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The use of anaphoric elements such as pronouns has its source in balancing between minimization of effort (for the speaker's sake) and maximization of expression (for the hearer's sake). All languages in the world appear to have personal pronouns, but they come in different forms, for instance full versus reduced ones or free versus bound ones. In languages that have both reduced and nonreduced pronouns, the reduced ones are specialized for anaphoricity, the nonreduced ones have focus functions (cf. Bresnan 2001). The general correlation between reduced form and anaphoricity (or topic-continuity) is observed by Givón (1984) under the name 'referential iconicity'. Haiman (1985) argues that this correlation can be explained by economy: the effort of the speaker can be minimized by reducing expressions of anaphoric (hence, predictable) referents. In languages that do not have different types of pronouns, the interaction with prosody gives the same result: unstressed pronouns need less effort, hence they are specialized for anaphoricity, while the stressed ones have focus functions. However, stress is used for different reasons in language (new information, contrast, shift in reference) and it is not always clear what principles guide a hearer's interpretation of a stressed or unstressed pronoun in a certain context. What are the different types of constraints that play a part in (un)stressed pronoun resolution and how do these interact? In this paper the interpretation of stressed pronouns in context will be analyzed in an optimality theoretic fashion.

1. Stressed pronouns: deictic or anaphoric?

Semantically, pronouns are usually associated with variables, which are essentially free. For instance, if a speaker doesn't know the name of a person she wishes to refer to, she might point to this person and say:

(1) She/SHE doesn't have a hand-out yet.

In most cases, however, pronouns are anaphoric. Anaphoric pronouns are usually topics or part of the background. As such, the variables they are associated with refer to familiar objects in the discourse. In these cases there is usually an antecedent in the linguistic context to which the pronoun is anaphorically linked. Anaphoric pronouns are not necessarily destressed. They may be stressed, in which case the stress does not indicate deixis, but rather contrastive focus. An example is Vallduví's (1990) dialogue in (2) [stress indicated by capitals]:

- (2) S1: Good morning. I am here to see Mrs. Bush again.
S2: Sure, Mr. Smith. Let's see... One of her assistants will be with you in a second.
S1: Could I see HER today? I'm always talking to her assistants.

In (2) the conversational implicature evoked by the focus is that S1 does not want to see one of Mrs. Bush's assistants again. In contrast, S1 wants to see HER/Mrs. Bush herself. Constituent focus evokes contrast within a contextually salient set of alternatives. This gives rise to the implicature that a certain predicate which holds for the focussed object does not hold for the other elements of the set of alternatives (cf. Rooth 1992).

2. Stressed pronouns: complementary preference?

Kameyama (1994) claims to have a unified account of interpretation preferences of stressed and unstressed pronouns in discourse. The central intuition is expressed as the "Complementary Preference Hypothesis" taking the interpretation preference of the unstressed pronoun as the base from which to predict the interpretation preference of the stressed pronoun in the same discourse position. For example, Kameyama discusses the following two famous sequences:

- (3) Paul called Jim a Republican. Then he insulted him. (Paul insulted Jim.)
 (4) Paul called Jim a Republican. Then HE insulted HIM. (Jim insulted Paul.)

As Prince (1981) notes, because HE and HIM are marked as being new, they cannot refer to Paul and Jim respectively. Being pronouns, they do, however, refer to some entities already in the discourse model, so here only Jim and Paul are left, in that order. Thus, we get a change in coreference. On the basis of these examples, Kameyama claims there to be a systematic relation between the stressed and unstressed counterparts which is of a complementary preference within a suitable subset of the domain. The assumption is that stressed and unstressed counterparts have exactly the same range of possible values. However, in the following sequence we get the same stress pattern as in (4), despite the fact that the two pronouns do not have the same range of possible values (cf. Prince 1981):

- (5) Paul called Jane a Republican. Then SHE insulted HIM.

The stress on the pronouns in (3)-(5) seems to be the result of the topic-focus structure of the sentence, rather than of a shift in preferred reference. Note furthermore that if the stress is on a different constituent, the pronouns can remain unaccented:

- (6) Paul called Jane a Republican. Then she HIT him.

3. Stressed pronouns: complementary preference not possible

In the novel 'Fire from heaven' by Mary Renault I found 50 examples of stressed pronouns, indicated by the author by means of italics [replaced by capitals by me, HdH]. For the vast majority of these examples, it can be argued that the stress signals contrastive focus; none of these examples can be accounted for by the Complementary Preference Hypothesis (alone). In the following two examples, the stress cannot be accounted for by the Complementary Preference Hypothesis as there are no alternative values for the first and second person pronoun:

- (7) 'Gold, my boy, gold is the mother of armies. I pay my men round the year, war or no war, and they fight for ME, under my officers.' (ME = the speaker)
 (8) 'Well, it teaches you to bear your wounds when you go to war.'
 'War? But you're only six.'
 'Of course not, I'm eight next Lion Month. You can see that.'
 'So am I. But YOU don't look it, you look six.' (YOU = the addressee)

Another example where Kameyama's Complementary Preference Hypothesis (KCPH) cannot apply is (9) with a stressed third person pronoun:

- (9) 'Of course,' he said. 'I shall kill Attalos as soon as I can do it. It will be best in Asia.'
 Hephaestion nodded; he himself, at nineteen, had long lost count of men he had already killed.
 'Yes, he's your mortal enemy; you'll have to get rid of HIM. The girl's nothing then, the King will find another as soon as he's on campaign.' (HIM = Attalos)

In the dialogue in (9) there is only one male individual in the third person, namely Attalos. Yet, he is referred to by a stressed pronoun. In all the cases above the stress signals contrastive focus. In (7) the implicature is that the men work for the speaker, not for anybody else. In (8) the contrast is between the speaker and the addressee: the first one looks eight years old, but the second one only looks six. In (9), finally, the contrast is between Attalos and the girl. That is, the implicature of the sentence is that the addressee will only have to get rid of Attalos and not of the girl.

4. Stressed pronouns: complementary preference overruled

In (9) above the Complementary Preference Hypothesis cannot be applied as there is no alternative referent available for the unstressed counterpart of the pronoun. Other cases provide direct evidence against the hypothesis. Consider for instance one text fragment with two instances of stressed pronouns:

- (10) ‘So, think which of them can’t afford to wait. Alexander can. Philip’s seed tends to girls, as everyone knows. Even if Eurydike throws a boy, let the King say what he likes while he lives, but if he dies, the Macedonians won’t accept an heir under fighting age; HE should know that. But Olympias, now, that’s another matter. SHE can’t wait.’ (HE = Philip = the King; SHE = Olympias)

In (10) there are two referents available for the masculine pronoun (namely, Alexander and Philip) and two for the feminine pronoun (*viz.*, Eurydike and Olympias). The reader may verify that Kameyama’s hypothesis would predict *HE* to refer to Alexander and *SHE* to Eurydike. Neither prediction is borne out. In other words, the stressed pronouns do not indicate a shift in reference. Instead, the stress evokes conversational implicatures: (i) other people might not know that the Macedonians won’t accept an heir under fighting age; (ii) Alexander can wait. These are once again relevant implicatures in the context.

A theory that tries to derive the interpretation of anaphoric expressions from constraint interaction is Optimality Theoretic Semantics (cf. Hendriks and De Hoop 1997, 2001). In this theory each utterance is associated with an in principle infinite number of interpretations. Hearers arrive – as fast as they do – at one or two optimal interpretations of the utterance by evaluating the candidate interpretations with respect to a set of (conflicting) constraints. The interpretation that arises for an utterance within a certain context maximizes the degree of constraint satisfaction and is as a consequence the best alternative (hence, optimal interpretation) among the set of possible interpretations.

The optimal interpretations that are assigned to stressed pronouns in discourse can be analyzed in terms of three ranked constraints. The constraints are formulated below.

- (11) *Contrastive Focus (CF)*: A stressed pronoun signals contrast within a contextually determined set of alternatives;
- (12) *Continuing Topic (CT)*: A pronoun is interpreted as a continuing topic;
- (13) *Kameyama’s Complementary Preference Hypothesis (KCPH)*.

The optimal interpretations for the stressed pronouns in (4)-(10) follow from the ranking CF >> CT >> KCPH, as shown in the tableau.

- (14) Constraint tableau for the interpretations of (4), (9) and (10).

Input	Output	Contrastive Focus	Continuing Topic	KCPH
(4)	HE=Paul; HIM=Jim	*		*
	HE=Jim; HIM=Paul		*	
(9)	HIM=Attalos			*
	HIM≠Attalos		*	
(10)	HE=Philip			*
	HE=Alexander		*	
	SHE=Olympias			*
	SHE=Eurydike	*	*	

In other words, Kameyama's Complementary Preference Hypothesis is neither sufficient nor necessary for a proper analysis of the use of stressed pronouns in discourse. In the examples discussed above, KCPH is only satisfied in the famous example (4). This is possible because in this example satisfaction of the KCPH corresponds with satisfaction of Contrastive Focus, which in turn is stronger than the constraint Continuing Topic that is violated by the winning candidate interpretation. If Paul called Jim a Republican and then Paul insulted Jim, stress on the pronouns would not be licensed by Contrastive Focus. However, if the stressed pronouns refer to Jim and Paul in the continuation, Contrastive Focus is satisfied. The contrast is between the two events: first Paul insulted Jim and then the other way around. This is in general the implicature that we get when two pronominal arguments of a predicate are stressed in the absence of further context. This is also what happens in the example (15), a translation from a Dutch newspaper fragment:

(15) SYDNEY – In the train returning to town from the Olympic Park, Dutch fans sang “Inge is OK, ole ole ole, Inge is OK, ole ole ole...” on Thursday night. Prince Willem Alexander, who congratulated Inge de Bruijn on her second olympic title with a kiss one hour earlier in the Aquatic Centre, thinks so too.

During the press conference following her victory in the 100 meter freestyle, De Bruijn spoke about the one moment in Sydney in which she did NOT take the initiative: “No, no, HE kissed ME.”

In (15) the KCPH cannot explain the use of the stressed pronouns because there are no complementary discourse values available. We do get an interpretation via Contrastive Focus, however, comparable to the interpretation of (4): the implicature is that Willem-Alexander kissed Inge and not the other way around.

Clearly, an analysis in terms of complementary preference of available discourse values does not account for the subtle interaction of conditions dealing with discourse relations, prosody, and topic-focus structure. I conclude that this interaction is better analyzed in terms of constraint satisfaction (see also Beaver 2000, for an Optimality Theoretic approach to pronoun resolution in Centering Theory).

5. *Semantic variation*

It was shown above that in English Kameyama's principle is a rather weak one, the effect of which only show under specific circumstances. Within an optimality theoretic approach to interpretation, we predict that there may be cross-linguistic variation induced by a different ranking of the same set of constraints. For example, we predict that there are languages in which the KCPH outranks Continuing Topic. In order to test this prediction I will briefly consider two languages where Contrastive Focus does not interfere in the interpretation of the pronouns because stress does not have to distinguish between continuing and shifted topics. In some languages continuing and shifted topics will be morphologically distinct pronouns, in other languages these will be stressed pronouns as opposed to unstressed pronouns, and sometimes, these will be overt pronouns as opposed to null pronouns. Consider the following Chinese sentences, discussed in Huang (1991):

- (16) Xiaoming yi jin wu, - jiu ba men guan shang le.
 “As soon as Xiaoming₁ enters the house, he_{1/2}/I/you/we/they... close(s) the door.”
- (17) Xiaoming yi jin wu, ta jiu ba men guan shang le.
 “As soon as Xiaoming₁ enters the house, he₂ closes the door.”

According to Huang, the use of the pronoun *ta* in (17) where a zero anaphor could occur (as in (16)), implicates a contrast in reference. In (16) the preferred reading for the null pronoun would be the continuing topic reading; in (17) the overt pronoun must be interpreted as a shifted topic. Obviously, this paradigm shows that a generalized KCPH is satisfied in Chinese (if we view *ta* as similar to a stressed pronoun in English). Note, however, that when a topic is actually given (in topic position),

both the zero pronoun as well as the overt pronoun must refer to this topic and they do not allow for a shifted topic reading anymore:

- (18) Xiaohua, Xiaoming yi jin wu, - jiu ba men guan shang le.
“Xiaohua₁, as soon as Xiaoming₂ enters the house, he₁ closes the door.”
- (19) Xiaohua, Xiaoming yi jin wu, ta jiu ba men guan shang le.
“Xiaohua₁, as soon as Xiaoming₂ enters the house, he₁ closes the door.”

In other words, the KCPH is overruled in Chinese by Continuing Topic (as it was in English). Chichewa differs from a language such as Chinese in this respect, as illustrated in the following paradigm (Bresnan 2001):

- (20) Fisi a-na-dyá chí-manga. Á-tá-chí-dya, a-na-pítá ku San Francisco.
“The hyena ate the corn. Having eaten it, he went to San Francisco.”
- (21) Fisi a-na-dyá chí-manga. Á-tá-dyá ichó, a-na-pítá ku San Francisco.
“The hyena ate the corn. Having eaten it (something other than the corn), he went to S.F.”

By using the full pronoun *icho* in (21) the interpretation that *it* refers to a continuing topic (anaphor) is unavailable. This leads to the very odd and in fact incoherent interpretation as given by the translation in (21). Unlike in Chinese, the presence of a topic in topic position, does not overrule this interpretive effect of a full pronoun, whence the (near) ungrammaticality of (22):

- (22) ?* M-kángó uwu fisi a-na-dyá íwo.
“This lion, the hyena ate it.”

This suggests that we may fruitfully account for the cross-linguistic patterns of pronoun resolution by making use of the reranking possibilities of constraints that the theory offers.

6. The problem of unintelligibility

At first sight, sentence (22) above seems to be a problematic example for Optimality Theory because of the clash in interpretation which in fact makes the (syntactic) *input* ill-formed. In principle, any input must lead to an optimal interpretation, no matter how many constraints are violated. Intuitively, the explanation of the ‘unintelligible’ syntactic input in (22) lies in the existence of an alternative (well-formed) input that blocks a coherent interpretation of this one (cf. Blutner 2000, Zeevat 2000). Blutner (2000) claims that the simplest explanation for blocking is a bidirectional Optimality Theory that takes into account the comprehension as well as the production perspective. An expression is blocked with regard to a certain interpretation if this interpretation can be generated more economically by an alternative expression. It may seem that unintelligibility is not a real problem for the theory, once we recognize that sometimes infelicitous interpretations might be optimal and hence should be part of the candidate set of interpretations. However, I have argued in De Hoop (2001) that unintelligibility differs from optimal infelicity, yet it may be solved within a bidirectional approach to optimization.

Conclusion

In general, the existence of (morphological) alternatives raises strong interpretive blocking effects. When there are two optimal lexical forms, it is economical to use them for different interpretations. Thus, when there are two pronominal forms for the third person singular, one might be optimally interpreted as a continuing topic, the other one as a shifted topic or focus. In this paper I have argued that in English stress plays only a minor role in the process of pronoun resolution (i.e., disambiguation). Rather, meaning effects of stress on pronouns are general semantic/pragmatic effects of focus. In particular, stressed pronouns indicate contrast within a set of contextually determined

alternatives. The optimal interpretations that are assigned to stressed pronouns in discourse can be analyzed in terms of three constraints and their ranking, such that Contrastive Focus >> Continuing Topic >> Kameyama's Complementary Preference Hypothesis. The possibility of reranking these constraints might be used to explain different patterns of pronoun interpretation in other languages.

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