

Rethinking Deep and Surface: towards a comprehensive model of anaphoric processes in dialogue

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1 Introduction

Hankamer & Sag, 1976; Sag & Hankamer, 1984 (henceforth, S&H) proposed that anaphoric processes exhibit a bifurcation. The two main characteristics distinguishing these classes are *parallelism* and *exophoricity*, as in (1a,b)

- (1) a. **parallelism**: anaphors that have a requirement of parallelism in form between the antecedent expression and the anaphor.
- b. **exophoricity**: anaphors which do not require a linguistic antecedent.

S&H suggest that:

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- *surface* anaphoric processes do not allow for exophoric antecedents (henceforth: are +endomorph) and exhibit parallelism effects with their antecedents,
- *deep* anaphoric processes allow for exophoric antecedents and do not exhibit parallelism effects with their antecedents.

These correlations are exemplified in (2) and (3), the former illustrating the potential or lack thereof for an exophoric antecedent, the latter contrasting the possibility of a passive/active mismatch between antecedent and anaphor:

- (2) a. [] [Hankamer points gun offstage and fires, whereupon a blood-curdling female scream is heard]
 Sag: (a) *I wonder who. [sluicing, surface]
 (b) *I wonder who was. [VPE, surface]
 (c) I wonder who she was. [definite pronominalization deep]
 (d) *Jorge, you shouldn't have. [VPE, surface]
 (e) Jorge, you shouldn't have done it. [S-it, deep]
 (S&H 1984, example 5)
- (3) The children asked to be squirted with the hose, so
 (a) they were 0. [VPE, surface]
 (b) *we did 0. [VPE, surface]
 (c) we did it. [S-it, deep]
 (S&H 1984, example 6)

H&S 1976 couch their modelling of this dichotomy in terms of the eponymous (Extended Standard Theory) levels of representation the anaphoric process would be accessing. However, they abandoned this view in their 1984 paper, arguing that anaphoric processes need to be modelled directly via a processing model. Apart from methodological considerations—‘deep’ had involved a disjunction between deep structure and deictically provided antecedents—the main empirical motivation for S&H were examples of VPE (as in (4a)), due to Barbara Partee, that show resolution is guided by an entity in which indexicals have been resolved, so contrary to the predictions of a syntactically based resolution mechanism. Similar data are exhibited by other anaphoric processes classified as surface, such as declarative fragments and propositional fragments: (4b) demonstrates both a resolution in which

indexicals have been resolved and the ungrammaticality of the sentential correlate:

- (4) a. A: Do you think they'll like me?
B: Of course they will ϕ . (=will like A)
- b. A: Who supported you?
B: Not you! (= A did not support B; cf. *Not you supported you.)

Thus, on the 1984 view: *there are two ways in which the interpretation of an anaphoric element can be recovered:* (S&H 1984,p. 335)

- (5) a. **Surface:** by reference to the representation of propositional structure of recent discourse which the understander has just constructed;
- b. **Deep:** by reference to constructs of the understander's discourse model.

S&H's dichotomy was very influential, probably more the 1976 proposal rather than the more semantically sophisticated 1984 proposal.¹ The main take home message has been, arguably, an intrinsic link between exhibiting (syntactic) parallelism and being an anaphoric process resolved relative to 'a syntactic antecedent'. Ironically, this goes very much against the semantically oriented message of S&H 1984. Over the years various counterexamples have emerged to the empirical claims of the surface/deep dichotomy, but no real successor proposal has emerged.² Certainly not for dialogue, which seems to have been S&H's target (see e.g. (2),(4) above.).

The class of anaphoric processes characterized by S&H was not assembled in a systematic manner. To put it somewhat crudely, in neither paper is there evidence that the authors had consulted a corpus to find examples, to consider distributional patterns, let alone to test the predictions of the theory on samples of conversation. Nor, beyond a smattering of *gedankenexperimente* were any experimental studies involved. This is merely a reflection of the state of theoretical linguistics at the time. In recent years there have been a variety of corpus studies on anaphoric processes in dialogue (see e.g. Hitzenman & Poesio, 1998; Tetreault & Allen, 2003 for pronouns), Nielsen, 2005;

¹Google scholar lists 728 hits for the 1976 paper and 207 for the 1984 paper.

²A noteworthy exception is (Culicover & Jackendoff, 2012), which will be discussed in a follow up paper to this one.

Miller, 2011 for VPE, Fernández & Ginzburg, 2002; Schlangen, 2003 for Non Sentential Utterances, Purver, Ginzburg, & Healey, 2001 for clarification requests, Besser & Alexandersson, 2007 for dysfluencies.). Nonetheless, there has not been, as far as I am aware, an attempt to characterize the range and distribution of available anaphoric processes.

What we ultimately need as a minimal basis for a comprehensive theory of anaphoric processes is a corpus study that follows the development of conversations in a number of distinct genres across multiple turns, checking how contextually dependent sub-utterances get resolved, addressing such issues as: Are their “antecedents” utterance based or exophoric? How far back can the antecedents be found? What sort of inference process is involved relating antecedent and anaphor?

In section 2 I describe a pilot study of this kind, using the British National Corpus (BNC) and the London-Lund corpus.

Based on data from the anaphoric processes which emerge from this study I reconsider in section 3 S&H’s audacious attempt at characterizing anaphoric processes as falling into the two classes **+endo(morphic),+parallel** (surface) and **-endo,-parallel** (deep).

As we will see, forty years after H&S 1976, and despite this striking claim having stimulated much research, our understanding of both exophoricity and parallelism remains highly incomplete. Taken at face value, our corpus study validates the correlations S&H hypothesized, with one exception. Nonetheless, once one digs deeper this characterization of anaphoric processes runs into a number of significant problems. A wide range of data justifies this claim. This includes: data showing that endophoricity is not a binary feature, but one correlated with the abstractness of the entity used in resolution; data exemplifying the existence of -endo processes that do exhibit parallelism; data pointing to the existence of +parallelism processes where the distance between antecedent and target can range over a number of turns, thereby going against the assumption that they involve merely a transient anaphoric relationship.

Nonetheless, there are a number of fundamentally important insights in S&H’s proposal. One of them, characteristic of Ivan Sag’s work generally, is the insistence to construct a consistent large-scale description of an interesting and complex domain. Apart from its importance for developing notions of semantic expressiveness that can enable genuine cross-framework evaluation, this seems a crucial ingredient in using theory as the basis for development in other domains such as language acquisition, for instance in correlating cogni-

tive development with ability to exploit anaphoric processes. An additional important insight, already present in the 1976 paper, is the realization that the linguistic modelling of anaphoric processes requires a means of integrating non-semantic information in a systematic way in dialogue context. Hence, interactional coherence is no longer simply to be specified ‘pragmatically’, but also constrained by the actual linguistic entities used, a clear precursor of a dynamic view of meaning. S&H were militating against two ongoing tendencies:

- losing linguistic complexity, as in logically-based models which abstract away from a linguistic level, e.g. Discourse Representation Theory (Kamp & Reyle, 1993), Dynamic Predicate Logic (Groenendijk & Stokhof, 1991, SDRT (Asher & Lascarides, 2003), and most recently Inquisitive Semantics (Groenendijk & Roelofsen, 2009), and in psychological theories of dialogue processing (e.g. Interactive alignment theory (Garrod & Pickering, 2004)
- losing contextual complexity (as in generative accounts that abstract away from dialogue context (e.g. Chung, Ladusaw, & McCloskey, 1995; Merchant, 2004.).

I will exploit one model of utterance processing in dialogue, that developed within the framework of KoS (Ginzburg, 1994; Ginzburg & Cooper, 2004; Larsson, 2002; Purver, 2006; Ginzburg & Fernández, 2010; Ginzburg, 2012b). Within that model the basic data structure representing context is the Dialogue GameBoard (DGB). The DGB is multidimensional and this allows us to ask about anaphoric processes: what resources of the DGB do they exploit? In section 4 I will sketch how this provides a framework that can capture the prominent types of anaphoric processes, as revealed by the corpus study, while pointing to no small number of fundamental issues that remain to be resolved both on the modelling and empirical fronts.

2 Anaphoric processes in Dialogue: a corpus study

2.1 The annotation scheme and its motivation

In this section I present the findings of a pilot corpus study that attempts to classify the range of available anaphoric processes in a dialogue. I annotated four extracts from these corpora, each from a quite distinct domain, comprising 204 turns (2050 words), three from the BNC (1450 words, 151 turns) and one from London-Lund (600 words, 53 turns). The BNC extracts are: an informal conversation between a child minder and two children (BNC KB8); a training session in a financial institution (BNC JP1); a court session (BNC JJY); the London-Lund extract is an informal chat between academics (LLC S.1.9). I will refer to this collection of extracts as the A(naphoric)P(rocesses)C(orpus).

A number of caveats should be mentioned at the outset. That this is a pilot, small scale study is evident. This implies that the usual issues with data sparseness are exacerbated substantially and also, with reasonably high likelihood, that various ‘significant’ phenomena have not been encountered. The spirit in which the study was conducted was not, in any way, to suggest that *rare(r) phenomena are not unimportant*, but rather that having an idea of what the commonest phenomena are, what the typical context accessing acts are, is important.

Before proceeding further, I should address an obvious elephant circling in the room: what is an anaphoric process? In order not to prejudge issues such as exophoricity one does not want to identify anaphoricity with existence of (linguistic) antecedent. The safest, in the spirit of van der Sandt’s slogan *presupposition as anaphora* (Van der Sandt, 1992, identify anaphoricity with contextual dependence. Having made this identification, and given a theory of context, we can then partition the classes of anaphoric processes relative to which element in context they utilize. Ultimately, this is a theory-dependent decision and relies on fraught issues concerning how content is resolved (see e.g. Recanati, 2004).

In the study I used the following categories, some of which are further partitioned into subclasses:

1. **Referential NPs:** proper names and definite NPs:

- (6) a. Shane: Got to check **the end dates, list numbers** (BNC, JP1)
- b. Ann: How was **your grandma?** (BNC, KB8)
- c. **Richard Blaney and Marie** I went and stayed in their um in **Wexted** last summer (LLC S.1.9)

2. **Indexical expression:** here I distinguished two subclasses:

- (a) **regular Ind(exical)Ex(pression):** words such as ‘I’, ‘you’, ‘now’, ‘here’.
- (b) **addr(essee)–call:** proper names used to address an interlocuter:
 - (7) a. thank you **Malcolm** (LLC S.1.9)
 - b. yes, **Mr [last or full name]** I’m sorry (BNC, JJY)

3. **Nominal anaphor:** here again I distinguished two subclasses:

- (a) **individual denoting anaphors:** pronouns such as ‘s/he’, ‘it’ used to denote individual entities such as persons and things:
 - (8) a. I’m not stopping you asking this witness at all, I don’t want, you mention the brochures and I don’t want to ask **him** questions ... (BNC, JJY)
 - b. I think to be honest to you, the the (unclear) have been given very little guidance, **she** doesn’t understand what’s supposed to happen (BNC, JP1)
- (b) **event denoting anaphors:** pronouns such as ‘it’ used to refer to events:
 - (9) We see Mrs [last or full name] as we came out of school. (pause dur=6) **It** was at the school yesterday, rather. (BNC, KB8).

4. **Demonstrative NPs** As with the anaphors I distinguished two subclasses:

- (a) **individual denoting demonstratives:** demonstratives such as ‘that’, ‘this witness’, or ‘that development’, used to denote individual entities such as persons and things:

- (10) ...when would the brochure, the sales brochure for **that development** be printed and available (BNC,JJY)
- (b) **event/proposition/fact denoting demonstratives:** demonstratives such as ‘that’ and ‘this’ used to refer to events, propositions and facts:
- (11) a. Anon 3: and at that time I think [last or full name] owned [last or full name] developments and also [last or full name] Anon 2: **that’s** correct (BNC, JJY)
- b. Anon 1: er the building er effectively would have only just commenced at **that stage**.
5. **Verb Phrase Ellipsis (VPE):** auxiliaries such as ‘did’, ‘were’, and ‘will’ whose complement is not expressed:
- (12) a. B: are you in touch with the St Bee’s crowd? / A : well, you know, to a certain extent, . . . , but Mary isn’t any more. (LLC S.1.9)
- b. Anon 3: were some of the directors of P L C also directors of developments? Anon 2: they were indeed. (BNC, JJY)
6. **Dysfluency expression:** Two subclasses are distinguished, following (Ginzburg, Fernàndez, & Schlangen, 2012), inspired by a similarly named distinction in the DAMSL annotation scheme (Core & Allen, 1997):
- (a) **Backwards Looking Dysfluency:** dysfluencies where the moment of interruption is followed by an alteration that refers back to an already uttered reparandum:
- (13) a. Well one of those Yeah, **one of them’s** negotiated and the other one isn’t. (BNC, JP1)
- b. I went and stayed in their um **in Wexted** last summer (LLC S.1.9)
- (b) **Forwards Looking Dysfluency:** dysfluencies where the moment of interruption is followed just by a completion of the utterance which is delayed by a filled or unfilled pause (hesitation) or a repetition of a previously uttered part of the utterance:

- (14) a. Ann: Has anyone listened to **erm (pause dur=6) what was it**, Radio Newcastle? (BNC, KB8)
 b. Nobody'll kno **nobody will know erm** who it is. (BNC, JP1)

7. **Non-sentential utterance**: as far as subclasses, I have used the majoritarian classes from the taxonomy of (Fernández & Ginzburg, 2002), unifying some classes and including one additional subclass (**eventive interjections**):

(a) **NSU-polarity**: NSUs such as ‘yes’, ‘no’ and modal adverbs used to comment on the veracity of a claim or answer a polar question:

- (15) a. Shane: We'll use some big ones now. John: **Undoubtedly.**
 b. A: But Mary isn't any more, you know? B: **No.**
 c. Anon 2: can I go back to where we were? Anon 3: **yes.**

(b) **NSU-shortanswer**: NSUs used in responses to explicit or implicit wh-questions:

- (16) a. Ann: Making what? Matthew: Fortune tellers. (BNC, KB8)
 b. John: End date? Shane: November. (BNC, JP1)

(c) **NSU-acknowledgement**: NSUs used to show understanding or accept assertions:

- (17) a. Richard: We walked further than that when we went to Crackside. Ann: **Aye.** (BNC, KB8)
 b. B : Richard Bl/aney and uh Marie A : **yes** B: and Marie I went and stayed in their ...

(d) **NSU-CR**: NSUs used in clarification requests:

- (18) a. Matthew: With all the walking we did. Ann Oh! **The walking?**
 b. Matthew: Erm (pause) She's getting better. Ann: **Mm?**
 Matthew: She's getting better.

(e) **eventive interjection**: interjections such as ‘oh’, ‘Thanks’, ‘Sorry’ which involve reaction to an event in the surroundings of the dialogue:

- (19) a: Tyburn Institute which we have on our doorstep. C:
oh. a: visitors **thank you** no that'd be my opinion. (LLC
S.1.9)

8. **Laughter**: markings of laughter events in the corpus, e.g.

- (20) a. A: I must see somebody. and **(laughs)** a: **(laughs)** (LLC
S.1.9)
b. Anon 3: I've heard of tactics Mr [last or full name] but . . . Unknown:
(laugh) (BNC, JJY).

The annotation scheme combines one existing annotation scheme (or rather its majoritarian classes), the annotation scheme for NSUs developed by (Fernández & Ginzburg, 2002; Fernández, 2006; Ginzburg, 2012b) with classes that are, for the most part, very familiar to researchers in semantics, pragmatics, and the philosophy of language. Perhaps the only surprising decision, given existing assumptions, is to include classes for dysfluencies and laughter. With respect to the former, classic conversation analytic work (e.g. Schegloff, Jefferson, & Sacks, 1977) argued that self and other repair form an essentially uniform phenomenon. Hence, if one includes, other-repair phenomena (our class **NSU-CR**), one should also include self-repair and, more generally dysfluent phenomena. (Ginzburg, 2012a; Ginzburg, Fernández, & Schlangen, 2013), show that (a) dysfluencies participate in semantic processes such as anaphora, conversational implicature, and (as arguments of) discourse markers, (b) they display significant cross-linguistic variation, while (c) giving rise to linguistic universals (e.g. the word used to respond negatively to polar queries (English 'No.') will also serve as an editing phrase (e.g. 'Bill no Frank is coming tomorrow.'). From this, they argue that dysfluencies deserve inclusion as a *bona fide* linguistic phenomenon. Laughter is frequent (on the order of 30598 tokens in the BNC, not much less than a quarter of the frequency of 'the', 139648.) and it has a number of conventionalized uses (Jefferson, 1979; Schegloff, 2001). One obvious weakness of the scheme concerns tense and event reference—this needs to be incorporated in a scaled up version of this study.

The corpus was annotated by the current author three times over a one year period, with the later annotations taking precedence. As mentioned above, about half of the classes are ones originating from a taxonomy co-developed by the author and most of the rest are easy to recognize on lexical or syntactic grounds.

2.2 Results

Table 1 displays the distribution of the different categories found in the annotation of the APC, for each extract and as a whole:

Table 1: Distribution of context dependent expressions in a sub-corpus of the BNC and LL

| Exp class | Child/adult | financial | court | Profs | Total (freq.) | Rate (per turn) |
|---------------------|-------------|-----------|-------|-------|---------------|-----------------|
| Indexical | 27 | 16 | 23 | 28 | 94(21%) | 46% |
| Ref-NPs | 16 | 9 | 34 | 12 | 71(16%) | 34% |
| NSU-ack | 6 | 12 | 4 | 22 | 44(10%) | 22% |
| ind-ana | 12 | 13 | 8 | 9 | 42(10%) | 21% |
| Dysfl-FLD | 4 | 3 | 15 | 10 | 32(7%) | 16% |
| NSU-polarity | 3 | 5 | 7 | 8 | 23(5%) | 11% |
| Dysfl-BLD | 2 | 5 | 8 | 3 | 18(4%) | 9% |
| addr-call | 4 | 2 | 9 | 2 | 17(4%) | 8% |
| NSU-shortans | 7 | 4 | 1 | 1 | 13(3%) | 6% |
| ae-dem | 1 | 2 | 5 | 4 | 12(3%) | 6% |
| event-interj | 4 | 0 | 1 | 5 | 10(2%) | 5% |
| ind-dem | 2 | 2 | 5 | 1 | 10(2%) | 5% |
| VPE | 1 | 0 | 5 | 2 | 8(2%) | 4% |
| Laughter | 2 | 1 | 1 | 3 | 7(2%) | 3% |
| event-ana | 1 | 1 | 0 | 4 | 6(1%) | 3% |
| NSU-CR | 4 | 0 | 0 | 0 | 4(1%) | 2% |
| Other | 7 | 3 | 5 | 12 | 27 | N/A |
| Total | | | | | 441 | |

Table 2 displays the average and maximal distance found (measured in turns) of a member of a given category from its antecedent, for those classes for which such an antecedent exists. It also provides figures for exophoric antecedents and indicates whether there is evidence for or against parallelism effects for that category in the APC. The contentious/non-obvious cases are discussed below and in section 3.

Table 2: Distance from antecedent, exophoricity, and parallelism of context dependent expressions in a sub-corpus of the BNC and LL

| Exp class | Antecedent Distance (avg) | Max Antecedent Distance | Exophoric | Parallelism |
|-----------------------|---------------------------|-------------------------|-------------------|-------------|
| Indexical | N/A | N/A | N/A | N/A |
| Ref-NPs | N/A | N/A | N/A | N/A |
| NSU-ack | 1 | 1 | 0 | y |
| ind-ana | 1.3 | 6 | 1 (6 uncl. antec) | n |
| Dysfl-FLD | 0 | 0 | 0 | n |
| NSU-polarity | 1 | 1 | 0 | n |
| Dysfl-BLD | 0 | 0 | y | |
| addr-call | N/A | N/A | N/A | N/A |
| NSU-shortans | 1.1 | 3 | 1 | y |
| event-interj | .9 | 1 | 3 | n |
| ae-dem | 1.7 | 5 | 1 | n |
| ind-dem | 1.2 | 5 | 3 | n |
| VPE | 1.6 | 3 | 0 | ? |
| Laughter | .7 | 1 | 0 | n |
| fact/event-ana | .7 | 1 | 0 | n |
| NSU-CR | 1 | 1 | 0 | y |

2.3 Discussion

Starting with distributional issues: on the face of it, the coverage is quite reasonable—the postulated classes cover approx. 94% of the examples found. Of course in the absence of a validated gold standard, this merely suggests that scaling up is worthwhile. Of the top four classes, numbers one, two, and four are indexicals, referential NPs, and pronouns, highly studied phenomena in semantics and pragmatics. However, number three, non-sentential acknowledgements, and from number five through ten are all categories that are intrinsically dialogical, underscoring in particular the pervasiveness of metacommunicative moves such as acknowledgements and self-corrections. The results replicate the findings of (Schegloff et al., 1977) about the preference for self- over other-correction.

Moving on to matters directly related to this paper, Table 2 would seem to validate the deep/surface dichotomy, despite their being small overlap—personal pronouns and VPE—between the classes considered here and the ones discussed by H&S: parallelism correlates with lack of exophoricity, and allowing for long cross-turn dependencies correlates with exhibiting exophoricity. Exophoricity being rare for the classes here (there are 9 such cases from 232 among the classes that allow for antecedents.), one might not pin too much weight on correlations of this kind, but what is a solid generalization is the strong tendency for anaphors to be adjacent, turnwise, to their antecedents—apart from the intrinsically within-turn dysfluencies. A potential hypothesis would be that the classes with a relatively high average or high max antecedent/anaphor distance would be drawn from the ‘deep’ anaphors, but among the five classes with an average antecedent/anaphor, max distance > 1 , we find VPE and declarative fragments,³ which are standardly viewed to be surface. VPE is the source of the one clear counterexample to S&H in the corpus data, a violation of voice parallelism of a kind discussed *inter alia* by Dalrymple, Pereira, & Shieber, 1991; Kehler, 1993; Kertz, 2010:

- (21) a: One sits here
A: Yes
a: and expects - to be visited.
A: Of course, yes.
a: Yes yes.

³Often also known as ‘short answers’.

A: And then in the end of course people always **do**. (London-Lund, S.1.9)

A less clear cut case is the following bare NP/short answer which addresses an implicit issue ('who are those people'):

- (22) B: You you can have too many people coming to see you here
A: Yes
A: Oh well I'm very sorry. Oh I do see. Yes yes, I think you mean me.
a (laughs), you take the hint - you take the hint yes good.
C: Yes, it's all the uninvited ones, they just come.
A: Yes yes I'm
C: people you've never known. they just come and you don't want to know. (London-Lund, S.1.9)

We need to dig somewhat deeper than these initial findings to become aware of some problems the deep/surface dichotomy runs into.

3 Problems for the deep/surface dichotomy

3.1 Gradable Exophoricity

The main issue that plagues exophoricity as a binary feature characterizing anaphoric processes is that it is not a binary feature—some constructions frequently utilize exophoric antecedents (demonstratives and eventive interjections, as revealed above); some allow for them, although in practice tend to utilize endomorphic antecedents (e.g. individual pronouns); some allow for them under very restricted circumstances (VPE, declarative fragments, polarity expressions,); whereas some cannot give rise to them due to their meaning (as discussed below, repair constructions.).

VPE (Miller & Pullum, 2012) devote their paper to exophoricity and VPE (or Post Auxiliary Ellipsis (PAE), as they prefer to call VPE), an issue which arose soon after S&H's first paper. They show that VPE allows for exophoric antecedents, as exemplified in (23):

- (23) a. Once in my room, I took the pills out. “Should I?” I asked myself.
(COCA) (Miller and Pullum’s 24a)
- b. [Context: A and B are eating a bowl of cherries; now only one is left.] A to B: If you don’t, I will. (Miller and Pullum’s 37)

In essence, they suggest that the reason for the difficulty in finding exophoric VPE is due to the difficulty in exophorically creating the contextual conditions they postulate as characterizing VPE, which as I will discuss later involve the raising of either the issue $p?$ for some proposition p or the issue $\lambda x.q(x)$ for a property q .

declarative fragments These are +parallel, by the S&H criteria: with a linguistic antecedent they exhibit case parallelism between source and target (Morgan, 1973; Ginzburg & Sag, 2000; Merchant, 2004; Ginzburg, 2012b).⁴ Nonetheless, where the trajectory of the conversation is somewhat predictable, they allow for exophoric antecedents, as in (24a-c) where at issue is, respectively, what does the customer want to buy, what is the destination required by the customer, and how much must the customer pay. (24d) was produced by a speaker who wished to ensure noone else would attempt to partake of the ice cream cone. It suggests that the ‘predictable conversational trajectory’ is not the whole story:

- (24) a. [In a boulangerie] Kim: Two croissants and a pain de mie.
- b. [In a train station] Kim: A single to Newcastle.
- c. [Kim puts newspaper on counter, Sandy is the salesperson] Kim: Three euros, seventy five cents.
- d. [Dana points to an ice cream cone in a little bowl, which she is leaving for a short while on the table:] For me. (attested example)

⁴These works contains detailed argumentation on the issue whether this construction should be analyzed as sentential at some level. In countering such a view, (Ginzburg, 2012b) shows that all existing possibilities for such an analysis (with the declarative fragment reconstructed *in situ*, fronted, as a cleft, as a pseudo-cleft etc) all display significant syntactic and semantic mismatches with the fragment.

Polarity expressions In the APC and generally in the BNC one does not find examples of polarity expressions resolved exophorically. Nonetheless, it is certainly possible to construct felicitous examples, in particular (25e) is ambiguous between a somewhat implausible reading (Kim asserting that Sandy does not have any questions for her) and one which indicates Kim's lack of desire to take any questions:

- (25) a. [Sandy wins crucial point in tennis match] Sandy Yes!
b. [Sandy receives a call on her phone.] Sandy Yeah?
c. [Sandy opens freezer to discover smashed beer bottle] Sandy: (Oh) No!
d. [Little Billie approaches socket holding nail] Parent: No, Billie
e. Sandy: I have some questions for you. Kim: No.

The examples in (25) exemplify an obvious difficulty in exophoricity argumentation: can we be sure that the examples in question constitute 'the same construction/lexical entry as the endomorphic cases? This issue affects pronouns as well, a point I will return to below. As it happens, cases like (25c,d) and the preferred reading of (25e) are analyzed by (Cooper & Ginzburg, 2011, 2013) in terms of a use expressing negative volition towards an event, distinct from the 'standard 'No'', which they argue always denotes a negative proposition, identical to the queried proposition when the latter is negative, of opposite polarity otherwise. If the ambiguity is necessary, one would have to find other examples to demonstrate exophoric possibilities for polarity expressions.

More generally, this illustrates the difficulty in conclusively resolving exophoricity debates, given their dependence on particular analyses of given phenomena. At the same time, the pattern we have seen here that indicates the gradience of exophoricity suggests it is best left explained in terms of how easy it is to express a given ontological category exophorically, with ease/difficulty correlated with the concrete (person, perceivable thing, event)/abstract ([existential] proposition, polar/complex question . . .).

As an illustration that this hypothesis is on the right track, I point to the contrast between two anaphoric NSU constructions not present in the APC, one of which did figure in H&S 1976, S&H 1984, interrogative and exclamative sluicing. In both cases, the NSU is a bare *wh*-phrase.

- (26) a. [picture of iphone 5] How sleek! / How amazing!/ What a sleek gadget!/ How sleek is the iphone 5?/ #How sleek?
- b. [Picture of 5 year old Bill standing next to complex sand castle he has built] What a clever guy! / How clever Bill is! / How clever! / How clever is Bill? / #How clever?

The antecedent for an interrogative sluice is either a quantified proposition or polar question (e.g. (Ginzburg & Sag, 2000; Ginzburg, 2012b) or a wh-question (Sag, Collins, Popova, & Wasow, 2012), whereas for an exclamative sluice it is a concrete individual or event. While (Ginzburg & Sag, 2000) showed the existence of exophoric resolution for interrogative sluices, in practice they are rare. On the other hand, exophoric resolutions for exclamative sluices are very common, as the following two examples from COCA and the BNC illustrate:

- (27) a. LAUER: Nice job. And again, we are now going to be joined by the cast from “The Artist” They just had a very big morning. With us now from Paris, the film’s Oscar nominated stars Jean Dujardin and Berenice Bejo and director, Michel – go ahead... CURRY: Michel Hazanavicius, I think. LAUER:... and producer Thomas Langmann. Guys, I hope I didn’t mess – we didn’t mess the name of your director up too much. CURRY: We tried. LAUER: But congratulations. What a day. (COCA)
- b. Kitty: I had this long conversation not knowing who the hell he (pause) so I said well are you going, I was thinking Kingfisher, so I thought well, I said are you going training tomorrow night? He said training? What training? I said well, you know, and I thought it could be somebody here (laughing):[as well]. Anon 4: (laugh) Kitty: Let’s face it, I made a complete prat of myself. And then Martin, I sa I still couldn’t think who it was. Martin came home and said oh is that Mark fro Mark from Woking? I thought, (laughing):[ah, ha]! Anon 4: The wrong bloody number. Kitty: Oops! Yeah. But honestly, how stupid! (BNC, KPK)

3.2 Non-surface surface anaphors: repair constructions

In the APC, we encountered three types of repair utterances, forwards and backwards-looking dysfluencies and non-sentential clarification requests. These

seem to be intrinsically endomorphic, which one could explain as following from their meaning involving the repair of *utterances*.⁵ Backwards looking dysfluencies and non-sentential clarification requests display parallelism effects. With respect to the former, this was proposed by (Levelt, 1983) and was shown to hold 84% of the time on the Switchboard corpus by (Hale et al., 2006); with respect to the latter, the claim originates in (Ginzburg & Cooper, 2004), based on data such as (28):

- (28) a. on its *intended content* reading NSU-CR requires segmental phonological identity between source and target:

A: Did Bo leave? B: Bo? (Intended content reading: **Who are you referring to?** or **Who do you mean?**) /Max? (lacks intended content reading; can only mean: **Are you referring to Max?**)

- b. an XP used to clarify an antecedent sub-utterance u_1 must match u_1 categorially:

A: I phoned him. B: him? / #he?

A: Did he phone you? B: he? / #him?

A: Did he adore the book. B: adore? / #adored?

A: Were you cycling yesterday? B: Cycling?/biking?/#biked?

These constructions are, therefore, *surface* constructions *par excellence*. And yet, in some very significant ways they do not fit into the expected mould.⁶

- The *intended content* reading of NSU-CR requires an metacommunicatively-driven inference process quite distinct from copying/deletion.
- Given the potential for backwards-looking dysfluencies at any stage in an utterance, accommodating them requires a non-monotonic, incremental view of grammar, which will allow for a similar inference process to that occurring with NSU-CRs but within turns.

⁵A counterexample to this claim with respect to forwards-looking dysfluencies would be the demonstration that one can hesitate felicitously using e.g. ‘um’ after an initial segment of a non-linguistic act. I am not aware of experimental evidence about this. Similar comments apply to the other two constructions.

⁶Expected by who? Mainstream grammar. S&H with their emphasis on the link between processing models and anaphora could plausibly be viewed as not too surprised.

3.3 Distance effects

When an anaphoric process allows for long distance links between source and target (= across several turns not separated by clarification interaction) this is significant from a processing point of view in arguing against it being ‘surface’, in the S&H sense of a transient entity, not integrated in the discourse model.

One such anaphoric process is exemplified by declarative fragments. As noted earlier, these are a prototypical surface anaphoric process, but there is considerable corpus evidence that they allow for long distance resolution. (Ginzburg & Fernández, 2005) show that in the British National Corpus over 44% of declarative fragments have more than distance 1 (using the BNC provided partition into turns), and over 24% have distance 4 or more, like the last answer in (29), (29c) is a constructed example from (Ginzburg, 2012b):⁷

- (29) a. Allan: How much do you think?
Cynthia: Three hundred pounds.
Sue: More.
Cynthia: A thousand pounds.
Allan: More.
Unknown: <unclear>
Allan: Eleven hundred quid apparently. (BNC, G4X)
- b. Liz: Who’s produced them?
Sue: It’s...
Allan: Erm the people who who our training consultant’s just gone to I I I P L?
Cynthia: Golly.
Allan: Somebody anyway.
Cynthia: Oh Andrea Andrea [*last or full name*]. (BNC, G4X)
- c.
- A(1): Who is coming to the barbecue?
B(2): the barbecue on Sunday?
A(3): the 29th yes

⁷The distance is measured from the antecedent (the interrogative utterance), the source of any parallelism effects.

Table 3: NSUs sorted by Class and Distance

| NSU Class | Example | Total | Distance | | | | | | | |
|----------------------|-------------------------|-------|----------|-----|----|-----|-----|-----|-----|--|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | >6 | |
| Acknowledgment | <i>Mm mm.</i> | 595 | 578 | 15 | 2 | | | | | |
| Declarative Fragment | <i>Ballet shoes.</i> | 188 | 104 | 21 | 17 | 5 | 5 | 8 | 28 | |
| Affirmative Answer | <i>Yes.</i> | 109 | 104 | 4 | | | 1 | | | |
| Reprise Fragment | <i>John?</i> | 92 | 76 | 13 | 2 | 1 | | | | |
| Repeated Ack. | <i>His boss, right.</i> | 86 | 81 | 2 | 3 | | | | | |
| Rejection | <i>No.</i> | 50 | 49 | 1 | | | | | | |
| | Total | 1285 | 1125 | 82 | 26 | 9 | 7 | 8 | 28 | |
| | Percentage | 100 | 87.6 | 6.3 | 2 | 0.6 | 0.5 | 0.6 | 2.1 | |

B(4): Sunday is the 28th.

A(5): Oh right, yes the 28th.

B(6): The one Sam's organizing?

A(7): Yes.

B(8): Will it be on even if it snows?

A(9): Sam hasn't said anything.

B(10): Right. Anyway, I'd guess Sue and Pat for sure, maybe Alex too.

As we saw in section 2, in practice resolution of anaphoric processes is usually quite local. This was confirmed on a larger scale for NSUs by (Ginzburg & Fernández, 2005), who showed that in the BNC 87% of NSUs have a distance of 1 sentence and that the vast majority (about 96%) have a distance of 3 sentences or less. Table 3 exemplifies the result for the six majoritarian classes.

Table 3 demonstrates that declarative fragments are the long distance NSU *par excellence*. However, with NSUs involved in repair, long distance potential seems intrinsically restricted. Once an utterance is grounded, the potential for a reprise fragment deteriorates rapidly, even though the issue it raises remains perfectly coherent:

- (30) a. A: Did Mr Nemzovich call? B: When? A: This morning. B: Nope.
Who is Mr Nemzovich?
- b. A: Did Mr Nemzovich call? B: When? A: This morning. B: Nope.
‡Mr Nemzovich?

- c. A: Did Mr Nemzovich call? B: When? A: This morning. B: ? Mr Nemzovich?
- d. A: Did Mr Nemzovich call? B: Nope. ‡Mr Nemzovich?

Distance in resolution, then is a significant parameter of anaphoric processes, but one that cuts across anaphoric processes that are +parallelism.

3.4 Parallelism effects with deep anaphors

The final issue I will raise for the deep/surface dichotomy concerns pronouns, the prototypically deep anaphors.

Here we can point to two issues. On the one hand, the antecedent for a pronoun can even be part of the *reperandum* in a disfluency, that part which will be ‘replaced’ during repair, so precisely the transient, unintegrated representational entity S&H associate with *surface* anaphors:

- (31) Peter was + { well } he was fired. (Example from Heeman & Allen, 1999)

More intrinsically perhaps, in grammatical gender languages, pronouns need to agree in gender with their antecedents, agreement that need have no non-linguistic basis. Thus, in Hebrew there exist two distinct nouns corresponding to English ‘car’, one feminine, one masculine and, correspondingly, pronouns to NPs containing these nouns needs to agree with the noun across turns, as in (32).

- (32) a. A: ledani yeš mexonit yafa B: eyfo hu kana ota?
 to-Dani exists car-sg-fem nice-sg-fem Where he bought her-sg-fem?
 A: Dani has a nice car. B: Where did he buy it?
- b. A: ledani yeš oto B: eyfo hu kana oto?
 to-Dani exists car-sg-masc nice-sg-masc Where he bought him-sg-masc?
 A: Dani has a nice car. B: Where did he buy it?

Although this remains to be tested experimentally, I believe that such a requirement extends to long distance pronominalization (Hitzeman & Poesio,

1998), exemplified in (33), a slightly modified Hebrew version of a dialogue cited in (Tetreault & Allen, 2003).⁸

- (33)
1. E: gamarta im xibur hamano'a? *So you have the engine assembly finished.*
 2. E: axshav xaber et **hamexonit/oto** lagrar. *Now attach the car to the tow.*
 3. E: derex agav kanita hayom delek *By the way, did you buy gasoline today?*
 4. A: ken. mileti kshe kaniti et hagalgal lemekaseax hadeshe. *Yes. I got some when I bought the new lawn mower wheel.*
 5. A: shaxaxto lakaxat iti ethajerikan, az kaniti xadash. *I forgot to take my gas can with me, so I bought a new one.*
 6. E: ze ala harbe? *Did it cost much?*
 7. A: lo veani bexol mikre carix et ze latraktor. *No, and I could use another anyway to keep with the tractor.*
 8. E: o key. *OK.*
 9. E: nu az xibarta **ota/oto** kvar (fem/masc) *Have you attached her/him yet?*

The upshot of this is that pronouns, at least in grammatical gender languages, maintain purely linguistic information about their antecedent, which is incompatible with a resolution based purely on a (language-independent) situational model or even a DRT-like or SDRT-like (Asher & Lascarides, 2003) DRS. What is interesting and challenging about examples such as (33) is that they do depend on a visual (or ongoing task) stimulus as well, given that purely linguistic antecedents are typically eliminated when the discourse topic with which they are associated shifts, as in (34):

(34)

⁸The facts in French, where gender is much more grammaticized in Hebrew, might be otherwise. (i) illustrates cross-sentential gender disagreement (albeit with a definite rather than a pronoun):

- (i) Le matin du 16 avril, le docteur Bernard Rieux sortit de son cabinet et buta sur **un rat mort**, au milieu du palier. Sur le moment, il écarta **la bête** sans y prendre garde et descendit l'escalier. (*La Peste*, Camus).

A(1): Sue hit Bill. / B(2): No, she patted him on the back. / A(3): Ah. (4) Is she going to a party tomorrow? / B(5): Yes. / A(6): I see. (7) Is #he/Bill?

3.5 Deep and Surface: some conclusions

In this section I tried to demonstrate, using data concerning various anaphoric processes, that the correlations which underlay the deep/surface dichotomy do not, in general, hold.

1. **Exophoricity:** there do seem to exist dialogical anaphoric processes that intrinsically require a linguistic utterance as their antecedent—repair processes seem to be the clearest candidates, and for a principled reason. Rather than exophoricity being a binary feature, a more likely contrast seems to be between anaphoric processes that *easily* extract antecedents from visual/audio scenes (e.g. demonstratives, nominal pronouns, and exclams), in contrast to anaphoric processes (e.g. polarity expressions and declarative fragments) which, due the semantically abstract nature of their antecedents, seem to need a topically restricted interaction scenario.
2. **Distance:** some anaphoric processes can allow for long distance (spanning a number of distinct turns) between source and target (ST), including anaphoric processes such as declarative fragments that exhibit categorial parallelism between source and target; other anaphoric processes are intrinsically local, exhibiting for the most part ST distances of one turn, most prototypically reprise fragments. This cuts across the classes that exhibit parallelism. In grammatical gender languages non-semantic ST parallelism can also be exhibited long distance by nominal pronouns typically tagged as deep
3. **Surface anaphora involving inference:** repair constructions such as dysfluencies and non-sentential clarification requests are both endophoric and exhibit parallelism. Nonetheless, their resolution involves meta-communicative reasoning, not mere copying/deletion/reconstruction.

4 Characterizing anaphoric processes in the Dialogue Gameboard

My aim in this section is to sketch a model of context that can be used as a basis for describing the anaphoric processes that occur in the corpus study in section 2. I will also consider how this model relates to the two component model assumed by SH and certain assumptions we need to make about the grammar.

4.1 Contexts in KoS

KoS—not an acronym—is a theory of dialogue context that has underpinned linguistic analyses of:

- NSUs such as propositional lexemes, declarative fragments, reprise fragments (RFs), sluicing (Ginzburg & Sag, 2000; Larsson, 2002; Ginzburg & Cooper, 2004; Purver, 2006; Fernández, 2006; Sag & Nykiel, 2011; Ginzburg, 2012b)
- dysfluencies (Ginzburg et al., 2012)
- pronouns, vocatives (Ginzburg, 2012b)

KoS is a framework for describing dialogical interaction that draws its inspiration from Situation Semantics, sign-based grammar, conversation analysis, and Clarkian psycholinguistics *inter alios*. Its formal underpinning is the type theoretic framework TTR (Cooper, 2005, 2012; Cooper & Ginzburg, 2013). Though I will proceed informally here, what makes TTR advantageous for KoS is that it provides access to both types and tokens at the object level. This plays a key role in developing metacommunicative interaction, as we shall see below, in that it enables simultaneous reference to both utterances and utterance types.

The entity that corresponds to ‘public context’ in KoS is the Dialogue GameBoard (DGB).⁹ Its structure is given in (35) — the *spkr,addr* fields allow one to track turn ownership, *Facts* represents conversationally shared assumptions, *Moves* and *Pending* represent, respectively, the utterances that

⁹Detailed motivation of the structure and evolution of the DGB is provided in (Ginzburg, 2012b), with a briefer introduction in (Ginzburg, 2013).

are yet to be grounded and have been grounded (‘grounded’ in the sense of Clark, 1996, on which more shortly), *QUD* tracks the questions currently under discussion:

(35)

Dialogue Gameboard

| <i>component</i> | <i>type</i> | <i>keeps track of</i> |
|---|-------------|-----------------------|
| Spkr: Individual Addressee: Individual | | Turn ownership |
| Facts : Set(propositions) | | Shared assumptions |
| Moves: List(Locutionary propositions) | | Grounded utterances |
| QUD: partially ordered set(<question, fec> pairs) fec=focus-establishing-constituent | | Live issues |
| Pending: List(Locutionary propositions) | | Ungrounded utterances |

In terms of the DGB, S&H’s 1984 model had some version of FACTS (a mental model (Johnson-Laird, 1983) or situational model (Zwaan & Radvansky, 1998)) and of Moves (a ‘propositional textbase’ (Fletcher, 1994)). The DGB, then, goes beyond such a view of context in at least two significant ways which derive from the fact that it is intended as a contextual resource for dialogical *interaction*, in contrast to earlier models of context, intended to process text or monologue. The two fundamental innovations relate to the fact that (a) questions, semantic entities that enable the representation

of potentially inconsistent resolutions, are an important source of structure in dialogue, and (b) the communicative process is explicitly represented:

- QUD: this provides a dynamic repository of relevance, where the lifetime of entities can be potentially ‘medium-term’ (stretching across turns).
- Pending/Moves: these provide a repository of entities encoding linguistic structure, a potential source of parallelism. Pending is downdated once an utterance is grounded, hence it is typically ‘short-term’.

Questions get introduced into QUD by a number of processes: querying (asking q makes q QUD-maximal), assertion (asserting p makes p ? QUD-maximal), accommodation triggered by clarification interaction (e.g. if A’s sub-utterance u is difficult to resolve or involves an error, the issue ‘what did A mean by u ?’ can become QUD-maximal) accommodation triggered by interaction in a conversational genre (e.g. in a customer/client interaction, the issue ‘what does the client require’ can become QUD-maximal). Adopting the assumption that parallelism, typically, exhibits a similar time course to the salience of the relevant entity of QUD, we can capture such effects by viewing QUD as tracking not simply questions qua semantic objects, but pairs of entities: a question and an antecedent sub-utterance. This latter entity provides a partial specification of the focal (sub)utterance, and hence it is dubbed the *focus establishing constituent* (FEC) (cf. *parallel element* in higher order unification-based approaches to ellipsis resolution e.g. Gardent & Kohlhase, 1997.) Thus, the FEC in the QUD associated with a wh-query will be the wh-phrase utterance, the FEC in the QUD emerging from a quantificational utterance will be the QNP utterance, whereas the FEC in a QUD accommodated in a clarification context will be the sub-utterance under clarification.

Pending is the contextual resource corresponding to utterances that are still in progress or under clarification. One of the key structuring aspects of conversational interaction is the ubiquitous metacommunicative interaction between the participants observable via periodic verbal and gestural backchannels, and occasionally via clarification questions of various kinds (e.g. ‘What did the speaker mean by ‘...’). This cycle of grounding or clarification is also present for a given speech participant monitoring her own speech, overt evidence for which are various dysfluencies such as hesitations

(‘the next thing to say is problematic’) and self-corrections (‘the recent sub-utterance needs fixing’). (Ginzburg, 2012b) offers a detailed argument for the type for Pending. For current purposes I mention merely the processing argument: one needs an entity both conversationalists have interest in preserving,

- from which the range of clarification requests is derivable,
- and which allows original speaker to interpret and recognize the coherence of a class of possible clarification queries that original addressee might make.
- allows the range of emergent utterance presuppositions to be derived (following an utterance ‘Did Sandy strike out?’ *the fact that, say, ‘Sandy’ refers to Sandy Koufax, the fact that that utterance consists of four words . . .*)

A straightforward entity that satisfies these requirements is the *locutionary proposition* defined by an utterance. Austinian propositions, individuated in terms of a situation s and a situation type T , were introduced in situation semantics (Barwise & Etchemendy, 1987). The original Austinian conception was that s is a situation deictically indicated by a speaker making an assertion whose truth involves s being of type T . A *locutionary proposition* specializes this notion to the case of a speech event u : in the immediate aftermath of u , **Pending** gets updated with a record of the form $\left[\begin{array}{l} \text{sit} = u \\ \text{sit-type} = T_u \end{array} \right]$

(of type *locutionary proposition* (LocProp)). Here T_u is a grammatical type for classifying u that emerges during the process of parsing u .¹⁰ In other words, an entity such as the *sign* in the sense of sign-based grammars such as Head Driven Phrase Structure Grammar (HPSG), Categorical Grammar (see e.g. Calder, Klein, & Zeevat, 1988; Moortgat, 1997), or in versions of Lexical Functional Grammar (see e.g. Muskens, 2001). The relationship between u and T_u —describable in terms of the proposition $p_u = \left[\begin{array}{l} \text{sit} = u \\ \text{sit-type} = T_u \end{array} \right]$ —can

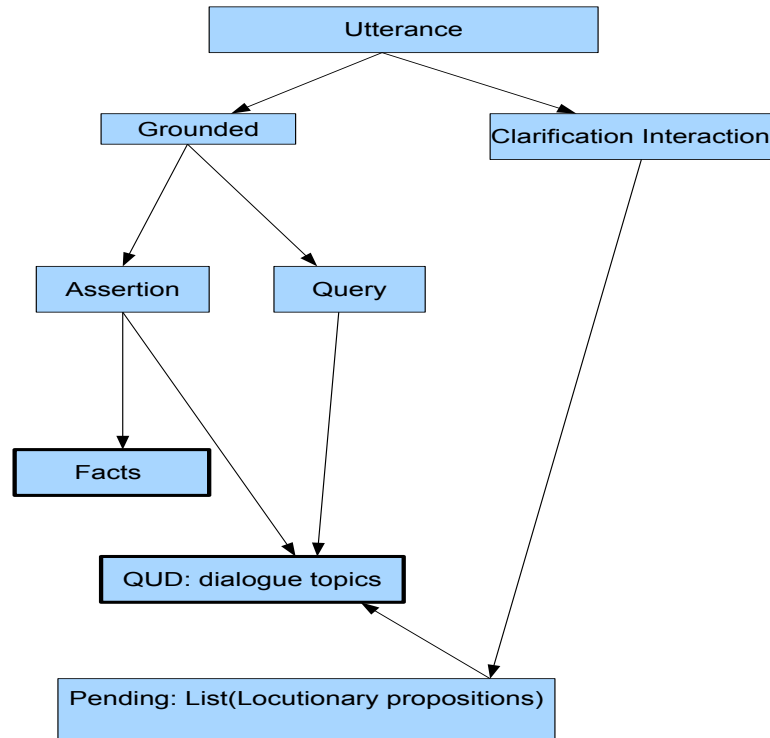
be utilized in providing an analysis of grounding/CRification conditions:

¹⁰In the most general case, given the need to accommodate structural ambiguity, it should be thought of as a *chart* (Cooper, 2012).

(36)

- a. Grounding: p_u is true: the utterance type fully classifies the utterance token.
- b. CRification: p_u is false, either because T_u is weak (e.g. incomplete word recognition) or because u is incompletely specified (e.g. incomplete contextual resolution—problems with reference resolution or sense disambiguation).

This, then, is the basic argument that while the utterance is in progress (see evidence for incremental interpretation (Rieser & Schlangen, 2011)) and in its immediate aftermath an entity like the $p_u(u, T_u)$ needs to be available to both participants. How long this entity can be assumed to persist once the utterance is grounded is very much an open question. Speakers are assumed to update the (Moves field of the) DGB with the content of their utterances as soon as the utterance is completed. However, given the potential need to engage in clarificatory discussion concerning the utterance, backtracking to the locutionary proposition needs to be possible. Hence, the most recent element of Moves needs to be a locutionary proposition. Whether this applies to other moves remains to be addressed experimentally. A flow chart of this view of processing is given in (37):



(37)

4.2 Interfacing Grammar and the DGB

In KoS anaphoric processes are handled by enabling grammatical constructions to interface directly with the DGB. To put it slightly differently:¹¹ we extend the Saussurean notion of sign by not only taking account of the signifier (the speech-event) and the signified (in sign-based grammar: the synsem) but also the context in which the signification takes place (here represented by the Dialogue GameBoard). I will discuss the main classes of the taxonomy of the APC informally, in a formal account one could characterize the resolution process by associating a type summarizing fields of the DGB utilized therein.

¹¹I owe this formulation to Robin Cooper.

4.2.1 Indexicals and addressee calls

The DGB keeps track of the turn holder, addressee, and utterance time, hence dealing with ‘I’, ‘you’, and ‘now’ in two-person dialogue is straightforward. Addressee calls are equally straightforward to capture, including in their use as turn assigners. The multi-party case ‘you’ is tricky (see e.g. Frampton, Fernández, Ehlen, Christoudias, Darrell, & Peters, 2009), as is ‘we’.

4.2.2 Referential NPs

Here we have two main classes: proper names and definites. The former get resolved on the basis of presuppositions represented in FACTS. This is true, to some extent, also of definites, but even in the small corpus considered here, it becomes clear very soon that for viability in this respect FACTS needs to be inferentially buttressed, for bridging or frame-based reference.

4.2.3 Polarity NSUs

This class of expressions typically occur in a post-polar query context (where $p?$ has been posed) or post-assertorically (where p has been asserted.). In KoS these contexts are uniformly characterized as ones in which $p?$ is the maximal element of QUD. This enables $p?$ to be used in combinatory operations to combine with the semantic operation emanating from the polarity expression but also ties its availability to this issue remaining under discussion. Presuppositions relating to the polarity of the question, crucial for correct interpretation of ‘No’, and in languages with distinct affirmation (French ‘oui’, ‘si’) are also captured in this way, assuming the semantics distinguishes $p?$ and $\neg p?$ (Cooper & Ginzburg, 2012). An account along these lines was developed originally in (Ginzburg & Sag, 2000) and refined somewhat in (Ginzburg, 2012b).

4.2.4 MCI expressions: acknowledgements, dysfluencies, and clarification NSUs

Acknowledgements (aka ‘backchannels’) are a means for providing positive feedback by B about A’s utterance. *Plain* acknowledgements are most often realized by means of affirmative particles ‘yeah’ and ‘yes’ as well as ‘mmh’ and its ilk. They occur typically in two junctures, either by B simultaneously with A’s turn at a phrasal boundary or as the first sub-utterance

once B responds to A’s turn. The preconditions of such utterances is $u1$ being the head of Pending and their force is that B understands $u1$. Intra-utterance acknowledgements are one source of motivation for the assumption that Pending consists of incrementally processed material. In other words, they require a grammar which can associate syntactic types and contents on a word by word basis (see e.g. Categorical Grammar, Steedman, 1999; Morrill, 2000, Dynamic Dependency Grammar Milward, 1994, and Dynamic Syntax Kempson, Meyer-Viol, & Gabbay, 2000).

Repetition acknowledgements involve repetition of a word or more from the currently pending utterance. Hence they involve segmental parallelism between that utterance and the acknowledgement. This can be captured given that such information is represented in the locutionary proposition defined by u .

Dysfluencies and clarification NSUs are both instances of *repair* interaction. Starting with non-sentential clarification requests: in the aftermath of an utterance u a variety of questions concerning u and definable from u and its grammatical type become available to the addressee of the utterance via inference rules called *Clarification Context Update Rules (CCURs)* in (Ginzburg, 2012b). Each CCUR specifies an accommodated question built up from a sub-utterance $u1$ of the target utterance, the maximal element of Pending (*MaxPending*). Common to all CCURs is a license to follow up *MaxPending* with an utterance which stands in a given coherence relation with the maximal element of QUD. One such rule is (*contextual*) *parameter identification* which allows B to raise the issue about A’s sub-utterance $u0$: *what did A mean by $u0$?* This process underpins the resolution of e.g. (38b,c) as CRs of (38a):

- (38) a. A: Is Bo leaving?
 b. B: Bo? (= Who do you mean ‘Bo’?)
 c. B: Who? (= Who do you mean ‘Bo’?)

This same mechanism when allowed to occur *incrementally, within turn* will allow the emergence of an issue *what did the speaker mean with sub-utterance $u1$?*) and is the basis for backwards-looking dysfluencies. What of filled pauses and FLDs? Such words serve as signals that the current speaker is weighing the issue of what the next word should be. This reflection can be

overtly realized as self addressed questions, exemplified in (39) from extract 1 in the APC:¹²

- (39) Ann: Has anyone listened to erm (pause dur=6) what was it, Radio Newcastle?

Although such words have a tendency to occur in certain positions (after ‘the’ and ‘a’, before the complements of a verb), they can in principle occur more or less wherever, including turn initially. One can write lexical entries for such words that assign them the force of signalling the issue of what the next word should be (see Ginzburg et al., 2012, 2013).

4.2.5 Declarative Fragments

Declarative fragments are one of the earliest anaphoric constructions children can produce. Whether these productions should be identified with the adult ones is not self-evident, but *ceteris paribus*, one could assume there is much commonality between the constructions. Assuming a view of questions as propositional abstracts the simplicity of the construction is captured as predication: the content arises by predicating the (question represented as) maximal element of QUD of the fragment’s content. As mentioned earlier, this construction carries a categorial parallelism requirement, one that persists over multiple turns, in principle. The parallelism dependency can be captured by specifying the construction’s category as matching the FEC of MaxQUD. This information gets filtered into QUD as a side effect of rules that increment QUD with a question following a query—a consequence of the fact that (Latest)Move is specified to be a locutionary proposition, an entity that contains the linguistic sign associated with the original interrogative utterance. Exophoric declarative fragments are explicated as arising via domain-specific inference which leads to the accommodation of *information structures*.

4.2.6 VPE

(Miller & Pullum, 2012) cite the corpus-based characterization by (Miller, 2011 of VPE, a characterization which also allows under very restricted con-

¹²Such self-addressed queries are common in the BNC. There are approx. 128k question-marked sentences in the spoken BNC, whereas in a corpus study reported in (Ginzburg et al., 2013) we found more than one hundred instances of such queries in the spoken BNC. Hence, these represent on the order of 0.1% of all queries in the BNC.

ditions for exophoric realization:

- (40) a. **Type 1: Aux Focus:** the subject of the antecedent is identical to the subject of the VPE utterance; the VPE utterance involves a choice between p and $\neg p$ for some proposition p ,
- b. **Type 2: Subject Focus:** The subject of the antecedent is distinct from the subject of the VPE utterance; An open proposition must be highly salient in the discourse context, and the point of the utterance containing the PAE must be strictly limited to providing a referent satisfying the open proposition.

These two contexts correspond in a transparent way, respectively, to the conditions $\text{MaxQUD.q} = p? : \text{polar-question}^{13}$ and $\text{MaxQUD.q} = \lambda x.P(x) : \text{wh-question}$ for some proposition p and property P .

4.2.7 Individual and event denoting anaphors

Although pronouns have been at the centre of syntactic and semantic research for decades, it is striking that a well worked account of their occurrence in dialogue is still elusive. A fundamental question is how many of the existent uses should be unified—intra and inter-sentential? Utterance antecedents and visual or aural stimuli? For a recent account unifying these cases in terms of *resource situations* and taking an incremental semantics perspective see (Poesio & Rieser, 2011). A challenge for any unified account is how to specify agreement to cover both both utterance and exophoric cases, though as I have emphasized earlier the dividing line is by no means always clear. (Ginzburg, 2012b) develops an account, with significant commonalities with the account of (Poesio & Rieser, 2011). Roughly, the antecedent for a singular pronoun must be a constituent of an *active move*—here ‘active’ is a composite property covering utterances whose content is in QUD (cf. Roberts, 2011 for a related line.).

4.2.8 Laughter

Laughter is multifunctional, with uses that include cancelling the seriousness of a preceding utterance and tension reducing acts, with the latter exemplified in (41), from extract 4 of the APC—a laughs to defuse potential embarrassment an earlier accusation levelled at A could have given rise to:

¹³Or in some case $\neg p?$, which as remarked above is a distinct question from $p?$.

(41) A: Oh I do see. I I think you mean me.

a: (laughs - -) you take the hint - you take the hint yes good.

The former can be related to repair moves discussed above. To accommodate the latter, one would need to generalize the grounding/repair cycle to include monitoring of emotional in addition to epistemic state.

5 Conclusions and Future Work

This paper has attempted to offer an empirical evaluation of Sag and Hankamer's striking hypothesis that anaphoric processes in dialogue could be partitioned in two transparently characterizable classes, a hypothesis that originated in the ground breaking papers of 1976 and 1984. The class of anaphoric processes I have considered are somewhat distinct, given that they were extracted from a pilot corpus study.

Judged purely in terms of the results of the corpus study, the correlations between parallelism and lack of exophoricity that S&H postulated hold out quite well. Judged using a somewhat enlarged set of data, including data emerging from introspection, I have suggested that those two parameters are problematic as a means of characterizing the range of anaphoric processes. As I have emphasized, the results of the corpus study here are tentative given its scale—it needs scaling up within and across languages for ultimate credibility; I have also pointed along the way various issues relating to exophoricity and to the potential distance between antecedent and anaphor that could and should be investigated experimentally. While controlled experimental work is important, it is no less important to get data from 'the wild', i.e. a variety of genres of dialogue interaction, as the initial indications show significant differences in distribution across genres.

In the final part of the paper, I sketched a model of dialogue context, based on the dialogue framework KoS, in which to uniformly describe the various anaphoric processes revealed in the corpus study. One of the key components of the model is its theory of utterance grounding and repair, which provides the basis for explaining several of the sources of parallelism in anaphoric processing. Central to this theory is the type theoretic idea of grounding as classifying an utterance event in terms of an utterance type—a

sign—and repair as an inference process that involves specifying a clarification question by combining elements from the utterance event and type. Needless to say, then, that this theory relies in a strong way on the reification of signs as structured entities, an idea whose fruitfulness and formalization is one of Ivan Sag’s fundamental contributions.

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