

1

Information Structure

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1.1 Introduction

The term *information structure* is often used as a convenient cover expression for a bundle of phenomena—referred to by *(back)ground*, *comment*, *contrast*, *focus*, *given*, *new*, *rheme*, *theme*, *topic* and associated terms—that exhibit pragmatic, semantic, morphosyntactic and phonological features. It is clear that information structure affects content, and in particular that it concerns context-sensitive aspects of content, but it is not universally agreed whether information structure forms a distinct dimension within the interpretive component of language.

In this chapter, for expository purposes and as in Kruijff-Korbayová and Steedman (2003), the term *information structure* is used broadly as encompassing utterance-level features of *both* a semantic and a structural nature. The discussion will be centered around the following information-structural notions: the *theme-rheme* distinction (§1.3), *givenness* and *topic* (§1.4), and *contrast* (§1.5). These descriptive notions allow linguists to go a long way in analyzing phenomena that have generally been thought of as concerning information structure. The facts concerning *focus*, one of the most (ab)used labels in information structure research, will be discussed in connection to the notions *contrast* and *theme-rheme*.

As a first approximation to information structure consider (1) (small caps identify the lexical item associated with nuclear prominence):

- (1) a. We like HOKEY-POKEY.
- b. Hokey-pokey we LIKE.
- c. Hokey-pokey we HATE.
- d. We LIKE hokey-pokey.

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Examples (1a) and (1b) have identical truth conditions but still differ interpretatively; there is something in the content, understood broadly, of (1a) which sets it apart from the synonymous (1b); this interpretive difference correlates with the difference in word order. Interestingly, (1b) and (1c) display a certain interpretative equivalence which is obviously not connected to their truth-conditional meaning; this interpretive equivalence correlates with the structural ‘sameness’ that they display. Both the interpretive difference between (1a) and (1b) and the partial interpretive equivalence between (1b) and (1c) are taken to be information structural in nature. There is also a difference in (non-truth-conditional) content between (1a) and (1d), which is of a nature similar to the difference between (1a) and (1b); here, however, the structural contrast associated with the interpretive difference is not in the word order but rather in the intonation. In English and many other languages, if not all, intonation is an important correlate of information-structural content.

The examples in (2) illustrate that the interpretive import associated with these structural differences is context dependent:

- (2) a. A: What are we having for dinner?
 b. B: We are having MUTTONBIRD for dinner.
 c. B': # We are having muttonbird for DINNER.
 d. B'': MUTTONBIRD.

Query-answer pairs are used in the literature to illustrate the connection between information structure and discourse congruence. The query in (2a) evokes a context against which uttering (2b) is felicitous whereas (2c) is not. This contrast in felicity is due to the (lack of) compatibility between the context, as evoked by the query, and the different information-structural imports of (2b) and (2c) (the difference between them is manifested, as in the pair (1a)-(1d), via intonation). Moreover, notice that the declarative fragment in (2d), a ‘short-answer’ counterpart of the full-fledged answer in (2b), is also felicitous in the context evoked by (2a). In fact, *ceteris paribus*, (2d) is a less marked answer than (2b). It is evident that context is of the essence in determining the content of (2d).

That information-structural phenomena concern in one way or another the relation of utterances to the previous context appears to be the current general consensus. Thus, following Krifka and Musan (2012), information structure will be seen as referring to ‘those aspects of natural language that help speakers to take into consideration the addressee’s

current information state, and hence to facilitate the current flow of information' (2012, p.1). This process of 'facilitation' is effected with respect to a number of resources in the addressee's current information state. It is therefore necessary to adopt a particular conception of what information states are like and describe the relevant contextual resources before we actually start discussing any information-structural notions.

1.2 Contextual resources

The view that context is of the essence for information structure gained wide acceptance due to the generalisation of dynamic accounts where the semantic contribution of sentences is seen as lying in their potential to change the context (see Isard, 1975). One of the main goals of the early approaches (e.g. Kamp, 1981; Heim, 1983; Seuren, 1985; Veltman, 1990; Groenendijk and Stokhof, 1991; Dekker, 1993) was to extend the analysis of a number of phenomena, like the interpretation of bound pronouns, beyond the limits of the sentence proper and into discourse. The influence of earlier views on context as a set of propositions held to be true by both speaker and hearer or as a *common ground* of shared beliefs (e.g. Karttunen, 1974; Stalnaker, 1974) was central to these approaches, but in the drive to account for the 'discourse' data, two important theoretical adjustments were made. On the one hand, it became clear that context had to be understood not as an interlocutor-neutral common ground, but rather as (the public area of) the addressee's information state at the time of utterance (t_u), since there exist speaker/addressee asymmetries which can only be accounted for if each conversationalist has a distinct 'dialogue gameboard' (Ginzburg, 2012). On the other hand, a subset of these early dynamic approaches felt that a view of the common ground as an unstructured construct was empirically insufficient and went on to introduce a certain degree of representational richness, which structured contexts into subdomains or broadened the spectrum of contextual resources available for the computation of content.

The idea that the relevant notion of context is a structured information state anchored in the addressee brought formal dynamic approaches to converge with research in other traditions, such as discourse analysis, (formal) pragmatics, functionalism, psycholinguistics and computational linguistics, as represented, for instance, by Halliday (1967), Chafe (1976), Clark and Haviland (1977), Webber (1979), Prince (1981a), Gundel (1985), Grosz and Sidner (1986), Sgall et al. (1986), Ariel (1988).

These works already elaborated in one way or another on the idea that speakers structure utterances in accordance to their assumptions about their addressee's current information states, which is the idea that inspired representative work on information structure in the 1990s (e.g. Vallduví, 1992; Lambrecht, 1995; Erteschik-Shir, 1997), has survived to this day, and is reflected in the quote above by Krifka and Musan (2012).¹

The erstwhile conception of context as a Stalnakerian set of commonly agreed propositions, assumptions or facts was soon enriched with an additional resource type, namely 'open propositions' (Prince, 1986), 'quaestio' (Klein and von Stutterheim, 1987) or 'questions under discussion' (*quds*) (Carlson, 1983; Ginzburg, 1994; Kuppevelt, 1995; Roberts, 1996; Beaver and Clark, 2008), which play a central role in the dynamics of dialogue and the rhetorical organisation of discourse. Quds are semantic questions (issues) which are introduced into context (at least) through uttered assertions and queries—asserting p introduces *whether* p ($?p$) and posing q introduces q —and which (potentially) constitute the subject matter of discussion and, thus, drive the progression of conversation. Interlocutors must keep score of the quds that arise in conversation and also of their degree of salience: the quds in the context are partially ordered and the most salient qud is ranked highest—it is qud-maximal—at t_u (Ginzburg, 2012). A qud is naturally taken to be a propositional abstract, a function from meanings of different kinds—those of the qud's potential short answers—to propositional meanings (those of the potential full-fledged answers) (Tichý, 1978; von Stechow and Zimmermann, 1984; Ginzburg, 1995; Krifka, 2001).² Quds play an essential role in accounting for the *theme-rheme* distinction in utterances.

A different enrichment to contexts was the addition of a class of objects susceptible of acting as antecedents for standard pronominal anaphora

¹ The origin of the terms *information structure* (Halliday, 1967) and *information packaging* (Chafe, 1976) is to be found precisely in a subset of those early works. Also essential were the ideas of the Prague School of linguistics (e.g. Sgall et al. (1986), Hajičová et al. (1998) and references therein). Newmeyer (2001) is an informative survey of the parallelism and mutual influence between American research on information structure and the Prague School.

² An alternative approach to quds (and to questions in general) defines the meaning of a qud as the set of (all) its possible (for some, correct) answers; see Roberts (1996) for quds and Hamblin (1973), Karttunen (1977), Groenendijk and Stokhof (1984) in general. Evidence involving information structure has been used to argue for the superiority of one or other approach (Krifka, 2001). The *Presup* in Jackendoff (1972) can be classed also as a qud, as it is an unsaturated propositional abstract. As for Prince's (1986) open propositions, although not formally defined as semantic questions, they are described as unsaturated abstracts and are explicitly argued to be, as a contextual resource, different from propositional assumptions or facts.

and of entering into other referential links: what Karttunen (1976) called *discourse referents*. Discourse referents are entities of different kinds, including, at least, individual tokens, individual types, event tokens and event types. Uttered referential expressions may add discourse referents into a context or may establish an anaphoric link to a contextually available referent. Anaphora requires a successful pairing of contextual configuration and utterance form and, therefore, interlocutors must also keep track of the availability of discourse referents and their degree of salience or accessibility, as discussed in the functional, psycholinguistic, and computational approaches cited above (also Hawkins (1978), Garrod and Sanford (1982), Givón (1992), Gundel et al. (1993), Grosz et al. (1995), Poesio et al. (2004)). Discourse referents, as a contextual resource, can be seen as constituting a level which is distinct from the ‘propositional’ level, which includes agreed propositions and quds (propositional abstracts). Contextual congruence, therefore, involves both entity level congruence (e.g. referential specification) and propositional level congruence (e.g. qud-related congruence). Here the term (*referential*) *givenness* will be used to refer to the felicity requirements associated with entity level congruence and its theoretical extensions.³ Discourse referents are central not only to the concept of givenness, but also to the information-structural notion of *topic*, as for instance in Reinhart (1981), where the definition of topic is construed at the level of discourse referents.

A third contextual enrichment, which is relevant for information structure, concerns, as shown below, the notion of *contrast* (see Dretske, 1972; Chafe, 1976). The context of a (sub)utterance may make available potential alternatives to that (sub)utterance. Alternatives become available (or are made salient) in context through explicit introduction of the class or set they belong to or via accommodation. The idea that (sets of) alternatives are (salient) contextual resources that play a role in the determination of content appears in, for instance, Jackendoff (1972), Ladd (1980), Rooth (1985, 1992), Büring (1997), Umbach (2003) and also in Hirschberg and Ward (1984), Ward (1988), Pierrehumbert and Hirschberg (1990), where it is claimed that, in order to account for some phenomena, the contextually available sets must be partially ordered sets (or scales). Also, alternatives as a contextual resource are at the basis of the notions of *parallel element* in higher order unification ap-

³ Gundel and Fretheim (2004) link entity level congruence to *referential* given/new and propositional level congruence to *relational* given/new. In contrast, some other approaches to givenness (Schwarzschild, 1999; Bott, 2008) obliterate the distinction between entity level and propositional level congruence (see §1.4).

proaches (Pulman, 1997) and of *focus establishing constituent* (FEC) in the dynamic framework of Ginzburg (2012).⁴

In sum, the relevant input context C_1 of an utterance U is viewed as the recipient’s information state immediately prior to U . C_1 minimally contains propositional assumptions, quds, discourse referents, and (sets of) elements that constitute potentially ‘utterable’ alternatives to the actual utterance or subutterances at t_u . These contextual resources are appealed to by information structural notions in effecting their role as facilitators of the flow of communication. The contextual congruence or felicity of U is partially determined by the fact that sentential information structure and the specific configuration of C_1 constrain each other.

1.3 Theme and rheme

The *theme-rheme* distinction is discussed here in connection to quds as essential elements in context update. The highest-ranked or maximal qud (henceforth, max-qud) in the qud set of C_1 circumscribes discourse progression: U , uttered in a context C_1 , must be specific to or an elaboration of max-qud_{C_1} (see Ginzburg (1994, 2012), Kuppevelt (1995), Roberts (1996), Asher and Lascarides (2003), Büring (2003) for different formulations). In addition, U introduces a qud which becomes qud-maximal in the output context C_2 (max-qud_{C_2}). This can be illustrated with a query-answer exchange like (a-d) in (2), repeated here as (3):

- (3) a. A: What are we having for dinner?
 b. B: MUTTONBIRD.
 c. max-qud_{C_1} : $? \lambda x. \mathbf{have\text{-}for\text{-}dinner}(\mathbf{A+B}, x)$
 d. max-qud_{C_2} : $? \mathbf{have\text{-}for\text{-}dinner}(\mathbf{A+B}, \mathbf{muttonbird})$

Max-qud_{C_1} , introduced by query (3a), is the propositional abstract (3c). The declarative fragment in (3b) spells out an elaboration—here, in particular, an answer—on max-qud_{C_1} by instantiating the latter’s λ -bound variable, thus resolving it. At the same time, (3b), due to its status as a propositional assertion, introduces a max-qud_{C_2} : the assertion of $p = \mathbf{have\text{-}for\text{-}dinner}(\mathbf{A+B}, \mathbf{muttonbird})$ makes $?p$, namely (3d), the

⁴ The FEC was called SAL-UTT in Ginzburg and Sag (2000). While contextual in nature, parallel elements/FECs are objects of type ‘utterance’ in that they are not purely semantic but rather include structural information as well. The idea that the *form* of utterances also contributes information which persists in context is convincingly argued for in Ginzburg (2012) and elsewhere.

max-qud for C_2 . Following e.g. Ginzburg (1999, 2012), Ginzburg and Sag (2000), Fernández (2006), declarative fragments belong to a syntactic type which constructionally absorbs part of its content from max-qud $_{C_1}$ (contra Merchant (2005)). This contextually sourced part of the content is not structurally expressed; rather, fragments spell out the only meaning component of p that elaborates on max-qud $_{C_1}$. In the case of (3) this is the value of the λ -bound variable: **muttonbird**.⁵

Muttonbird in (3b) is a *rheme*. Rhemes spell out the meaning components of U which elaborate on max-qud $_{C_1}$ (Engdahl et al. (2000); cf. the idea that the rheme is the expression of the actual update potential of an utterance (Vallduví, 1992, 1994; McNally, 1998b; Steedman, 2000, 2014)) and it is thanks to this elaboration that max-qud $_{C_1}$ progresses to max-qud $_{C_2}$. In this sense, it can also be said that the rheme is the structural exponent of the progression from max-qud $_{C_1}$ to max-qud $_{C_2}$ (but see below). The idea that the rheme is the locus of progression in discourse can be traced back to early work within the Prague School (see references in Sgall et al., 1986; Hajičová et al., 1998; Newmeyer, 2001).

Fragments like (3b) will be referred to as *themeless utterances*. Other themeless utterances, namely, affirmatives (*yes*) and rejections (*no*), occur also as answer elaborations but do so on polar max-quds. *Yes* and *no*, like the answer *muttonbird* in (3b), are propositional in nature (Krifka, 2001). The content of *yes*, for instance, is p , where p results from elaborating on $?p$ (max-qud $_{C_1}$) by, in a sense, ‘stripping’ it of its interrogativeness (Gutzmann and Castroviejo, 2011; Ginzburg, 2012). As a themeless utterance, *yes* spells out only the meaning component of U which elaborates on max-qud $_{C_1}$: the ‘stripping’ operation that $?p$ is subjected to.

Yet another example of themeless utterance is to be found in direct sluices, which embody a type of elaboration on max-qud other than that of answers. Direct sluices like (4b) are felicitous as queries for additional information that is underspecified (quantified away) in a previous utterance; in other words, they require a polar max-qud $_{C_1}$ $?p$, where p is a quantified proposition (Fernández, 2006; Ginzburg, 2012):

- (4) a. A: We’re having something (special) for dinner.
 b. B: WHAT?
 c. max-qud $_{C_1}$: $?\exists x$.**have-for-dinner**(**A+B**, x)
 d. max-qud $_{C_2}$: $?\lambda x$.**have-for-dinner**(**A+B**, x)

⁵ The emergence of (3d) as max-qud $_{C_2}$ need not imply that (3c) is previously downdated; (3c) could remain in the qud set of C_2 , ranked right below (3d), awaiting evidence that A does not reject p . If this tack is taken, once p is grounded as an assumption, both (3d) and (3c) will be removed from the qud set.

Assertion (4a) provides the right type of polar $\text{max-qud}_{C_1} ?p$, shown in (4c), for the sluice to be felicitous. The *wh*-meaning of the direct sluice is constructionally applied to $?p$ by λ -abstracting over the quantified element of p , thus yielding $? \lambda x. \mathbf{have\text{-}for\text{-}dinner}(\mathbf{A+B}, x)$, which by qud update becomes max-qud_{C_2} , as in (4d). The sluice, a themeless utterance, spells out the *wh*-meaning of q , the only part of its content that elaborates on max-qud_{C_1} .

As noted above, themeless utterances are common in query-answer exchanges, which is expected. However, as seen in (2), full-fledged sentential answers are obviously also possible, albeit more marked: they spell out not only the elaboration on max-qud_{C_1} but also a *replica* of max-qud_{C_1} . Spelling out this replica of max-qud_{C_1} , minus the element substituted by the elaboration, is precisely the job of the *theme*. Examples (5) and (6) illustrate ‘short’ and full-fledged utterances for elaborations on q and $?p$, respectively. The (c) utterances convey the same content and effect the same elaboration on max-qud_{C_1} as the (b) utterances, but, in addition, they replicate max-qud_{C_1} . Utterances like (5c) and (6c) will be referred to as *theme-containing utterances*:

- (5) a. $\text{max-qud}_{C_1} : ? \lambda x. \mathbf{have\text{-}for\text{-}dinner}(\mathbf{A+B}, x)$
 b. B: [R MUTTONBIRD].
 c. B': [T We are having] [R MUTTONBIRD] [T for dinner].
- (6) a. $\text{max-qud}_{C_1} : ? \mathbf{have\text{-}for\text{-}dinner}(\mathbf{A+B}, \mathbf{muttonbird})$
 b. B: [R YES].
 c. B': [T We] [R ARE] [T having muttonbird for dinner].

Given that themeless utterances can constructionally combine with max-qud_{C_1} and in principle effectively carry out a context update, the question arises as to why speakers opt to replicate max-qud_{C_1} : why are there theme-containing utterances? The answer to this question is that qud update can actually be a complex two-step process. The theme, if present, triggers the first step: a preparatory update from C_1 to $C_{1'}$, which renders the input context suitable for the ensuing rheme-provisioned update from $C_{1'}$ to C_2 . Krifka (1993), Steedman (2000), Kruijff-Korbayová and Webber (2007), for instance, take this step to be a verification that C_1 supports or can accommodate the ‘presuppositional’ import of the theme (cast in terms of structured meanings or Roothian sets of alternatives meanings). For current purposes, this context preprocessing role of themes can be taken to be qud-related: theme-containing utterances *prepare* the input context by promoting a given qud to qud-maximality

prior to its being elaborated on. Themes provision a specific max-qud_{C₁'} (obtained from the qud set, other sources in C₁, or accommodation) and then the rheme updates C₁' by elaborating on this max-qud_{C₁'}.⁶

One common set of cases in which themes are obligatory corresponds to utterances that elaborate on quds that are already in the qud set, but which have lost maximality at t_u: the theme (re-)raises the qud to qud-maximality to enable its elaboration by the rheme. As an example, consider the exchange in (7), an excerpt from the play *Everything in the garden* (G. Cooper, 1962), focussing on the polar query (7c) (in italics):

- (7) a. Jenny: Do you want an egg?
 b. Bernard: Are you having one?
 c. J: *Do you want one?*
 d. B: If you're having one, I will, otherwise no.
 J: You are a lazy devil.
 B: No. It's just that I don't want an egg enough to start everything going towards cooking it, but if you were going to do one for yourself, well, I'd want it enough for that.
 J: I don't think I'll have one
 B: I'll do you one if you like.
 e. J: [T You] [R DO] [T want one].
 f. B: No, I don't. I'll just do you one. You ought to eat.

Jenny's query (7c), which introduces $?p_c = ?\mathbf{want}(\mathbf{B}, \mathbf{egg})$ as max-qud, is (self-)answered by (7e). However, by the time (7e) is uttered $?p_c$ has lost its qud-maximality, since the intervening conversational moves, gathered in (7d), keep on updating the qud set: at t_u the max-qud inherited from context (max-qud_{C₁}), supplied by the last move in (7d), is whether Bernard will do an egg for Jenny (if she likes).⁷ The use in

⁶ In English, grammar bans fragment realisations of transitive predicators, as in (i), where max-qud is elaborated on via instantiation of the predicator λ -variable:

- (i) a. max-qud_{C₁}: $? \lambda P.P(\mathbf{mia}), (\mathbf{muttonbird})$
 b. B: *[R LOVES]. / She LOVES it.
 c. B': [T Mia] [R LOVES] [T muttonbird].

There are two possible accounts of the facts. One: *she* and *it* in *She LOVES it* in (b) are thematic, like *Mia* and *muttonbird* in (c), and thus express a redundant replica of max-qud_{C₁} (a pronominal version of (c)); English grammar excludes here elaboration via a themeless utterance. The other: *She LOVES it* is, despite appearances, a themeless utterance; the presence of *she* and *it*, important for referent tracking, is inert with respect to the theme-rheme distinction.

⁷ The term (*conversational*) *move*, used here and below, refers to an utterance qua basic discourse unit with particular intentional or illocutionary meaning and context update effects (Carletta et al., 1997; Cooper et al., 1999).

(7e) of a theme-containing utterance enables elaboration on nonmaximal query $?p_c$, without resorting to an explicit reformulation (*A few turns back I asked whether you wanted an egg and now I know the answer is yes*): the theme updates C_1 to $C_{1'}$, by replacing the inherited max-qud_{C_1} with a newly provisioned $\text{max-qud}_{C_{1'}}$, and the rheme elaborates on this $\text{max-qud}_{C_{1'}}$, by resolving $?p_c$ to p_c . Notice that an elaboration on $?p_c$ spelled out by means of a themeless utterance would be infelicitous: $\#Yes$ (or even $\#You\ do$).⁸

Interestingly, it has been observed that themeless utterances are a local phenomenon in dialogue. Fernández (2006) reports on a corpus study where all declarative fragments in two-party dialogue elaborate on a qud introduced at most three moves away (*one* move away in 83% of these) and where all nonsentential affirmatives elaborate on a qud which is one or two moves away (over 95% are *one* move away). This confirms that themeless utterances elaborate on quds whose maximality is preestablished at t_u , which also indirectly supports the idea that theme-containing utterances are used in nonlocal elaborations. In this respect, Vallduví (2001a) argues that there is a parallelism between themeless utterances at the qud-elaboration level and pronouns at the discourse-entity level, in that pronouns must specify referents that are maximal, or salient, at t_u , i.e. the context dependence of themeless utterances and pronouns is subject to the same locality constraints (only 8% of pronouns in the corpora analyzed in Hitzeman and Poesio (1998) had their antecedent more than one move away). In contrast, theme-containing utterances, which tend to elaborate on quds that are nonmaximal at t_u , appear to be parallel to definite descriptions in that the latter also tend to specify nonlocal antecedents. The parallelism extends to the fact that theme-containing utterances can be used (redundantly and possibly giving rise to particular rhetorical effects) whenever a themeless utterance is used, as in (5) and (6) above, but not vice versa, which is exactly the situation with definite descriptions and pronouns (Gundel et al., 1993).⁹

Theme-containing utterances are also used when $\text{max-qud}_{C_{1'}}$ is obtained by ‘broadening’ the inherited max-qud_{C_1} : if max-qud_{C_1} is part of

⁸ It is unlikely Bernard’s second turn in (7d) is a first (unsuccessful) answer to (7c). Even if it were, there are two additional ensuing moves, which keep on updating the qud set.

⁹ In (5) and (6) intermediate structural alternatives are possible: in (5) *We are having MUTTONBIRD* and in (6) *(Yes,) we ARE* or *(Yes,) we ARE having muttonbird*. It remains to be seen whether the existence and distribution of these ‘intermediate’ alternatives sheds light on the distinction between themeless and theme-containing utterances with respect to qud accessibility.

or is a sub-issue of a broader issue $\text{max-qud}_{C_1'}$ (i.e. max-qud_{C_1} upwardly entails $\text{max-qud}_{C_1'}$), then a theme-containing utterance may promote $\text{max-qud}_{C_1'}$ to qud-maximality (prior to elaboration on it). The idea is that elaboration on the broader $\text{max-qud}_{C_1'}$ will also bring about a provision of information that is relevant for max-qud_{C_1} . Consider (8):

- (8) a. A: Will Anna marry Manny?
 b. B: [T Anna] [R ADORES / HATES] [T Manny].

The max-qud_{C_1} introduced by query (8a), $? \text{marry}(\text{anna}, \text{manny})$, is part of the broader issue $? \lambda P.P(\text{anna}, \text{manny})$, which is the $\text{max-qud}_{C_1'}$ introduced by (8b). If the issue of Anna marrying Manny is under discussion then so is the issue of Anna's relationship to Manny, so max-qud_{C_1} upwardly entails $\text{max-qud}_{C_1'}$. While the theme-containing utterance in (8b) does not actually resolve (8a), it certainly constitutes a legitimate follow-up, by provisioning a new max-qud and elaborating on it.¹⁰

A third scenario in which theme-containing utterances are required is the case of the implicit (thus, nonmaximal) quds that provide the rhetorical backbone of coherent discourse in approaches like Carlson (1983), Klein and von Stutterheim (1987), Kuppevelt (1995), Roberts (1996), Buring (2003). In (9), inspired on an example in Buring (2003), B answers A's query about a concert by assessing different aspects of it:

- (9) a. A: How was Lorde's concert?
 b. B: [T The band][R played very WELL],
 c. B: [T the audience][R danced NONSTOP],
 d. B: but [T the sound][R was APPALLING].

Max-qud_{C_1} after (9a) is $? \lambda P.P(\mathbf{L}'\text{s concert})$. However, moves (b-d) are elaborations not on max-qud_{C_1} , but on implicit quds about the band, the audience and the sound. Elaboration on these implicit quds forms part of a rhetorical strategy which splits up a broader issue into smaller components: the implicit quds are subquds of the (super)qud $? \lambda P.P(\mathbf{L}'\text{s concert})$ introduced by (9a) (Roberts, 1996) or as quds on which the content of (9a) is dependent (Carlson, 1983): though obviously not max-

¹⁰ Steedman (2014), on which ex. (8) is inspired, uses a related set of examples (his (10) and (13)) to illustrate the fact that themes do not (always) reflect max-qud_{C_1} . This fact is taken to show that the 'presuppositional' import of themes is primarily speaker determined (also eg. (Reis, 1999)) and only indirectly limited by qud congruence. Despite some differences in emphasis, the speaker-centered view in Steedman (2014) and the qud-centered view adopted here are largely compatible.

imal, they are available from C_1 at t_u via an associative, subsectional or non-monotone link to max-qud_{C_1} (Hawkins, 1978; van Deemter, 1994; Hendriks, 2002). Thus, a theme-containing utterance is required to render each of them maximal at t_u . Move (9b), for instance, raises $\text{qud } ?\lambda P.P(\mathbf{band})$, nonmaximal in C_1 , to max-qud_{C_1} , and then elaborates on it by instantiating the λ -variable, eventually yielding a polar $\text{max-qud}_{C_2} ?\mathbf{played-very-well}(\mathbf{band})$.

Both (8) and (9) require a theme to spell out that the max-qud to be elaborated on is not the inherited max-qud_{C_1} . However, the relationship between the inherited max-qud_{C_1} and the theme-provisioned max-qud_{C_1} is different. In (8) we have an upward-entailing broadening of the max-qud , while in (9) there is no broadening; rather, $?\lambda P.P(\mathbf{band})$ is a subqud that ‘narrows’ down the superqud $?\lambda P.P(\mathbf{L's concert})$ in a nonmonotonic fashion. This difference between (8) and (9) is reflected structurally: in cases of qud ‘narrowing’, like (9), there is explicit flagging by means of *contrast* on (one element of) the theme (cf. Büring (2003) on ‘contrastive topics’). This will be discussed further in §1.5.

The three cases of theme-containing utterances described here do not exhaust the list of situations in which speakers may choose to provision a nonmaximal qud at t_u . Take, for instance, classic examples of English ‘focus-movement’ like (*Now they are coming out with a new hydraulic crane.*) CHERRY PICKERS *they are called* (Prince, 1981b). Here the provisioning of max-qud_{C_1} , $?\lambda x.\mathbf{have-name}(\mathbf{hydraulic-crane}, x)$ by means of the theme would appear to be licensed by a conversational rule stating that it is always an option to discuss the name of a recently introduced discourse referent (by a *hydraulic crane* here). Engdahl (2006) states that elaboration by U on nonmaximal quds is in fact an extremely common phenomenon and uses the term *focal question accommodation* to refer to the hearer’s acceptance as qud-maximal of noninherited quds that are spelled out by means of a theme-containing utterance (the first step in a two-step complex update).¹¹

The examples discussed so far are cases in which the elaboration effected by U on max-qud is spelled out by a simplex expression (an NP, a verb, a *wh*-word, affirmation). These are often referred to as *narrow rhemes* (which include here rhemes in both theme-containing utterances and themeless utterances). In contrast, so-called *wide/broad rhemes* ob-

¹¹ Qud accommodation is a common phenomenon in dialogue, introduced by update rules linked to specific conversational plans or genres or even to clarification routines (Cooper et al., 2000; Larsson, 2002; Traum and Larsson, 2003; Ginzburg, 2012).

tain when the elaboration effected by U on a max-qud is spelled out by a complex expression (VP, sentence). In (10) (a-b) illustrate a narrow rheme and (c-d) and (e-f) illustrate cases of wide rheme:

- (10) a. max-qud_{C₁'}: ? λx .buy(**moana**, x)
 b. [T Moana bought] [R WHITEBAIT].
 c. max-qud_{C₁'}: ? λP .P(**moana**)
 d. [T Moana] [R bought WHITEBAIT].
 e. max-qud_{C₁}: ? λPx .P(x)
 f. [R Moana bought WHITEBAIT].

The mechanics of qud elaboration are the same in (a-b) and (c-d): the theme-provisioned max-qud_{C₁'} is elaborated on via answerhood, in that U provides an instantiation for the λ -variable. The difference is that in (10d) this instantiation is realised by a VP. The same applies to (e-f), with a clausal rheme, where max-qud_{C₁} would be a general question ? λPx .P(x) in an out-of-the-blue context, expressed by queries such as *What's up?*, *What's new?*. Tokens like (10f), referred to as all-rheme utterances (eg. Steedman (2014)), are themeless utterances. This makes sense, since ? λPx .P(x) is the inherited max-qud_{C₁}.¹² All-rheme utterances have also been analyzed as instantiating a predication on a spatiotemporal 'stage' constant corresponding to the 'here-and-now' of the discourse (Erteschik-Shir, 1997), so max-qud_{C₁} would not be (10e) but rather something like ? λP .P(**stage**). It is conceivable also that (10f), in which the subject spells out a referent that is given, is actually identical to (10d), even if it occurs after a query like *What's new?*: the subject *Moana* could arguably be thematic; if so, (10f) would elaborate not on the max-qud_{C₁} in (10e), but rather on a self-provisioned max-qud_{C₁'} like (10c), which is in fact a subquestion of (10e). Of course, not all all-rheme utterances can be analyzed in such a way: subject-accented utterances like *The COMPUTER crashed* (Bolinger, 1972) can be all-rheme and cases like *A policeman arrived* are also generally treated as all-rheme (Erteschik-Shir, 1997). Kuroda (2005) is representative of a line of work in which all-rheme utterances like these are seen as fundamentally different from theme-containing utterances (and 'short answers'). In this approach, all-rheme utterances expressthetic/descriptive judgments—unitary descriptions of perceived or conceptually apprehended situations; in contrast, theme-containing

¹² (10f) is also a felicitous elaboration on a max-qud_{C₁} ? λx .cause(x ,happy(**B**)), as introduced by a why-question such as *Why are you so happy?*.

utterances express categorial/predicational judgments—cognitive associations of an attribute with an entity (see §1.4 for pertinent discussion on the notion of topic).

There has been substantial debate on how to reflect the relationship or opposition between the different theme-containing utterances and the themeless all-rheme utterance in (10), or, in other words, how to account for the ambiguity of the string *Moana bought WHITEBAIT*: at first blush it appears that this string, with nuclear prominence on a particular word (*whitebait*) is compatible with two or three theme-rheme partitions. The concept of *focus projection* has extensively been appealed to in the literature (Selkirk, 1996): a set of rules on the syntax-phonology interface determines whether the nuclear accent on a particular word may or may not ‘project’ to the phrasal level. The rules would allow the nuclear accent on *whitebait* in (10) to associate with the object NP, the VP or the sentence, whereas in other cases—eg. the answer in (8) above—the projection of the nuclear accent to a higher phrasal level would be blocked. However, more recent approaches tend to do away with specific projection rules and derive the ambiguity in (10) from intrinsic default properties of prosodic or metrical structure (Büring, 2006; Calhoun, 2010) or from contrasting syntactic derivations (Steedman, 2014).

As noted at the start of this section, qud-based approaches to context update see U, uttered in a context C_1 , as an elaboration of max-qud_{C_1} . Themeless utterances, both declarative fragments and all-rheme structures, effect this elaboration *simpliciter*; from the perspective of the mechanics of context update, themeless utterances have a default status. In contrast, theme-containing utterances are used precisely to enable complex updates that consist of an elaboration on a qud which is not maximal in C_1 at t_u . Indeed, the job of the theme, if present, is to spell out this nonmaximal qud so as to render it maximal ($\text{max-qud}_{C_1'}$) prior to its being elaborated on. Thus, it is clear that themes and rhemes are fundamentally different: themes are not inherent to a contextual update, whereas rhemes, which actually *embody* the contextual update, are. In a sense, rheme is interpretatively a noncategory, in that its function as an elaboration (of max-qud_{C_1} or $\text{max-qud}_{C_1'}$) is already built in in the dynamics of context update. ‘Elaboration’ should not be seen as a contextual resource itself; rather, it is a means to effect the transition between input and output contexts. The theme, in contrast, is indeed a direct linguistic expression of a contextual resource, since it provisions a $\text{max-qud}_{C_1'}$ to enable a nondefault update; therefore, it makes sense to consider it an information-structural category which is linguistically

encoded across languages. In fact, in a variety of languages, themes, if present, are explicitly marked either syntactically, by appearing in non-canonical slots, often outside the ‘core’ clausal domain (Vallduví and Engdahl, 1996)) or by associating with intonational phrases headed by complex fall-rise tones like L+H* and L*+H Steedman (2014) and non-default metrical structures, e.g. metrical reversal (Calhoun, 2010).¹³

In contrast, if rheme is technically not an interpretive category, there should be no expectation that it be associated with a particular realisation. Actually, it has been observed that rheme is never ‘linguistically marked in any interesting way’ (McNally, 1998b, p. 176). In many languages it associates with ‘neutral’ realisation, be it a canonical syntactic position (Vallduví, 2001b) or absence of prosodic marking other than default intonation (cf. Downing and Pompino-Marschall (2013) for a list of languages). In this view, the label ‘rheme’ would be no more than a convenient way to refer to the non-theme part of theme-containing utterances. However, this view of rheme could be argued to be untenable given the received wisdom that the structural exponent of ‘new information’ or ‘answerhood’, which may intuitively correspond to what has been referred to as rheme here, is indeed marked with some variant of structural prominence: syntactic, morphological or, most typically, prosodic, as discussed in Molnár and Winkler (2006), Büring (2007, 2010), Zimmermann and Féry (2010), Zimmermann and Onea (2011). Of course, this claim is made most often not about rheme directly, but about an allegedly broader category called *focus*, which is the category referred to as *contrast* in §1.5 below, and is extrapolated to rhemes via the assumption that rheme is a subtype of focus/contrast, namely information or answer foci (Kiss, 1998; Büring, 2010). Here the assumption that rheme is a subtype of focus/contrast is eschewed (for experimental evidence against this assumption, see Katz and Selkirk, 2011). Rather, what is assumed is that (a) rheme and focus/contrast are independent notions, (b) that focus/contrast is indeed an information-structural category which is (often) grammatically encoded by prominence, and (c) that (the non-theme part of) an utterance always includes a focus/contrast (see §1.5 below). In view of this, the putative structural marking of the rheme can, in fact, be seen as a marking of the focus/contrast which is set within

¹³ Steedman’s ‘unmarked themes’—themes with no contrast within them—could be an exception, if they cooccur with no perceivable marking of the theme-rheme boundary. A subset of these unmarked themes, however, are ‘redundant’ themes, as found for instance in cases of full answers which immediately follow explicit *wh*-queries (see discussion in fn.6).

the non-theme part, i.e., the rheme, of the utterance (see Selkirk (2008) for related arguments that rheme is not structurally spelled out while focus/contrast—her ‘contrastive focus’—is). This point, admittedly subtle, comes in handy to explain cases where nuclear-accent assignment does not follow default metrical patterns (e.g. FROZEN *whitebait* as a followup to *So you bought fresh whitebait. What did Moana buy?*). This, as noted, will be discussed in §1.4 and in §1.5.¹⁴

1.4 Givenness and topic

The interpretation of the pronoun *it* in *The kea pecked it* crucially depends on the availability of an antecedent in context, afforded by linguistic means, as in *Last night Hamish left his backpack outside. The kea pecked it*, or through physical co-presence, as when Hamish utters *The kea pecked it* after he has shown his damaged backpack to his tramping mates. This contextual antecedent—the mental object of type ‘backpack’ that *it* links to—is what we refer to as discourse entity or *discourse referent*, since Karttunen (1976). Discourse referents are useful to account for the context dependency not only of pronouns but also of all referring nominal expressions (Poesio et al. (2010), adapted):¹⁵

- (11) a. indefinites (*a P, some P*): a referent x_1 is added to the context and asserted to be of type \mathbf{p} ($[x_1, |\mathbf{p}(x_1)]$).
- b. definites (*the P, that P*): a referent x_1 is added to the context and asserted to be identical with the unique referent of type \mathbf{p} (in the context) ($[x_1, |x_1 = \iota y.\mathbf{p}(y)]$).
- c. pronouns: a referent x_1 is added to the context and noted as needing resolution via a condition $x_1 = ?$ ($[x_1, |x_1 = ?]$); resolution leads to this condition being replaced with an equality with a salient referent.

¹⁴ The theme-rheme distinction has been defined in connection to the contextual dynamics of qud. Quds have also been argued to characterise at-issueness (Potts, 2005) by e.g. Simons et al. (2011): very roughly, a proposition p is at-issue if $?p$ is relevant to a qud. (Classical) presuppositions and other phenomena which also display projective behaviour are not-at-issue content. The at-issue/not-at-issue distinction appears to be analogous to the distinction between foregrounded and backgrounded content (e.g. Cummins et al., 2013).

¹⁵ Quantificational and predicative nominal expressions are assumed to be nonreferring, although there is debate on the nature and independence of these nominal semantic functions. Also, referents are not just individual tokens, but should include also at least individual types, event tokens, and event types. Finally, there are nonnominal expressions that display anaphoric behaviour.

These interpretive rules, of course, do not exhaustively characterise the referring expressions listed. It is well known, for instance, that definites may enter into referential links that are not based in identity, but on an associative bridging relations (part-whole, set-member) (Clark, 1977; Asher and Lascarides, 1998). However, they suffice to illustrate the sort of congruence effects addressed by accounts of entity-level context dependency (Chafe, 1976; Clark and Haviland, 1977; Hawkins, 1978; Webber, 1979; Prince, 1981a; Garrod and Sanford, 1982; Grosz and Sidner, 1986; Ariel, 1988; Givón, 1992; Gundel et al., 1993; Grosz et al., 1995). These accounts, as noted in §1.2, are of a diverse nature and, not surprisingly, deploy a terminology which is equally diverse: (referential) accessibility, (discourse) anaphora, cognitive status, (assumed) familiarity, information status, topicality, or (*referential*) *givenness*.

Common to most approaches to referential givenness is the distinction between referring expressions which establish a link between the referent they introduce and an antecedent referent—(11b),(11c)—and those which simply state that the referent they introduce is of a particular type—(11a). The former are evoked, familiar, given, (uniquely) identifiable, old or unused expressions whereas the latter are new, novel or type identifiable. In addition, referents present in context must be ranked (or categorised) according to their degree of salience. Pronouns, for instance, as reflected in (11c), must take up a referent that is salient or highly accessible ('in focus' in Gundel et al. (1993)). In fact, the interpretation of pronouns is very much a local phenomenon (see §1.3), since a vast majority of pronouns find their antecedent in the immediately preceding move (e.g. 92% in Hitzeman and Poesio's corpus). Ginzburg (2012), for instance, argues that an antecedent for a pronoun is to be found in an *active* move and provides a definition of 'active' which indeed includes adjacent moves but also other moves on the 'right frontier' of the discourse structure, incorporating the well-known insight of the discourse-configurational literature that nonadjacent contextual locality is constrained in such a way (Polanyi, 1988; Asher and Lascarides, 2003).

The locality of pronominal anaphora ('local focus' in Grosz and Sidner (1986)) is at the basis of formal treatments like Centering theory (Grosz et al., 1995; Poesio et al., 2004), a popular framework in computational and corpus linguistics. In Centering, the referents afforded by the local context of U (referents realised in the active move U-1, the utterance immediately preceding U) are partially ranked and the maximal referent in U-1 (preferred center or C_p) is, by virtue of certain rules and constraints and given some provisos, a very likely candidate for pronominal

realisation in U. This likely candidate for pronominal realisation is the backward-looking center of U (C_b). The definition of C_b of U as expressor of the referent that is most salient in U–1 (if referred to in U at all) is akin to the definition of *topic* in Givón (1992), where all referents are called ‘topics’ and the topic par excellence is the most salient one. The identity of C_b and topic, though not universally agreed upon, is argued for in Ward (1988) and exploited in detail in Beaver (2004). The notion of topic will be returned to shortly.

Discourse referents, as the relevant contextual resource behind givenness, are independently motivated and distinct from other resources, such as the quds which underlie the theme-rheme partition. The need to keep these two types of context dependency—referential givenness and qud-related themehood—separate is emphasised by Reinhart (1981), Prince (1981a, 1986), Gundel and Fretheim (2004), among others, on conceptual and empirical grounds. Ginzburg (2012), as noted, argues that pronouns are contextually associated with (a subutterance of) an active move. Since moves are of type ‘utterance’—they include structural information in addition to content—, they are fundamentally different from quds, which are propositional abstracts of a purely semantic nature. As such, quds are not rich enough to act as antecedents for pronouns, since it is essential that antecedents carry information about e.g. grammatical gender (pronouns in grammatical-gender languages agree with their antecedents).

However, not all approaches to context dependency distinguish between referent-level givenness and qud-level themehood. One such approach is Schwarzschild (1999), empirically based not so much on the referring expressions in (11b)-(11c) (also covered), but on another structural correlate of givenness: deaccenting (van Deemter, 1994; Büring, 2006, 2007; Ladd, 2008; Calhoun, 2010). Deaccenting, understood as the absence of accent on an item that would otherwise receive a (nuclear) accent in a default prosodic/metrical structure, is connected to referential givenness (deaccented definites often behave, anaphorically, like a pronoun) but also the ‘given’ in the given-new partition of Halliday (1967) or the ‘background’ in the contrast-background partition in Steedman (2014) (see §1.5). Deaccenting is illustrated in (12b):

- (12) a. A: So you bought fresh whitebait. What did Moana buy?
 b. B: FROZEN whitebait.
 c. B: Frozen/FROZEN TARAKIHI.

The deaccenting of *whitebait* in (12b) is due to the earlier mention in (12a), which affords, as discussed shortly, an ‘antecedent’ for it; in Schwarzschild’s terms it is ‘GIVEN’. *Whitebait* in (12b) contrasts with *tarakihi* in (12c), which, as expected, is accented (*frozen* is optionally accented). Schwarzschild’s GIVENNESS, however, is not simply defined on discourse referents but also on the propositional notion of entailment. To extend entailment-defined GIVENNESS to subsentential expressions it is posited that they be semantically raised to a propositional type and subsequently subjected to existential closure. So in (12b) the GIVENNESS content of *whitebait* is $\exists x.\mathbf{whitebait}(x)$, which is entailed by the GIVENNESS content of *fresh-whitebait*: $\exists x.\mathbf{fresh-whitebait}(x)$. This same mechanism can be used to bring themehood under the aegis of GIVENNESS if we enrich the procedure with the assumption (commonplace in a number of approaches to contrast/focus) that *wh*-words in questions and accented items in their answers are substituted by a variable (giving rise to ‘open propositions’) and then subjected to existential closure. The GIVENNESS content of the full-fledged answer *We are having MUTTONBIRD for dinner*, example (5) in §1.3, is entailed by the GIVENNESS content of the question *What are we having for dinner*, since the GIVENNESS content of both is, technicalities aside, $\exists x.\mathbf{have-for-dinner}(\mathbf{A+B},x)$.

Siding in some respects with Schwarzschild (1999), Bott (2008) explicitly advocates for a merger of referent-level givenness and qud-level themehood, arguing that the latter can be subsumed under the former (see also Rochemont (1986)) if (a) referents are crucially seen as encompassing different semantic types (at least entities, kinds, properties), and (b) the theme is not seen as a monolithic category, but rather as a composite of different primitives (links and tails (Vallduví, 1992)), each establishing its own anaphoric dependency of a different nature and on different antecedents. However, Bott’s account also crucially includes a rich notion of discourse configurationality—discourse segments, a notion of referential topic for each segment, and also quds that guide discourse segmentation—which plays an essential role in the definition of the anaphoric dependencies of the theme (or its parts) and draws a line between them and the dependencies of ‘classical’ referential anaphora.

Erteschik-Shir (1997) also bases the definition of information structure solely on the referent level. Context is viewed as a set of referents (file cards) categorised in terms of salience; information-structural notions like *topic* and *focus* express in U the salience status of these referents: topic expressions denote referents that are members of the salient subset in C_1 and can accordingly be subjects of predication, whereas focal

expressions denote referents that are not salient in C_1 , but which, by their mere encoding as focal in U , become members of the salient subset in C_2 and are therefore available as subjects of predication in $U+1$.

While Erteschik-Shir's view of focus as promoter of referents into salience (or topicality) is quite unorthodox, her take on the notion of topic is quite representative of the standard definition of 'aboutness' topic as found in Reinhart (1981) and Gundel (1985) (see earlier antecedents in Krifka and Musan (2012, p. 25-30)): the *topic* constituent in U expresses a designated (set of) referent(s) about which something is predicated by means of the nontopic elements of U (the *comment*). Erteschik-Shir (1997, p. 10), for instance, illustrates this with (13):

- (13) a. A: Tell me about John.
 b. A': Tell me about Mary.
 c. B: John invited Mary to dance.

If utterance B is a followup to the request by A, then the topic constituent in B is *John*; if B is a followup to the request by A', then the topic is *Mary*. This suggests that (13a) and (13b) set up different input contexts for (13c) that differ precisely in the identity of the referent that is distinguished as topic. The claim is that in human communication information is (also) organised as being 'about' particular entities (with the possible exception ofthetic judgments, as discussed in §1.3); the job of topics as a contextual resource is to represent the (set of) referent(s) with which the information conveyed by U has to be associated and topic constituents are the spellout of this contextual resource, thus enabling interlocutors to keep track of each other's referential 'aboutness' structure. One can remain agnostic about whether the organisation of information as being 'about' a particular topic is basically a linguistic matter related to discourse coherence (e.g. Bott, 2008) or a reflex of the architecture of human memory (e.g. Givón, 1992).¹⁶

It may be inferred from examples like (13) that the topic constituent of U expresses the topic referent in C_1 (as set up by $U-1$). However, topic constituents as defined could also be taken to specify the choice of topic referent for U 's output context C_2 . Of course, this does not matter

¹⁶ See Schlobinski and Schütze-Coburn (1992), McNally (1998a), Gómez-González (2001), Endriss (2009), Roberts (2011) for informative discussions on the notion of topic, van Bergen and de Hoop (2009) for sample approaches to the interface with syntax and intonation, and Cook and Bildhauer (2013) for issues that arise in annotation of topics in corpora. Roberts (2011) includes a review of different diagnostics for topic—like the one in (13)—and their sometimes divergent results.

in cases of *topic continuity*, i.e., when the topic referent in C_1 is identical to the one in C_2 , but it becomes highly relevant in cases of *topic shift*. Consider the two possible followups to A in (14). The formal difference between the first sentences in B and B' determines the preferred pronoun resolutions in the respective second sentences:

- (14) a. A: Hamish plays curling.
 b. B: He plays against Tip on Saturdays. He often beats him.
 c. B': Tip plays against him on Saturdays. He often beats him.

In B Hamish often beats Tip, whereas in B' Tip often beats Hamish. *Hamish* is arguably the topic constituent in (14a), so 'Hamish' is the expected topic referent in C_1 for both B and B'. If topic constituents express the topic in C_1 , then the topic of the first sentences in both B and B' is the constituent that refers to 'Hamish' (*he* in B and *him* in B'). If so, we must conclude that the preferred pronoun resolutions in the second sentences have nothing to do with topichood. Alternatively, one could argue that the topic of B' is not *him* but rather *Tip*: this would mean that it does not express the inherited topic, but rather the choice of topic referent for C_2 , which can be identical to the topic in C_1 , as in (14b), or not, as in (14c). This ties in with the open issue of the givenness status of topic constituents (discussion in Endriss, 2009), since the latter view naturally lends itself to the possibility that topics are not strictly given (cf. Portner (2007) also for a 'forward-looking' view of topics). It is also related to the issue of whether there is one topic or more per utterance. In fact, if one pursues the connection between topic and centers in Centering theory, as sketched above, the two candidates for topichood in the first sentence of (14c) would correspond each to one type of center: *him* spells out the backward-looking center C_b (a continued topic) and *Tip* the preferred center C_p (a shifted topic) (some languages grammatically distinguish continued from shifted topics (Aissen, 1992)).

In sum, there is evidence that topics, as a distinguished (set of) referent(s) which act as organisational pivots for information—or effect an organisational partition of information in context (Portner and Yabushita, 1998)—are a distinct contextual resource type which plays a role in entity-level congruence. As argued in Büring (2003), Bott (2008), Roberts (2011), Karagjosova (2013), topics at the entity level work in parallel to quds—as spelled out by themes—in the propositional domain. This complementarity should not be obscured by the terminological confusion that surrounds the terms *theme* and (*discourse*) *topic*.

1.5 Contrast

As noted in §1.1, the notion of ‘alternative’ is central to the concept of *contrast* adopted here. Namely, contrast is viewed as the expression of a dependency between an actual (sub)utterance U_a and some contextual antecedent U^+ (this contextual antecedent is taken to be an object also of type ‘utterance’, with structural information in addition to content). U^+ affords one or more relevant alternative (sub)utterances (U_b, U_c, \dots) which may have been potentially produced instead of U_a and which, if produced, would have displayed the same type of contextual dependency on U^+ as U_a . This is shown in (15), adapted from Umbach (2003):

- (15) a. The-research-team⁺ arrived at the base camp late at night.
 b. Ben talked to the LEADER_a.

Subutterance *the leader* (U_a) in (15b) is a contrast. It is anaphorically dependent on a contextual object U^+ introduced by *the research team* in (15a). U^+ affords (perhaps as an implicature) other (sub)utterances like $U_b =$ the geologist, $U_c =$ the meteorologist, which could have been uttered in (15b) instead of U_a . There is general agreement that in English contrast is, with some exceptions, marked by prosodic prominence. There are claims that prominence may be a universal structural correlate of contrast (see discussion in Büring, 2010; Féry, 2013).

The notion of contrast, as used here, is analogous to the notion of focus in Alternative Semantics (Rooth, 1985), since the general function of focus in this framework is to evoke alternatives (*focus* is also used in Selkirk, 2008; Zimmermann and Onea, 2011; Krifka and Musan, 2012, among many others). However, given that *focus* is also commonly used to refer to ‘rheme’, independently of whether *rheme* and *contrast* are merged into one category, the term is avoided here (pace Vallduví and Vilkuna, 1998; Steedman, 2014). In Alternative Semantics a contrast has an additional semantic value that corresponds to the set of alternatives its ordinary denotation belongs to, which, in turn, generates alternative propositional values. For example, in (15b) *the leader* would have a secondary denotation $\{\text{leader}\}_{\text{team}}$, which, provided ‘geologist’ and ‘meteorologist’ are members of $\{\ }_{\text{team}}$, generates alternative propositions ‘Ben talked to the $\{\text{geologist/meteorologist}\}$ last night’. One may wonder how this secondary set denotation arises: it could be introduced by the contrastive phrase itself by virtue of it being marked as a contrast (see Vallduví and Vilkuna, 1998), or it could be posited that all expressions have a secondary set denotation and that contrast indicates that this

secondary denotation is relevant for interpretation in the corresponding context (see Steedman, 2014, for a position along these lines). Umbach (2003) takes the tack, adopted here, that contrasts are anaphoric to a ‘bridging’ antecedent—via associative, subsectional or nonmonotone anaphora (Hawkins, 1978; van Deemter, 1994; Hendriks, 2002)—which affords the relevant set of alternatives.

Comparability between alternatives—dissimilarity and similarity—is essential in contrast. Umbach (2004) shows that dissimilarity arises from alternatives having to be mutually nonsubsuming (in (15) the leader, the geologist, and the meteorologist are referentially independent), while similarity is due to the fact that alternatives must have a common integrator (a concept that subsumes them all). U^+ , the bridging antecedent (in (15), ‘the research team’), provides this common integrator.

Contrast as defined here is conceptually independent of themehood. In theme-containing utterances, therefore, one would expect contrastive expressions to be compatible with both their being theme and their being rheme (see e.g. Vallduví and Vilkuna, 1998; Steedman, 2000, 2014). In fact, in §1.3 it was noted that contrasts in the theme appear in cases of ‘qud narrowing’, whereby the theme-provisioned max-qud_{C_1} , is a subqud of the inherited max-qud_{C_1} . It was also suggested there that utterances always include a contrast within the non-theme part of an utterance, i.e. a rhematic contrast. In other words, (a) all utterances would have a (rhematic) contrast and (b) a subset of the theme-containing utterances would include an additional (thematic) contrast. In Steedman (1991, 2000, 2014) the independence of contrast and themehood is reflected in the recognition of two independent layered information-structure partitions, theme-rheme and contrast-background. The utterance is partitioned into theme and rheme (all-rheme utterances are contemplated, and, nonstandardly, also all-theme utterances) and then both the theme and the rheme may in turn be partitioned into a contrast and a background (unmarked themes include no contrast).

Thematic contrasts are illustrated by (16) (= (9) in §1.3). The expressions *the band*, *the audience* and *the sound* in (b-d) are in the theme part of a theme-containing utterance. These expressions are often referred to as *contrastive topics* (Roberts, 1996, 2011; Büring, 2003; Wagner, 2012):

- (16) a. A: How was Lorde’s-concert⁺?
 b. B: [_T The BAND_a] [_R played very WELL],
 c. B: [_T the AUDIENCE_a] [_R danced NONSTOP],
 d. B: but [_T the SOUND_a] [_R was APPALLING].

Contrastive topics, being contrasts, are marked in English by means of prosodic prominence (hence, the small caps). However, the particular accent that characterises them is a complex L+H* (fall-rise) tone, distinct from the nuclear accent within the non-theme part of the utterance, which is a simplex high tone H* (followed by a low boundary tone).¹⁷

In (16) U⁺ (the common integrator) is *Lorde's concert* in (a) and each of the contrasts in (b-d) is linked to this antecedent by means of a subsectional or nonmonotone relation. Interlocutor B chooses not to elaborate on max-qud_{C₁}, ?λP.P(**L's concert**), but rather to single out and assess different subspects of it. In (b), for instance, the theme provisions the nonmaximal max-qud_{C₁'}, ?λP.P(**band**). The role of the contrast within the theme is to guarantee that the theme-provisioned max-qud_{C₁'} is necessarily interpreted as a subqud of max-qud_{C₁}. This is imposed precisely by the subsectional nature of the anaphoric dependency that holds between *the band_a* and *Lorde's concert⁺*.

Contrastive topics illustrate one type of interplay between two dimensions of contextual congruence: on the one hand, the fact that (b) is a theme-containing utterance specifies that it does not elaborate on the inherited max-qud_{C₁}, but rather on a self-provisioned max-qud_{C₁'}; on the other, the fact that the theme of (b) includes a contrast U_a which relates to an element of max-qud_{C₁} via a subsectional dependency, forces max-qud_{C₁'} to be a subqud of max-qud_{C₁} (see Roberts, 2011, p. 1915). As noted in §1.3, it seems deployment of this type of qud-splitting rhetorical strategy requires explicit presence of a contrast (Büring, 2003).

The idea that contrasts are related to a subsuming antecedent U⁺ is attractive and covers many occurrences. In some cases, however, the apparent U⁺ is not a subsuming expression but rather an identical earlier mention of U_a, as in (17) (*concert* in (17b) can be deaccented; see below):

- (17) a. A: How was Lorde's-concert⁺?
 b. B: [_T LORDE'S concert/CONCERT_a] [_R was GOOD]

However, examples like (17) can be accounted for if one plausibly posits, following Bott (2008), that contrasts, by definition, *must* depend subsectionally on a contextual antecedent (adapting his notation, U_a < U⁺, where < is instantiated by relations like 'be-a-member-of', 'be-part-of',

¹⁷ The term *contrastive topic* would suggest that thematic contrasts must be, in addition, a subtype of topic, defined in §1.4 as distinguished referents that act as organisational pivots for information. Certainly, this is a possibility that is exploited for instance in Bott (2008). Repp (2010), however, discusses some facts that would suggest otherwise. The issue will not be addressed here.

or ‘be-an-instantiation-of’).¹⁸ The mere copresence of contrast-marking on U_a in (b) and the earlier mention of ‘Lorde’s concert’ in (a) is enough to coerce the accommodation of a subsuming U^+ —something like ‘recent concerts/events attended by B’—which implicates the existence of comparable alternatives to U_a . In both (16) and (17) the ‘alternatives’ interpretation is due to the existence of a bridging contextual antecedent U^+ ; the difference is that in (16) ‘Lorde’s concert’ is explicitly introduced, whereas in (17) ‘recent concerts/events attended by B’ is accommodated. As expected, the ‘alternatives’ reading disappears if *Lorde’s concert* in (17b) is not structurally marked as a contrast (if it were an unmarked theme); only the identity-anaphora reading would be available.

Contrasts like *Lorde’s concert* in (17b), which coerce accommodation of a subsuming antecedent, also trigger a complex effect in the qud-structure of context. The max-qud_{C_1} , (redundantly) provisioned by the theme, $? \lambda P.P(\mathbf{L's concert})$, must be understood as a subqud of some superqud, since, as in (16), the theme that expresses it contains a contrast. However, this superqud, namely $? \lambda P.P(\mathbf{recent events})$, is not explicit, but rather must be accommodated (probably a rhetorical effect of the redundant replication of the inherited max-qud_{C_1}). Once this superqud is accommodated, elaboration on $? \lambda P.P(\mathbf{L's concert})$ by (17b) can be seen as being part of a qud-splitting rhetorical strategy. As expected, a natural continuation by B of (17b) would be as in (18c), where ‘the recital by Kiri Te Kanawa’ instantiates a nonsubsuming alternative to U_a and where the self-provisioned $? \lambda P.P(\mathbf{recital by KTK})$ is elaborated on as part of the same qud-splitting strategy:

- (18) a. A: How was Lorde’s-concert? \rightarrow
 (How were the-recent-events-B-attended+?)
 b. B: [_T LORDE’S concert/CONCERT_a] [_R was GOOD], but
 c. B: [_T the-recital-by-Kiri-Te-KANAWA_b] [_R was SUPERB].

In sum, despite appearances, there is no contrast-mediated anaphoric dependency between the two mentions of ‘Lorde’s concert’ in (17) or the two nonsubsuming alternatives in (18); rather, contrasts U_a and U_b anaphorically depend on an accommodated U^+ , ‘recent events attended by B’, which acts as common integrator. Also, the contrast-containing themes in (17b) and (18b,c) implement a superqud-splitting strategy, as

¹⁸ There is a conceptual connection between Bott’s subsectional $<$ relations and the partially ordered set relation of Hirschberg and Ward (1984), Ward (1988), and Pierrehumbert and Hirschberg (1990), which is argued to define the dependency between expressions like topicalised phrases and their contextual antecedent.

expected; this superqud is accommodated into context via a ‘broadening’ of the inherited max-qud_{C₁} (see details in Bott, 2008).

It was also noted in connection with subutterances like *Lorde’s concert* in example (17) that more than one accentual pattern is possible. This is so because contrast is actually not the expression of (the denotation of) an alternative, but rather the expression of whatever distinguishes the expressed alternative from the other alternatives (see Steedman, 2014), i.e., the element of particularisation with respect to the common integrator or of dissimilarity between the alternatives. Consider (19):

- (19) a. [T LORDE’S-concert_a]_R was GOOD], and
 b. [T KIMBRA’S-concert_b]_R was OKAY].

In (19) the nonsubsuming alternatives are ‘Lorde’s concert’ in (a) and ‘Kimbra’s concert’ in (b). The contrasts, however, are *Lorde’s* and *Kimbra’s*, whose meanings suffice to express the element of particularisation with respect to a common integrator like ‘recent concerts’ or of dissimilarity between the two alternatives. *Concert*, on the other hand, contributes the element of generalisation with respect to the common integrator or of similarity between the two alternatives. As such, it is marked as being part of the background (in the contrast-background partition of the theme) by means of deaccenting. In (17) the two accentual patterns may be correlated with whether the accommodated U⁺ is ‘recent events’ (no deaccenting) or ‘recent concerts’ (deaccenting of *concert*). Of course, deaccenting of *concert* is a priori also compatible with ‘recent events’ as U⁺: in (19) (a-b) could be uttered in reaction to a query like *How were the concerts you’ve recently been to?* but also a query like *How were the different events you’ve recently been to?* In the latter case *concert* further restricts the common integrator from the inherited U⁺ ‘recent events’ to ‘recent concerts’. This is probably also why *concert* may be deaccented in (18b), since a recital can also be (nontechnically) classed as a concert.

The cases of contrast dealt with so far are cases of thematic contrast, but, as suggested above, all utterances (except for Steedman’s all-theme utterances) must have a rhematic contrast. Given the view of contrast adopted here, this is a natural conclusion if all utterances are seen as an elaboration on a (sometimes implicit) max-qud. Let us illustrate this with an elaboration like (5) in §1.3, partially repeated here as (20):

- (20) a. A: What⁺ are we having for dinner?
 b. B: MUTTONBIRD_a.

Themeless utterance (20b) answers the qud spelled out by *wh*-query (20a). *Wh*-expressions denote classes (or sets) of objects and, therefore, are prime candidates to act as bridging antecedent U^+ for things that belong to the class (or the set) they denote. *Muttonbird* in (20b) belongs to the class of things—e.g. dishes or foodstuff—that may be had for dinner and therefore stands in a subsectional relation to *what*. Contrast on *muttonbird* expresses the existence of this subsectional relation (the same would apply to a theme-containing utterance like *We are having MUTTONBIRD for dinner*). As with the case of thematic contrast, ‘what’, as subsuming antecedent, affords alternatives to U_a (e.g. ‘whitebait’, ‘tarakihi’), which are also dishes that may be had for dinner.

The type of dependency displayed by *what* and *muttonbird* in (20) exists in all question-answer pairs (including polar questions and their answers). If all utterances are seen as elaborations on a qud, this is tantamount to saying that (the non-theme part of) every utterance must include a contrast. As noted in §1.3, this is not an unwanted result, since it accounts for the prosodic prominence of subutterances like *muttonbird* in a way which is analogous to the case of contrastive topics and preempts the need to claim that this prosodic marking is directly associated with ‘rhematicity’, something to be avoided in light of the arguments in McNally (1998b), Vallduví (2001b), Selkirk (2008) that ‘rheme’ is a non-category. The claim that (the non-theme parts of) all utterances are in principle contrastive goes back to Bolinger (1972) and is also reflected in the claim that all nuclear accents are (broadly) contrastive (see Ladd, 2008; Calhoun, 2010; Steedman, 2014).

One can also establish a link between the idea that *wh*-expressions in quds are bridging antecedents for subutterances like *muttonbird* in (20) and the notion of ‘focus establishing constituent’ (FEC) in Ginzburg (2012) (a.k.a. ‘salient utterance’ in Ginzburg and Sag, 2000), posited to account for certain properties of nonsentential utterances. The FEC is defined as ‘an antecedent subutterance which specifies semantic, syntactic and/or phonological parallelism conditions for the fragment utterance’ (Ginzburg, 2012, p. 234) and it is explicitly argued that the *wh*-expression in a *wh*-interrogative utterance acts as FEC for the ensuing declarative fragment that elaborates on the qud it introduces. FEC and the associated qud form a compound contextual resource; this means that wherever and whenever a given max-qud (of the *wh*- variety) is elaborated on by an utterance, there is an associated FEC that acts as bridging antecedent for a subutterance of it.

Some of the issues, discussed above, which arise with thematic contrast also arise with rhematic contrast. For instance, there are times when it would appear that the relevant antecedent for a rhematic contrast is not a subsuming expression but rather a nonsubsuming alternative, in analogy to (18) above. Consider ‘corrections’ like (21), where the apparent contrast-related antecedent of *whitebait* is *muttonbird*:

- (21) a. A: Did you buy muttonbird⁺?
 b. B: I bought WHITEBAIT_a.

However, as in (18), it could be argued that subsectional anaphoric dependency is obligatory for a contrast like *whitebait* and that this, together with the copresence of an alternative like *muttonbird* is enough to coerce the accommodation of a subsuming U⁺ (‘food from the fishmonger’s’, for instance) for both alternatives. Alternatively, and perhaps more naturally in (21), it could be argued that (b) is an elaboration not on the qud introduced by (a) but rather on a self-provisioned max-qud_{C1}, ‘what did B buy?’, which provides a suitable subsuming antecedent (the denotation of the *wh*-expression) for *whitebait*.

Also, in analogy to (19), backgrounding is used to further restrict the inherited common integrator U⁺, provided by the subsuming antecedent *what*. This is illustrated by (22):

- (22) a. A: What⁺ did Moana buy?
 b. B: FROZEN whitebait_a.

What in (22a) establishes as common integrator, say, the class of food-stuff things that Moana could have bought. However, the deaccenting and backgrounding of *whitebait* in (22b) indicates that only the meaning of *frozen* contributes to the element of particularisation with respect to the common integrator and that therefore this common integrator is not the inherited U⁺ but rather the more restrictive class of whitebait things that Moana could have bought.¹⁹

We have based the discussion in this section on a broad definition of contrast as expressing a subsectional dependency between the contrastive expression U_a and a subsuming antecedent U⁺ that, in turn, affords comparable alternatives for U_a (Umbach, 2003, 2004). This seems sufficiently adequate to account for a wide variety of facts and relates

¹⁹ Interestingly, Vallduví and Zacharski (1994) and Ladd (2008) argue that this deaccenting strategy used to distinguish the element of particularisation/dissimilarity from the element of generalisation/similarity in the subutterance that contains the contrast is not available in some languages.

back to Bolinger’s early insight that there is a common contextual basis for all perceived varieties of contrast. It also explains the absence of clear-cut systematic differences in the prosodic marking of different types of contrast detected by Calhoun (2010). Calhoun concludes that perhaps a sounder approach to the expression of contrast is to conclude that gradient increase in prominence and gradient constraining of the common integrator by contextual factors are positively correlated and feed each other. Of course, this does not rule out the possibility that in certain languages different subtypes of contrast be conventionally associated with discrete structural configurations, be they syntactic, prosodic or morphological (see Molnár and Winkler, 2006; Repp, 2010).

This broad definition of contrast is also sufficient to allow for those semantic operators that are known to depend on contrast (‘focus-sensitive operators’) to express their meaning, since what they need is basically a set of comparable alternatives: the bridging antecedent affords these alternatives and therefore provides the needed domain of quantification. *Only*, for instance, expresses that the content of the proposition in which it occurs cannot be truly asserted of any of the alternatives of the subutterance that contains the contrast, as determined by the common integrator, whereas *also* expresses that it can. Other instances of association with contrast (‘semantic uses of focus’ in Krifka and Musan, 2012) work in a similar fashion. Beaver and Clark (2008) provides an exhaustive analysis of contrast-sensitivity building on a definition of context that, like here, includes a notion of max-qud (‘current question’) and the requirement that (some element in) this max-qud affords a set of alternative propositions that are its potential elaborations (the ‘focus principle’). On such a basis, Beaver and Clark (2008) proposes that there are three degrees of contrast-sensitivity: (a) operators like *only* which associate with contrast by convention (they actually associate with the set of alternative propositions afforded by (the relevant element in) max-qud), (b) quantifiers like *always* which may freely use the qud-afforded set of alternative propositions as the domain variable defined by its restrictor, and (c) operators like negation, which only appear to associate with a contrast (their ‘scope’ being entirely determined once the correct max-qud is identified).²⁰

²⁰ In principle, association with contrast should exist with both thematic and ‘rhematic’ contrasts, since the basic semantics of contrast are one and the same (see e.g. Vallduví and Zacharski (1994) for cases of association with contrastive topics).

Interestingly, Beaver and Clark’s approach is compatible with the idea that rheme is not actually a category in information structure. What we need is inherited maximal quds, themes that provision nonmaximal quds when necessary, and contrasts (and the contrast-background partition) to evoke the common integrator that affords the sets of alternatives that are relevant for interpretation and are exploited by contrast-sensitive operators. The idea that rheme is not a category entails, of course, that any information-structure marking (such as accent in English) that is found within a themeless utterance or within the non-theme part of a theme-containing utterance has nothing to do with theme-rheme, but rather with the subsectional dependency of a part of this utterance on a part of the max-qud it elaborates on. If this is correct, it turns out that congruence between questions and answers in discourse is determined by two different contextual resources: on the one hand, by the dynamics of max-qud elaboration—where themes play a role—and, on the other, by the anaphoric dependency that holds between an interrogative expression and the subutterance that denotes its specification—where contrast plays a role.

1.6 Summary

As is well known, the literature on information structure is vast. There are many excellent overviews and monographs which contain ample discussions of concepts and data. In addition to the works cited in the preceding sections, a great deal of ground is covered by the following (by no means an exhaustive list): de Swart and de Hoop (2000); Drubig (2003); Ward and Birner (2004); Marandin (2004); Wedgwood (2005); Traat (2006); Dipper et al. (2007); Ishihara et al. (2004); Lee et al. (2007); Krifka and Féry (2008); Breen et al. (2010); Eilam (2011); Hinterwimmer (2011); Truckenbrodt (2012); Arnold et al. (2013); Song (2014).

Information structure can be thought of as concerning those aspects of the structure of utterances that contribute to their relation with context, understood here as an interlocutor’s information state at the time of utterance. Theories of meaning that take context to be of the essence for linguistic interpretation have come to view context as a richly structured multidimensional object inhabited by a number of resources. Within this general perspective, the information structural notions discussed in this chapter have been defined as correlating with particular contextual resources. These correlations are at the heart of contextual congruence.

Theme (§1.3) has been analyzed as relating to questions under discussion (quds). Quds are propositional abstracts that inhabit the propositional domain of context and which guide discourse progression. The basic idea is that at every point of a linguistic interaction there is (at least) a qud that is maximal which is elaborated on by an explicit move. This move is effected, in principle, by a themeless utterance, since qud is locally salient. Theme-containing utterances become necessary whenever a move does not elaborate on the inherited max-qud. They effect a two-step context update: they specify a non-maximal qud, which is promoted to qud-maximality, and then elaborate on it.

Givenness and topic, in contrast, have been discussed in §1.4 as relating to discourse referents, subutterances which inhabit the referential domain of context. Again, the basic idea is that at every point in discourse there is a subset of discourse referents that are maximally salient and other referents that are nonsalient and that this distinction correlates with the form of referential expressions. In addition, some of these discourse entities are distinguished with an additional role in context as organisational pivots for information. These are the discourse referents that are marked as topics.

In §1.5 contrast has been defined in connection with the notion of alternatives. An expression which is marked with a contrast stands in a subsectional dependency with a subsuming contextual antecedent. The fact that this anaphoric dependency is subsectional implies that there are mutually nonsubsuming alternatives to the contrast that are also subsumed by the antecedent. These alternatives play a number of important roles in contextual congruence and in the interpretation of some semantic operators. The subsuming antecedent of a contrast must have semantic and structural properties, like a discourse referent, but its contextual dynamics are closely associated with qud-structure.

It is true that other notions, or perhaps finer-grained distinctions within the notions discussed, could have been included in the general picture presented in this chapter. It is also true that for each of the notions covered there exist additional facts that exhibit complexities on their own. Despite these shortcomings, this chapter will hopefully have succeeded in convincing readers that the more we learn about the nature of context and its role in dynamic interpretation the better we will be able to understand utterance-level information structure.

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