theme, the goal, or the

composite in the 'next to' condition and in the 'on top of' condition. The task with blocks was similar but showed a somewhat lower degree of preference for composite interpretations in the 'on top of' condition.

(30)

	Theme	Composite	Goal
Next-it	99%	1%	0%
On-it	60%	40%	0%
Next-that	50%	43%	7%
On-that	12%	88%	0%

Brown-Schmidt et al. argue that the data show that a salience difference between referents of *it* and *that* does not predict these data, and that instead a form-specific constraint should be associated with *that* which states that composite entities are preferentially referred to by *that*. They say (p. 302), "According to a salience account, conditions that increase *it*-interpretations should decrease *that*-interpretations because *that* does not prefer the most salient alternative". Thus they view it as a problem for a salience account that the 'on-top-of' condition increased the likelihood of composite interpretation for *it* beyond what it was in the 'next-to' condition, while the same condition also increased the likelihood of composite selection for *that*. They conclude that this result "is consistent with the prediction that the demonstrative pronoun would be interpreted as the composite if one was available, regardless of salience."

We suggest that Brown-Schmidt et al.'s results are compatible with predictions of the Givenness Hierarchy, without positing a special condition on the use of *that* for composites.

First, it is important to note that since the 'on top of' condition creates an entity, but the 'next to' condition is much less likely to do so, it is also more likely that there will be a composite referent for either *that* or *it* in the former condition. This fact is independent of any particular account of the referents of *that* vs. *it*. Second, within the Givenness Hierarchy framework, it would be assumed that the referent of the theme (which is the structurally most prominent syntactic position in these sentences) is always brought into focus, and is therefore available for reference with either *it* or *that*, but most likely the former, since explicitly marking that the referent is in focus would distinguish it from the other entities. Third, the composite will only be referred to when a composite is likely to be created that is easily conceptualized as an individuated entity, i.e., in the 'on top of' condition but less likely in the 'next to' condition. We would assume that such composites could also be brought into focus, since they incorporate the in-focus theme, but they would be less in focus than the theme itself (see discussion in §3.1 above about different degrees of salience among entities with the same cognitive status). This explains why composites are sometimes interpreted as referents of *it*, but are much more likely to be interpreted as referents of *that*, which only encodes activated status, and is underspecified for (but not inconsistent with) the status 'in focus'. The goal will never be in focus, even weakly so, and should therefore never be interpreted as the referent of *it* but should also be much less likely to be interpreted as the referent of *that*, especially when there is a competing composite, as it is the least salient of the three possible referents.

Brown-Schmidt, et al. argue that the Givenness Hierarchy cannot account for their results; but their argument is based on an incorrect premise that the Givenness Hierarchy predicts that in-focus entities cannot be referred to by 'that'. As we have emphasized in this paper, however, forms that encode lower statuses on the Givenness Hierarchy can be used to refer to

entities with higher statuses. Since the statuses are in a unidirectional entailment relation, forms are underspecified for higher statuses rather than excluding them. In this particular case, since the theme is always brought into focus, and the composite is sometimes brought into focus, both are available for reference with *it*. However, the composite is much more likely to be referenced with *that*, even when it is in focus, since it is less salient than the theme, and the focus shift implicature triggered by the underspecified *that* results in the composite being overwhelmingly selected over the theme referent in the 'on-that' condition.

4. Conclusion

We have proposed in this paper that reference production (and understanding) is a complex product of a number of interacting cognitive systems and factors, some linguistic and some not linguistic. The linguistic system imposes constraints on the encoding of conceptual and procedural information in the referring expressions. Specifically, with respect to procedural information, we propose that determiners and pronouns in natural language provide information about how and where the speaker's intended referent is to be accessed in memory, by explicitly signaling, as part of their conventional meaning, one of six cognitive statuses on an implicational 'Givenness Hierarchy'. These lexical items constrain possible interpretations to ones that minimally have the cognitive status explicitly encoded by the particular pronoun or determiner. However, mapping between forms and the statuses of their possible referents is one-to-many rather than one-to-one, because forms that explicitly encode a particular status are underspecified for higher statuses rather than excluding them. The Givenness Hierarchy in turn interacts with

more general cognitive/pragmatic factors and principles relating to relevance, informativeness, and salience/accessibility to further constrain and determine how referring forms are produced and interpreted.

We thus agree with the growing number of researchers in experimental psycholinguistics whose findings suggest that an adequate description of reference production and interpretation requires a multi-factor account and cannot be explained solely in terms of salience. However, we disagree in the nature of the factors that are involved. We also agree with those who posit an important role for salience in an account of reference production and understanding; but we disagree on the exact nature of this role. Specifically, we do not think that information about salience and accessibility is built directly into the linguistic forms used in reference production.

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