

Something Old, Something New: Addressee Knowledge and the Given-New Contract

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Abstract

Although speakers in a dialogue are known to design utterances cooperatively with respect to meaning, less is known about audience design with respect to syntax. We report two picture verification experiments that investigated the production of Given-New ordering when speakers' and addressees' knowledge differed. In both experiments, speakers produced word orders that reflected their own but not their addressees' knowledge states. We suggest that speakers do not engage in audience design for aspects of their utterances which they do not consider to be necessary for adequate communication.

Introduction

Cooperation or fluency?

When speakers produce utterances in a dialogue, they operate under two main constraints. First, they must produce utterances that fulfill their communicative need: They must ensure that addressees can extract the meaning that the speaker intends to convey. In other words, they must think about what the addressee knows or doesn't know, wants or needs to know, and so on. This requires them to act cooperatively. However, speakers must also satisfy a more general constraint relating to the overall norms of interactions, by producing utterances in a timely manner, without undue hesitations and disfluencies. These two constraints can conflict: Low-level processing demands reduce the resources that can be allocated to higher-level planning. In some cases, speakers may have to decide between being cooperative but disfluent, or fluent but uncooperative. There is good evidence that speakers usually try to be cooperative with respect to the content of their utterances, but less is known about cooperation with respect to utterance *form*. In this paper, we investigate the production of Given-New structure, and the extent to which Given-New ordering reflects the

speaker's desire to be cooperative versus the need to meet interactive norms.

Fitting utterances to audiences

Cooperation and content. There is substantial evidence that speakers design their utterances with their audience in mind. Such *audience design* has been found to occur at different levels of linguistic structure. For example, speakers adapt their accent according to their audience (e.g., Bell, 1984). However, most experimental evidence for audience design has focused on meaning-related aspects of language. In particular, research has shown that speakers adapt their lexical and conceptual choices to reflect what they believe about their addressees' knowledge. Many studies have demonstrated that speakers use longer and more contentful referential expressions when they believe their addressees will have difficulty in identifying a referent than when they believe that their addressees will be able to identify a referent straightforwardly (e.g., Clark & Wilkes-Gibbs, 1986; Krauss & Weinheimer, 1966). In these experiments, researchers manipulated the assumed or jointly developed *common ground*, or mutual knowledge, on which a particular speaker-addressee dyad could call. In each case, the question was whether by adapting their own linguistic behavior, speakers can enhance addressees' ability to correctly extract the meaning that the speaker wishes to convey.

Audience design at meaning-related levels of structure makes good sense. The primary goal of communication is to ensure that speaker and addressee comprehend each other correctly, so modifying one's behavior to maximize the chances of correct mutual interpretation is sensible. Even so, there is some debate about the extent to which speakers take their common ground with the addressee into consideration during the earliest stages of utterance planning. Some models propose that speakers' beliefs about addressee

knowledge can constrain the semantic and lexical content of the utterances that speakers initially generate (Lockridge & Brennan, 2002). That is, utterance planning necessarily involves consultation of a model of the addressee's knowledge state. Such models assume that speakers are fundamentally cooperative. We can think of this as speakers trying to fulfill the cooperativeness requirement, even if it is at the expense of fluency.

However, other researchers suggest that speakers are fundamentally egocentric (Brown & Dell, 1987; Horton & Keysar, 1996). For example, Horton and Keysar (1996) found evidence that speakers consistently failed to take their addressee's knowledge into account and produced inadequately specific descriptions when placed under time pressure. They proposed a model in which speakers first generate utterances without recourse to information about the addressee's knowledge state, and only then monitor the pre-articulatory utterance for appropriateness. If necessary, and if processing demands allow, the utterance is then revised to accommodate the addressee's knowledge state. Under this approach, the fluency constraint has a higher priority for speakers than the cooperativeness constraint. Nevertheless, even in their model, speakers are assumed to consult their model of common ground when processing resources allow.

Cooperation and Form. Clearly, speakers do tend to behave cooperatively towards their addressees with respect to what they say. But do they behave cooperatively with respect to *how* they say it? We focus here on syntactic structure (see Bard et al, 2000, for a related discussion with respect to phonology). There has been little investigation of audience design at the level of syntax. In general terms, we might expect to find less evidence for audience design with respect to syntactic structure than with respect to lexical/semantic structure, because variations in syntax do not necessarily have communicative implications. Speakers can successfully communicate the same intended meaning using different syntactic structures (e.g., *The pennyloafer struck the shopkeeper* or *The shopkeeper was struck by the pennyloafer*), whereas using different words (e.g., *pennyloafer* versus *docksider*; see Brennan & Clark, 1996) may lead to different interpretations (an addressee may have two different concepts for the labels *pennyloafer* and *docksider*).

One exception, where syntactic structure may impact on communicative success, is syntactic ambiguities. These can cause (possibly temporary) processing difficulties for the addressee. However, Ferreira and Dell (2000) found no evidence that speakers avoid producing utterances that are temporarily syntactically ambiguous, even when they were told that their utterances would be rated for clarity. In this respect, therefore, we see little evidence for audience design at the level of syntactic structure.

The Given-New Contract. One place where we might expect to find audience design with respect to syntax is in the ordering of Given and New entities. Many linguists have noted a strong preference for Given entities to precede New entities (e.g., Prince, 1981). Indeed, the preference for Given-New ordering has been hypothesized to be a language universal (Clark & Clark, 1978).

This theoretical observation is backed up by empirical research in a variety of languages (Bock & Irwin, 1980; Osgood, 1971; Sridhar, 1988). Importantly, a Given-New preference has been reported for both language production (e.g., Bock & Irwin, 1980; Sridhar, 1988) and language comprehension (Clark & Haviland, 1977).

One interpretation of the tendency to produce Given-New ordering is that it is a manifestation of audience design: Speakers know that addressees prefer it, and hence produce it as a cooperative activity. This stance has been made explicit in some theoretical accounts of information packaging. For example, Vallduvi (1992) suggested that information packaging, including Given-New ordering, is designed to "optimize the entry of data into the hearer's knowledge store". Under this approach, speakers mention Given entities first so that addressees know which part of their knowledge store to address, and then update that entry with the New information contained in the later part of the sentence.

If this approach is correct, then speakers should produce word orders that reflect their addressee's knowledge state: An entity that is Given to the addressee should appear preceding an entity that is New to the addressee, irrespective of what the speaker knows. If both entities are New (or indeed Given), then the speaker should produce default word order.

An alternative interpretation of Given-New ordering is that it reflects ease of processing for the speaker. Given entities are both semantically and lexically activated, and are correspondingly easier to access during the processes of language production (Bock, 1982). Under an assumption of incremental processing (Kempen & Hoenkamp, 1987), Given entities therefore claim earlier positions in the developing word order. If this approach is correct, then Given-New ordering is essentially egocentric: a means of promoting fluency.

This approach predicts that speakers will by default produce word orders that reflect their own knowledge state: An entity that is Given to the speaker will appear preceding an entity that is New to the speaker, irrespective of what the addressee knows. If both entities are of the same status, then the speaker will produce whatever the default ordering is. Speakers may subsequently revise their utterance to accommodate their addressees' knowledge if this differs from their own; but this would be a later process.

In previous experiments on Given-New ordering, the speaker and the addressee always had the same knowledge state, making it impossible to distinguish the two positions. We carried out two experiments that manipulated the knowledge states of the speaker and the addressee independently. The question we investigated was: Do speakers produce syntactic structures that are designed to be cooperative with respect to their addressee? Specifically, do speakers normally produce word orders that reflect their own knowledge state, or do they design them to reflect the knowledge of their addressees?

We used a picture verification task, in which a Describer described pictures to a Matcher, who had to decide whether that description matched their own picture. We manipulated Describer and Matcher knowledge by showing both the Describer and the Matcher, just the Describer, or neither, an initial 'scenario' picture which introduced one of the entities depicted in the target picture. We examined whether the Describer's description for the target picture displayed Given-New ordering. More importantly, did this ordering reflect the Matcher's knowledge or only the Describer's knowledge? In Experiment 1, Describers and Matchers were restricted in what they could say; in Experiment 2, they were allowed to interact freely.

Experiment 1

Method

Participants. Twenty-four pairs of participants were paid to participate.

Items. For each experiment, we prepared two sets of items. The DESCRIBER's set consisted of 24 pairs of experimental cards and 48 pairs of filler cards. The pairs of cards included a *scenario* card which introduced one entity (and hence making it GIVEN), and a *target* card showing that entity and another entity taking part in an action. For the 24 experimental card pairs the target card depicted a transitive action with an inanimate agent and an animate patient. In the "target" cards for the filler pairs, 12 pairs depicted an intransitive action with an inanimate agent, 12 depicted an intransitive action with an animate agent, 12 depicted a transitive action with an animate agent and patient, and 12 depicted a transitive action with an animate agent and an inanimate patient. The *scenario* card was manipulated in the experimental card pairs so that each *target* card could be preceded by either an *Agent scenario* - the scenario card depicted the agent, or a *Patient scenario* - the scenario card depicted the patient.

For example, a target picture showing a book hitting a chef (Figure 1) could be preceded by either an agent

scenario: book on a shelf (Figure 2); or a patient scenario: a chef in a kitchen. For the filler cards, half the scenario cards had an agent scenario and half had a patient scenario. The MATCHER's set was similar to the DESCRIBER's set except that half of the target cards which they would be matching were altered to induce a *No* match response. For the experimental cards the response to the match cards was *No* on half the cards because the agent was different and on half the cards because the patient was different.



Figure 1: Example target picture

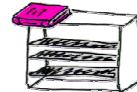


Figure 2: Example agent scenario

Procedure. Participants were randomly assigned to be either the DESCRIBER or the MATCHER for the whole experiment. Participants sat on either side of a table and were separated by a divider (see Figure 3).

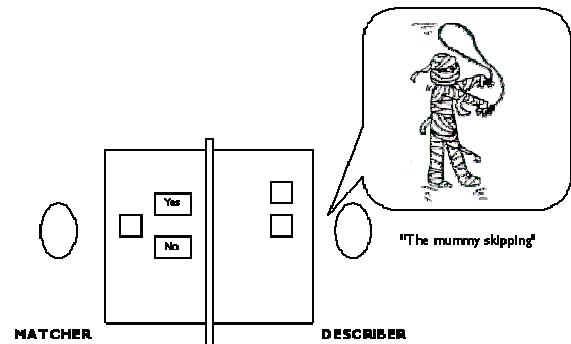


Figure 3: Overhead of the experimental set-up

For each part of the experiment, the DESCRIBER was informed about how much the MATCHER would know. In the *No Knowledge* condition, the DESCRIBER was instructed to describe each card. In the *Same* and *Privileged Knowledge* condition, the DESCRIBER was told to describe only the second card. In all conditions, the DESCRIBER described the target card and the MATCHER said *Yes* or *No* and placed their card in the appropriate box. The order of the knowledge conditions was that the *No Knowledge* condition was always completed first. The order of the

Same Knowledge and Privileged Knowledge conditions was counter-balanced.

Results

Scoring. DESCRIPTERS' descriptions were scored as ACTIVES if both entities were mentioned; the agent appeared as the subject of the sentence; and the patient appeared as the direct object. They were scored as PASSIVES if both entities were mentioned; the patient appeared as the subject of the sentence; and the agent appeared as an oblique object.

The proportion of PASSIVE and ACTIVE sentences produced by the DESCRIPTER were calculated. Only the PASSIVE sentences were included in the analyses as the proportions are complementary.

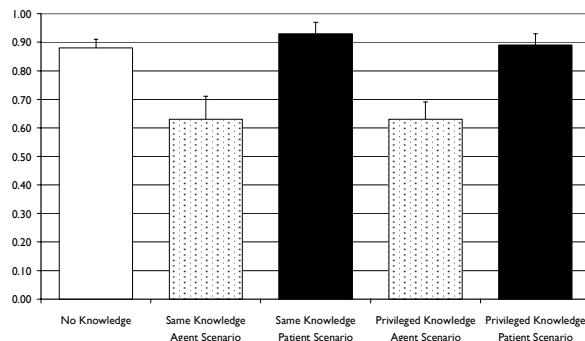


Figure 4: Proportion of Passive sentences produced by the DESCRIPTER in Experiment 1

We conducted a 2 (Knowledge – Same, Privileged) \times 2 (Scenario – Agent, Patient) analysis of variance. The No Knowledge condition was not included as there was no scenario manipulation. This revealed a main effect of Scenario, $F_1(1, 23) = 22.3$, $p < .01$, no main effect of Knowledge, $p > 0.1$, and no Interaction, $p > 0.1$. A second analysis was conducted as a one-way ANOVA across all knowledge conditions on the proportion of PASSIVE sentences. This revealed a main effect of Knowledge, $F_1(2, 46) = 3.46$, $p < .05$. Post-hoc Newman-Keuls revealed a significant difference between No and Privileged Knowledge, $p < .05$; marginal between No and Same Knowledge, $p = .08$.

Experiment 2

In Experiment 1, participants were very restricted in the type of contributions that they could make to the dialogue: Matchers were only allowed to give Yes/No feedback, and to ask the Describer to repeat a description. But previous research has shown that speakers' tendency to design their utterances for their addressee is influenced by the feedback that they receive from the addressee. For example, speakers do not shorten referring expressions with repeated mention

if the addressee does not respond (Krauss & Weinheimer, 1966). It is therefore possible that the results of Experiment 1 are not indicative of the extent to which speakers take their audience's knowledge into account in normal dialogue. To investigate this possibility, we carried out a second experiment, which was identical in all respects to Experiment 1 except that MATCHERS were allowed to interact freely. For example, if the DESCRIPTER said *the mummy skipping*, the MATCHER could reply *No, I have the fairy skipping*, or *Do you mean the guy with the bandages?*

Participants. Twelve pairs of participants took part.

Results

The proportion of PASSIVE and ACTIVE sentences produced by the DESCRIPTER were calculated. Again only the PASSIVE sentences were included in the analyses as the proportions are complementary.

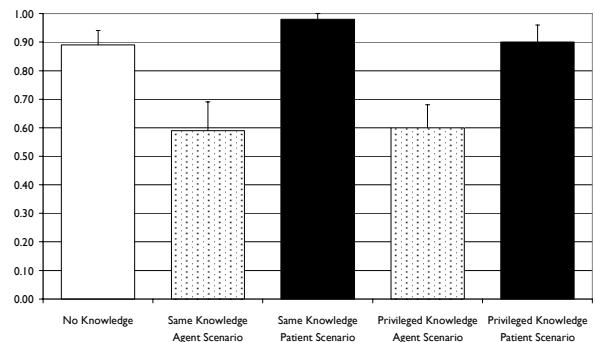


Figure 5: Proportion of Passive sentences produced by the DESCRIPTER in Experiment 2

A 2 (Knowledge – Same, Privileged) \times 2 (Scenario – Agent, Patient) analysis of variance revealed a main effect of Scenario, $F_1(1, 11) = 19.8$, $p < .01$, no main effect of Knowledge, $p > 0.1$, and no Interaction, $p > 0.1$. A second analysis was conducted as a one-way ANOVA across all knowledge conditions on the proportion of PASSIVE sentences. This revealed no effect of Knowledge, $p > 0.1$.

Discussion

In two experiments, we investigated how speakers describe transitive pictures as a function of their own or their addressees' knowledge. In one condition, the speakers simply described the target picture to their addressee. In another condition, both the speaker and their addressee saw an initial picture which showed the agent or the patient of the target action. In a third condition, the speaker saw an initial picture which

showed the agent or the patient of the target action, but their addressee did not. In each case, the speaker was aware of their addressee's knowledge state.

As in previous experiments, we found strong evidence of a preference for Given-New ordering: Speakers produced orderings that reflected their own knowledge. Thus, entities that they had previously encountered tended to appear in early word order positions, manifested as a tendency for Given agents to appear as the subject of active sentences, and Given patients to appear as the subject of passive sentences. Note that the active and passive sentences were denotationally identical, hence conveyed the same meanings. The effect of the scenario card was to alter which entity was mentioned first, not the meaning that was expressed.

However, we found no evidence that speakers take into account the knowledge of their addressees when formulating word order. Speakers produced passive sentences if the patient was speaker-Given, even when it was addressee-New to the addressee; speakers also produced more active sentences if the agent was speaker-Given than if it was speaker-New to the speaker, irrespective of whether it was Given or New to the addressee.

These results are in keeping with approaches that explain Given-New ordering in terms of information availability and incremental processing. Placing Given, hence accessible, entities in early word order positions helps speakers to meet the constraint of fluent production. The results sit less well with approaches that explain Given-New ordering in terms of audience design. Speakers did not produce word orders that were designed for their audience: Their utterances did not cooperatively accommodate their addressees' knowledge. Clearly, speakers do not produce Given-New order primarily to facilitate their addressees' entry of information into memory.

Previous research has demonstrated that speakers take into account their audience when designing their utterances at levels relating to meaning. Even results like those of Horton and Keysar (1996) show that speakers usually try to act cooperatively, and only tend to fail to cooperate when they are placed under a high processing load. In contrast, our results suggest that speakers do not primarily aim to act cooperatively with respect to syntactic structure. Even when they were not placed under any pressure, Describers produced syntactic structures that reflected their own ease of processing, and not that of their addressees. We suggest that this reflects both the inability of speakers to assess syntactic structures for difficulty (including ambiguity, as Ferreira and Dell's (2000) results suggest), and also a willingness to ignore audience design at levels of structure that are likely to be less relevant to successful communication in favor of devoting more resources to aspects of utterances that are likely to impact upon communicative success, such as lexical and semantic content.

In our experiments, the Matchers' task was straightforward, and Describers may have felt that producing a word order that reflected the Matchers' knowledge would not appreciably affect comprehension. In fact, post-experimental questionnaires revealed that both Describers and Matchers focused on aspects of the task directly related to meaning. Both groups reported that the most difficult part of the task, to which they devoted most effort, was correctly identifying the relevant entities. It is possible that with a more difficult task, where syntactic variations might have a more profound impact on Matchers' comprehension and hence ability to perform the task, speakers would be more concerned to formulate syntactic structures that were maximally easy to understand.

If correct, this would mean that speakers choose to allocate their limited resources depending on the probably communicative consequences of their decision. When successful communication is not likely to be endangered, they are willing to focus more on meeting the fluency constraint. However, when successful communication is at stake, speakers expend relatively more resources on behaving cooperatively. Insofar as syntactic variations are less likely to impact upon successful communication, speakers are less likely to display evidence of audience design with respect to syntactic structure.

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