Information Structure for Philosophers

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Abstract:

This paper is an overview of concepts and theories of information structure, with an emphasis on their importance to philosophy. It introduces some of the basic ideas of information structure, and how information structure in represented in English via intonation. It reviews traditional approaches to theories of information structure, that are still important to current research. It outlines current work on two of the central components of information structure: focus and topic. These illustrate some contemporary theories. It concludes with a discussion of the philosophical implications of information structure.

Key words:

Focus, topic, information structure, semantics, pragmatics, syntax, intonation.

The field of information structure studies how information conveyed in an utterance is packaged or organized—or structured. In many utterances, parts of what one says are old

information, already known or recoverable to the hearer. Some parts of it are new information. Some anchor the utterance to prior discourse, and some indicate where the discourse should go. Some indicate what the utterance is about, and some indicate what is being conveyed about it.

For linguists, information structure is a fascinating and important topic. It intersects with many of the major areas of linguistics, including semantics, syntax, morphology, and phonology. It is relevant to a wide range of linguistic phenomena, and shows interesting cross-linguistic variation. It is no surprise that linguists care about information structure.

But why should philosophers care about this; or more specifically, why should philosophers of language care? Much of the goal of this essay, beyond introducing philosophers of language to important features of information structure, is to illustrate why we should care about it. But let me mention a few reasons that will be important as we progress. First, of course, it is just interesting, and confronts us with many of the central complexities in the study of language, in direct ways. So, anyone who finds language interesting should find information structure interesting. But there are several more specific reasons philosophers should care about information structure. It reveals subtle aspects of meaning, but also shows that these aspects of meaning can have substantial—even truth-conditional—effects. It reveals complex interactions between semantics and pragmatics. It shows ways that discourse is structured. It shows unexpected forms of context-dependence. It also reveals important interactions between grammar and these semantic and pragmatic phenomena. Information structure show us many fundamental things about how languages work, that are important for philosophers as well as linguists.

With so may issues and areas of linguistics in play, it will be no surprise that the field of information structure is huge and rich. One cannot hope to survey all of it in a short essay.[1] Instead, I shall present a few examples of important features of information structure, and extract some general morals for philosophers from them. I shall introduce some of the basic ideas of information structure in section 1. In section 2, I shall talk more specifically about how information structure in represented in English via intonation. Section 3 will sketch some of the traditional approaches to theories of information structure, that are still important to current research. Sections 4 and 5 will sketch more current work on two of the central components of information structure: focus and topic. These will briefly illustrate some contemporary theories. I shall try to keep track of philosophical issues as we go, but I shall return to philosophical morals in section 6.

1. Introducing Information Structure

We can illustrate some core aspects of information structure with a simple example:

    (1)   He spoke GREEK.

(The capital letters mark what we can for now think of as 'stress' or emphasis.) Actually, this is best thought of as part of a little dialog:

    (2)   a.   What language did Cicero speak?

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[1] One might look at the *Oxford Handbook of Information Structure* (Féry & Ishihara 2016), which comes in at 966 pages and still leaves quite a bit out.

b. He spoke GREEK.

(Shakespeare managed to provide a more scintillating version of this dialog.)

You will notice a few things about this example right away. The 'stress' on *Greek* indicates contrast. Cicero spoke Greek, rather than Latin (or Aramaic, or Gaulish …). It also provides new information. It informs the questioner, who presumably is unsure what language Cicero spoke, that in fact it was Greek. But you will also take it as established that we are talking about Cicero, and that Cicero is the referent of *he*. Here we see information structure. The utterance is structured for what is established or 'given', and what is new information. The stress helps mark new information. As we will see, it does much more than that.

There is more than that involved in information structure. It also helps to structure discourse. Certain answers are felicitous for certain questions, but not for others. Information structure is central to how this is controlled. Consider:

(3) What language did Cicero speak?

a. He spoke GREEK.

b. #HE spoke Greek.

The first answer seems natural, the second seems awkward or unacceptable in context, marked by the '#'. The question sets up what is established or given in the conversation, while the stressed element marks what new or important information is being provided about it. This in turn makes it acceptable or unacceptable as an answer to a question.

Among its roles, information structure marks what parts of an utterance provide new or old information, and that in turn helps structure well-formed discourse. That is already important; but we will see that when we look more closely at specific features of information structure, there is much more to the story.

2. Intonation and Meaning

We have seen that, in English at least, features of information structure are marked by what I loosely called 'stress', and marked by capital letters. We see this with *GREEK* and *HE* in (3). The relation between this kind of 'stress' and meaning is one of the important insights from the study of information structure. We will review some of it here.

Here is a tempting view. All stress indicates is some kind of highlighting of certain parts of a sentence. Take another simple case:

> (4)   a.   SAM talked to Alex!
>
>   b.   Sam talked to ALEX!

You might think that semantically, these really say the same thing. You have just highlighted *Sam* in one and *Alex* in the other.

Though we might think these really say the same thing, we might also think that highlighting something can make a pragmatic difference. You at least direct your hearer to the importance of what you highlight. Perhaps they will draw some inferences from that. This may be part of broadly Gricean interpretation (e.g. Grice 1959, 1975). It may be part of a general project of assessing what a speaker is trying to do in making an utterance (e.g.

Hobbs et al. 1993; Thomason 1990; Thomason et al. 2006).[2] Such a view is suggested by Sperber & Wilson (1986 p. 203), who explicitly call it a "vocal equivalent of pointing." The same idea is echoed in the title of Bolinger (1972), "Accent is predictable (if you're a mind reader)." Bolinger goes on to talk about "emotional highlighting" (p. 644), which seems much like Sperber and Wilson's pointing.[3]

There is good reason to think this view is incorrect. First, we need to understand better what we have called 'stress' marked by capital letters. It is not stress. Most phonologists take stress to be a rhythmic phenomenon, akin to a down-beat in music. What we are looking at is a matter of intonation. More specifically, what is marked by capital letters are points of intonational prominence. These are high or low points, or other specific contours,

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[2] Cognitive scientists sometimes tak about 'mind reading'. This broadly covers our ability to see other people as agents and attribute mental states to them (having a 'theory of mind') but also our ability to recognize other people's plans and intentions. The idea here is that emphasis supports such mind reading. See, for instance, Apperly (2011), Bratman (1987), Carberry (1990), Fagin et al. (1995), and Pollack (1992). For a good discussion of how this relates to core issues in philosophy of language, including the Gricean program, see Harris (2020).

[3] Bolinger's work involves the detailed study pitch accents. His real interest in this paper is to argue that accent placement cannot be predicted by grammatical—syntactic or phonological—rules.

in the pitch level of an utterance.[4] Actually, we can get even more specific. Pitch is defined as *perception* of fundamental frequency, so we are looking for points of perceived prominence. These turn out to be what are called *pitch accents*, which are the high or low points, or specific contours, corresponding to perceived prominence in pitch.

With that in mind, look again at (1). Where we have capital letters on *GREEK*, what we really have is a pitch accent. If you listen carefully, you will hear that it is a high point in the pitch contour. In the standard notation, this is written H*.[5] (The * marks alignment with the main stressed syllable.)

There are other pitch accents. One example from Büring (1999) makes this vivid (even if the example itself feels dated):

5.   a.   What did the popstars wear?

      b.   The FEMALE pop stars wore CAFTANS.

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[4] A speech sound is produced by a number of different features of the articulatory system. When talking about pitch, the main focus is on the frequency of oscillation of the vocal folds, often labeled F_0 for the 'fundamental frequency'. See any phonology textbook, e.g. Kenstowicz (1994).

[5] Or, in the terminology of Bolinger (1958) and Jackendoff (1972), the A-accent.

Again, if you listen, you will hear an H* accent on *Caftans*, while *female* gets a kind of fall+rise contour, usually glossed as L+H* (for low followed by high).[6]

One of the important developments in the last several years is that pitch accents form a highly constrained system. This has been especially well-studied for languages like English and German, though a large number of languages have been investigated.[7] A widely recognized standard system posit five pitch accents (Beckman et al. 2005): H*, L*, L*+H, L+H*, H+!H* (with a 'downstep'). Other systems use six (Beckman & Pierrehumbert 1986). There is more to the story than that. An intonational phrase is made up of more than a pitch accent, as the pitch accent is just part of an intonation contour. Still relying on the H and L prominence markings, we can note that an intonational phrases end with either a fall or a rise, meaning they hit either a high or low, marked H% or L%. (In many theories, an initial boundary tone is only an optional H). There are also phrase accents, which in effect tell us where the pitch winds up after a pitch accent. These are usually marked H- or L-. In simplest form, an intonational phrase is a pitch accent followed by a phrase accent followed

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[6] Or, in the terminology of Bolinger (1958) and Jackendoff (1972), the B-accent. This terminology is taken up by Büring (2003).

[7] For an important overview, see Ladd (1996). Groundbreaking work was done by Pierrehumbert (1980) and Beckman & Pierrehumbert (1986). For more cross-linguistic insights, see the many papers in Féry & Ishihara (2016), that discuss Bantu languages, Greek, Hungarian, Japanese, Mandarin, Romance, sign languages, Sino-Tibetan languages, and Slavic languages, among others.

by a boundary tone, but several of these steps can be iterated to produce more complex tunes. Different systems implement this differently, but the result is a limited range of tunes that are used. By one count, 22.[8] We have already noted some systems use a downstep marked !, which indicates a lowering of the register in which tones are realized. For most of our discussion of information structure, it will be safe to simply discuss pitch accents. But, for instance, the whole intonational tune for *the female pop stars* in (5) is L+H* L- H%.

Perhaps most important to us, the intonational structure this work uncovers relates to meaning, and to information structure. The feeling of 'new' information we see in (1) is highly correlated to H*. This is what is known as *focus*. We will explore the properties of focus more in section 4. The L+H* accent in (5) encodes a different meaning, more to do with both what is given or old, but also how what is already given can be modified. This is an aspect of what is known as *topic*. We will explore the properties of topic more in section 5. Other semantic aspects of intonation have been explored. For instance, Ward & Hirschberg (1985) argue that the fall-rise contour with an L*+H accent indicates uncertainty on the part of the speaker about whether a response is appropriate.[9]

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[8] Again, see Ladd (1996), and classic work of Pierrehumbert (1980) and Beckman & Pierrehumbert (1986).

[9] For more on the interpretation of accents and whole tunes, see Pierrehumbert & Hirschberg (1990).

We will explore more details of topic and focus below. But even this brief overview of intonation and its meanings shows us something important about our languages. We started with the idea that intonation is a kind of highlighting, unconstrained by anything but our general interpretive or 'mind reading' abilities. But the details show us something very different. Intonation has a highly regimented form. It is conventional in nature. It has a grammar.[10] It also produces specific encodings of meanings. We are looking not at the open-ended pragmatic side of language, but the grammatical, conventional side. One moral here is that our first instincts about how aspects of our language work can be wrong. Intonation and the way it encodes information structure is a good example.[11]

3. Some Traditional Ideas

Information structure has been investigated by a huge number of traditions in the study of language, using many different theoretical frameworks. Functional linguistics, cognitive linguistics, generative linguistics, formal semantics, pragmatics, and so on have all had something to say about it. The term 'information structure' itself is due to Halliday (1967). A related term 'information packaging' is due to Chafe (1976). Related notions were discussed at length by the Prague school (Daneš 1968; Firbas 1964). See the overview in

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[10] Technically, one of the insights of Pierrehumbert (1980) is that it has a finite state grammar.

[11] This is a point made clearly by Lepore & Stone (2015). I discussed it more in Glanzberg (2018).

Hajičová et al. (1998). Chafe put the idea nicely, saying that what we are concerned with has to do "primarily with how the message is sent and only secondarily with the message itself, just as the packaging of toothpaste can affect sales in partial independence of the quality of the tooth paste inside" (Chafe 1976 p. 28).

We have already seen one of the leading themes in this early work: the idea that an utterance is divided up between what is somehow new and what is somehow old or given. One version of this is the *given-new contract* of Clark & Haviland (1977). They think of this as a kind of Gricean principle, requiring an utterance to mark old and new information. It is a tempting idea that focus corresponds to new information, and is marked by H*. In English, L+H* marks a kind of topic, and corresponds to given information.

But what counts as old/given or new is not so simple. There are a number of highly developed notions of givenness in the literature. A good place to start is Prince (1981a). Prince distinguishes three different notions of givenness, all in terms of what speakers can expect of hearers. The strongest is a notion of recoverability, which requires that a speaker assume that a hearer will be able to predict that a linguistic item will occur in a particular position in a sentence. (Prince attributes this notion to Halliday (1967) and perhaps Kuno (1972).) Weaker is that a speaker assume a hearer has an entity in mind. Weaker still is that a speaker assumes a hearer can infer (the existence of) a particular entity. (Prince attributes this to Clark & Haviland (1977), and again, perhaps Kuno (1972).) Subsequent work of Prince (1992) adds substantially more to the taxonomy. Other approaches focus more on the status of an entity in an agent's conscious thinking (e.g. Chafe 1976; Lambrecht 1994). Important work of Gundel et al. (1993) combines aspects of Prince-like and Chafe-

like approaches, and also makes claims about what linguistic forms go with what sorts of givenness status. See also developments from centering theory (Grosz et al. 1995).

The main emphasis in this literature is on entities that can be counted as given or new in a discourse. That also leads to a focus on noun phrases that pick out entities, and how the information status of their referents relates to grammatical marking.[12] Along with this goes various ideas about how information structure partitions a sentence. If a constituent (say a noun phrase) is marked as new, what remains outside of it is in some way old. This is what Prince (1986) calls an open proposition. It is often identified with what is presupposed (Chomsky 1971; Jackendoff 1972; Lambrecht 1994). Not all of this work develops semantics or pragmatics of presupposition in depth, but see Beaver (2001) for an extended discussion. (Lambrecht is the exception here.)

We can find other ways of partitioning a sentence for information structure. If some constituent (again presumably a noun phrase) is marked as distinctively given, then what remains outside of it is in some way telling us what is new about the marked referent. This sets up what is sometimes called a *topic-comment* division. Terminology here varies widely. We see such terms as *topic* (e.g. Givón 1983; van Kuppevelt 1995; Reinhart 1981), *theme* (e.g. Allerton 1978; Daneš 1968; Firbas 1964; Halliday 1967; Steedman 1991), or *link* (e.g. Vallduví 1990). These are related, but often differently understood notions. But generally,

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[12] This is clear, for instance, with Gundel et al. (1993). Other work looks more broadly at syntactic forms, such as Prince (1985) and Birner & Ward (1998).

with identifiable topic elements and identifiable new or focus elements, we can partition a sentence in multiple ways. Each theory emphasizes slightly different ways of doing so.

In the next sections, we will examine the notions of topic and focus in more detail. For now, we simply remind ourselves of two important elements of the tradition: information structure relates to given versus new information, and it partitions sentences. Though we will see quite different formal implementations of these ideas, they remain important.

For the moment, we may reflect on one more moral. Language can show interactions between grammar and the psychological states of speakers. Work on givennness has attempted, in many ways, to try to identify some of those.

4. Focus

One of the most extensively studied aspects of information structure is what is called *focus*. We will look at it in more detail here.

We have already seen focus in examples like (1). We have seen that it somehow correlates with new information, and it is typically marked by an H* accent. Here is one more example, borrowing from Rooth (1996):

(6)   Ede wants COFFEE.

The capitals here mark an H* pitch accent. The right pitch accent is brought out clearly by a question-answer configuration:

(7)   a.   Does Ede want coffee or tea?

  b. Ede wants COFFEE.

You will naturally pronounce this with an H* accent on *coffee*.

4.1. Focus Phenomena

We will begin by reviewing some of the major phenomena that go with focus.

Focus placement is tightly constrained by questions. This is what is known as *question-answer congruence*. Consider:

  (8) Does Ede want coffee or tea?

    a. Ede wants COFFEE.

    b. #EDE wants coffee.

Versus:

  (9) Who wants coffee?

    a. #Ede wants COFFEE.

    b. EDE wants coffee.

Roughly, the focused element must provide an answer to a question.

Focus has a number of other importat features. It typically indicates a kind of *contrast*:

  (10) a. John likes JANE.

    b. JOHN likes Jane.

There is a uniform difference between these examples. In each, the focus indicates some kind of *contrast*. In (10a), it is indicated that John likes Jane, as opposed to, say, Sue or Mary. In (10b), it is indicated that it is John who likes Jane, as opposed to, say, Bill or Fred (cf. Dretske 1972).

The indication of contrast might in some cases seem like a kind of 'add on', supplementing the main message of an utterance. But sometimes it seem central to meaning. A nice example is given by Francis Ford Coppola's film "The Conversation." In it, a professional eavesdropper records someone saying to another:

(11)   He'd kill us if he got the chance.

The eavesdropper is then faced with many worries about the safety of the people he spied upon. A plot twist leads to their committing a murder. Going back over the tape, the eavesdropper realizes the message is in fact:

(12)   HE'd kill US if he got the chance.

Constrast can be very important to what is conveyed by an utterance.

Perhaps one of the most important features of focus is that in some environments, it shows clear truth-conditional effects. These show up in the presence of focus-sensitive operators like *only* and *even*, adverbs of quantification like *always*, etc. Following Rooth (1985), consider:

(13)   a.   John only introduced Bill to SUE.

        b.   John only introduced BILL to Sue.

Consider a circumstance where John introduced Bill to Sue and to Mary, and did no other introducing. In this case, (13a) is false, while (13b) is true.

Likewise for adverbs of quantification we see, again following Rooth:

(14)   a.   In Saint Petersburg, OFFICERS always escorted ballerinas.

        b.   In Saint Petersburg, officers always escorted BALLERINAS.

Finding a hapless officer escorting an opera singer falsifies (14b) but not (14a). This is the phenomenon known as *association with focus*. It shows that focus is in part a semantic phenomenon, as it can affect truth conditions in some environments.[13]

Focus shows a number of other interesting features. Among many, it can indicate sentence-internal contrast, as in (Rooth 1992):[14]

(15)   An AMERICAN farmer told a CANADIAN farmer a joke.

There are also questions about whether focus can encompass a whole clause (so-called broad focus). It also frequently triggers implicatures.

We have seen that focus has, among many features, three main ones: question-answer congruence, contrast, and truth-conditional effects with focus-sensitive operators

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[13] Rooth (1985) is perhaps the seminal work on association with focus. It builds on important work of Anderson (1972), Dretske (1972), and Jackendoff (1972). I believe Jackendoff coined the term 'association with focus'.

[14] But see discussion of Ladd (1996) and Roberts (1996).

(association with focus). It also often indicates new information. We will look below at how to account for these facts.

4.2. Focus Marking

It is commonly recognized that the intonational marking of focus is the phonological realization of an underlying feature in syntax.[15] So it is assumed that there is a feature F for focus. The leading idea is that this is ordinary syntactic feature, on par with what distinguishes nouns from verbs, plurals from singulars, nominative from accusative case, and so on. It is interpretable (like gender, number, and so on), but still syntactic.

Let me mention a few of the many reasons this is the standard assumption. One is that there are clear relations between accent placement and syntax. As Selkirk (1995) observed, there is a preference for a phrase to be marked by an accent on its internal argument, and not its head:

(16)   a.   What did John do?

       b.   John drank BEER.

This is entirely felicitous. However, the question-answer congruence indicates that the focus is the verb phrase *drank beer*, while the perceived prominence is on *beer*.

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[15] You can think of it as like spell-out in a standard Chomskian Y-model (e.g. Chomsky 1995).

There are a number of other reasons. One is the much-discussed phenomenon of 'second occurrence focus', where semantically a focus is present, but no pitch accent is recognized (Beaver et al. 2007; Beaver & Clark 2008; Partee 1991). Also, it is an old observation that focus seems able to affect grammaticality (Jackendoff 1972). And more recently, important connections between focus and ellipsis have explored (Merchant 2001; Rooth 1992). A number of authors have noted the role of information structure in the syntax of copular clauses (e.g. Heycock & Kroch 2002). The persistent connections between syntax, focus and other elements of information structure, and accent placement make a general case that there are syntactic features realized by accents serving information-strutural functions. Finally, there are big-picture reasons. Many models of how syntax relates to semantics and phonology hold that semantics and phonology cannot see each-other, and so there must be features in the syntax before phonology and semantics split that can affect both. All together, these pieces of evidence, and others, have led to the standard assumption that information structure is marked in syntax and realized in some languages by accent.

The general phenomenon of how accent relates to the syntactic marking of focus is usually called *focus projection*, as the core issue is that syntactic focus projects past intonational marking. Theories of focus projection have changed since Selkirk's seminal work, due to the influence of Schwarzschild (1999). We will not go into details, but one important observation from both of them is that accent placement is affected by givennness. In Schwarzschild's theory, there is a contraint of givenness, which requires that constituents that are not syntactically marked for focus are given. So, the classic idea appears here. Schwarzschild offers a specific definition of givenness, which makes given material in a

very rough sense anaphoric, but with some specific insights into how entailment can support givenness.

As anyone familiar with work in the minimalist program will know, there has recently been a lot of attention to where elements of the grammar can be reduced. So, whether F marking is an eliminable feature of grammar is itself a research issue. We will leave things with the common assumption that one way or another, the grammar sees F.[16]

We pause again to note some morals about what started out looking like highly general or pragmatic phenomena. The more we look at it, the more it looks like grammar. We now see that even more clearly. Focus seems to be a part of syntax, and can have truth-conditional effects.

4.3. Theories of Focus

Focus has been extensively studied in many traditions, and there are several well-developed theories of focus. We will concentrate on one very influential approach: the *alternative semantics* of Rooth (1985, 1992). This has been taken up and developed by a number of authors, and is perhaps the dominant approach within formal semantics. One of

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[16] For overviews of these issues, see, (Beaver & Clark 2008), (Büring 2016a), or Kadmon (2001). I have not really touched on contemporary work relating accent to syntax, in the tradition of Jacobs (1983) and Rochemont (1986), and Truckenbrodt (1999). Again, see Büring (2016a) for extensive discussion, and many papers in Féry & Ishihara (2016).

the main competitors to this view is a structured meaning approach, developed by Krifka (1991, 1993) and Stechow (1991). See Kratzer (1991) for more discussion.

One way of thinking of Rooth's theory is that it takes the effect of contrast to be the basic feature of focus. To capture this, we want to associate with a focused element a range of contrasting options. In (6) the contrast is that Ede wants coffee as opposed to tea. In (1) the contrast is that Cicero spoke Greek as opposed to Latin, or Aramaic, or Gaulish, etc. To capture this, we associate with a sentence an extra semantic value, called its *alternative set* or *focus semantic value*. For notational purposes, we may indicate the semantic value of a sentence—the proposition it expresses or its truth conditions—by boldface. I shall use familiar logical notion, so we have:

(17) $\llbracket$Ede wants COFFEE$\rrbracket$ $= \mathbf{W(e, c)}$

We need a separate value for the sentence that reflects the alternatives. This will be a set of propositions, corresponding to *Ede wants coffee*, *Ede wants tea*, etc. So we need $\mathbf{W(e, c)}$, $\mathbf{W(e, t)}$, …. For compositional purposes, we let the range of alternatives be maximal. In this case any individual. In common notation any $x \in D_e$. So our alternative set, indicated by a superscript f for focus semantic value, is:

(18) $\llbracket$Ede wants COFFEE$\rrbracket^f = \{\mathbf{W(e, x)} \mid x \in D_e\}$

Note we are generalizing over the place of the focused constituent, in this case, *coffee*. The general form for a sentence $S(F)$ with focused constituent F is:

(19) $\llbracket S(F) \rrbracket^f = \{\mathbf{S}(x) \mid x \in D_F\}$ for appropriate type D_F.

Note that in many cases, context will restrict the range of alternatives. But for compositional purposes, we can leave them wide.

One of the central developments of Rooth (1985) is a compositional way to assign focus semantic values.[17] We can skip that for our purposes. In addition to Rooth's own work, good presentations include Beaver & Clark (2008) and Kadmon (2001).

The presence of an alternative set explains many aspects of focus. It explains the appearance of contrast. The alternative set simply is the set of contrasting elements. This is made all the more vivid when we remember that in most cases, we will expect a contextually restricted set of alternatives to be active in a given discourse. So, we expect a salient set of alternatives to be give for any focused constituent.

Alternatives also relate to question-answer congruence. Here is a highly simplified version of this insight. Following the tradition in intensional semantics, we may take the semantic value of a question to be the set of propositions that answer it.[18] Consider the question *Who does John like?* The semantic value of this will be the set $\{\mathbf{L}(\mathbf{j}, x) \mid x \in D_e\}$. (With appropriate restrictions on the range of x beyond D_e; perhaps animacy, and perhaps also contextual domain restriction.)

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[17] Rooth's work takes inspiration from Hamblin (1973). A somewhat different version of alternative semantics is given by Kratzer (1991).

[18] This is in the tradition of Hamblin (1973) and then Roberts (1996). There have been many developments since, notably Groenendijk & Stokhof (1984) and Karttunen (1977).

Congruence is now a match-up between a question semantic value and a focus semantic value. Observe we have:

(20)   a.   Who does John like? Semantic value $\{\mathbf{L}(\mathbf{j}, x) \mid x \in D_e\}$.

        b.   John likes SAM. Alternative set $\{\mathbf{L}(\mathbf{j}, x) \mid x \in D_e\}$.

The two values are identical, and we have congruence. But consider:

(21)   a.   Who does John like? Semantic value $\{\mathbf{L}(\mathbf{j}, x) \mid x \in D_e\}$.

        b.   JOHN likes Sam. Alternative set $\{\mathbf{L}(x, \mathbf{s}) \mid x \in D_e\}$.

These are not matching, and we lack congruence.

There are some delicate issues about just what the congruence condition should be. The observations we just made suggests identity, which is in the spirit of Roberts (1996). But perhaps that condition is too strong. Another option is that the focus semantic value contain the question semantic value. (If we have selectional restrictions like animacy, this is a natural condition.) Though working in a somewhat different framework, Rooth (1992) suggests that the question value should be contained in the alternative semantic value, contain the ordinary semantic value of the sentence, and contain at least one other element.

One of the main applications of alternative semantics is association with focus. There are several options for how this might done. One is to follow the original theory of Rooth (1985) and write alternative sets directly into the semantic of expressions like *only*. *John only introduced Bill to SUE* is true if and only if John introduced Bill to Sue, and this is is the unique true proposition in the alternative set. A little more formally, we have:

(22) $[\![Only(S)]\!] = \forall p \in [\![S]\!]^f \ (true(p) \rightarrow p = [\![S]\!])$

This shows how an operator can associate with focus, and produce truth-conditional effects.

However, since work of Roberts (1996) and Rooth (1992), it has been observed that there is something unsatisfying about this approach. It hard-codes focus into the meanings of specific operators, but offers no generalizations about where and why association with focus is found.

I shall very briefly gesture towards one other option, from Rooth (1992) further developed by von Fintel (1994). The idea is that focus sets up a felicity condition much like we have already seen. But the relation need not be to an overt question. What focus needs is a salient set of alternatives in the discourse. Hence, focus is in some ways anaphoric. A phrase α is anaphoric on a set C, requiring, as above, that $C \subseteq [\![\alpha]\!]^f$ and $[\![\alpha]\!] \in C$ and one other value is in C. Rooth writes this $\alpha \sim C$. You can think of $\sim$ as triggering an anaphoric presupposition.

Association with focus happens on this theory when an operator takes C as a covert domain restriction. We can see this, for instance, with *only*, which semantically functions like a quantifier. Where above we wrote the alternative semantic value into the sematics of *only*, we can use C instead:

(23) $[\![Only(S)]\!] = \forall p \in C \ (true(p) \rightarrow p = [\![S]\!])$

With the $\sim$ condition this makes *only* operate on the alternative set, as needed. In fact, as it operates on C, it operates on a contextually restricted set of alternatives. And, the uniform way that operators associate with focus is via $\alpha \sim C$.

There are other approaches. Roberts (1996) develops an approach based more directly on questions. The extended discussion of Beaver & Clark (2008) argues that different expressions associate with focus in different ways: some more like the pragmatic theories of Roberts and Rooth (1992), some more like the earlier semantic proposal of Rooth (1985).

4.4. The Tradition and Morals

Focus is a key part of information structure, and we have now seen one developed theory of how it works. As we mentioned, there are many others. But let us pause to ask where the traditional idea that focus is new information has wound up.

It is fair to say that the idea of new information has been replaced. First of all, there is some reason to worry about whether new entities really correspond to focus. Reinhart (1981) noted:

    (24)   a.   Who did Felix praise?

           b.   Felix praised HIMSELF.

We likewise have:

    (25)   a.   Who does Dick Cheney love?

           b.   Dick Cheney loves DICK CHENEY.

In these cases, we have focus but re-use an already given, and presumably not new, entity as a referent.

Alternative semantics can be seen as replacing the idea of new information with contrast and discourse regulation. Alternative sets create contrast. This can provide new referents, and often does, but it is more that the contrast set is evoked than that the referent of a focused constituent must be new. And, appropriate contrasts make for good answers to questions, and so the rules of discourse require them. Does this eliminate the idea that focus is new information? The point is debatable, but I suggest no. Rather, it shows that the idea of new information covered several different phenomena. Focus is typically new, but what is required is a combination of alternatives and congruence.

I should mention that other theories still put more emphasis on givenness. I shall briefly mentioned the work of Schwarzschild (1999), which makes heavy use of an updated notion of givennness. At the very least, where accent is placed is closely connected to givenness. In more recent work, Rooth (2016) as noted that it can also be seen as offering a different analysis of when ~ is licensed. See Rochemont (2016) for more discussion.

Focus shows us a number of important morals about meaning and grammar. First, it shows us a particular form of context dependence. Focus triggers alternatives, and the domain of alternatives is highly dependent on context. But the mechanism that triggers this is not like an indexical or a quantifier domain. Overly, it is triggered by a pitch accent, and we assume that in the underlying grammar that means it is triggered by an F feature. Context dependence can how up in many places, and can have many triggers.

Focus also shows us how meaning can be both pragmatic in form but semantically coded. Focus indicates contrast, and that often takes on a merely pragmatic aspect, indicating alternatives but having truth conditional effects. We have seen from examples like (12) that this can be important to the understood message of an utterance. And we have seen that it is not simply general Gricean pragmatics or mind reading. There is a special indication of contrast. But association with focus tells us that this sort of meaning can have truth-conditional effects, when the right operators are in place. Generally, focus shows that language can encode quite subtle forms of meaning, that can both indicate contrast, trigger specific context dependence, and interact with truth conditions.

We also see that focus shows us that grammar can extend far past what we might have expected. We have already seen that intonation in English is highly conventionalized, but we also see evidence that it can realize a specific syntactic feature.

We should conclude that meaning and grammar are richer than we might expect, and even truth-conditional meaning can go beyond its most obvious and basic forms.

4.5. A Glance Cross-Linguistically

Many languages have focus. Not surprisingly, languages realize focus differently. Many use intonation, as English does, but many also use syntactic form, morphology, or other aspects

of phonology to encode focus. And we should be aware that different languages encode slightly different semantic properties in focus.[19]

I shall not try to survey the many languages and cross-linguistic differences that have been studied. Good starting places are the papers in É. Kiss (1995) or Féry & Ishihara (2016). But to illustrate how things can appear cross-linguistically, I shall mention one well-studied case: Hungarian (e.g. É. Kiss 1981, 1998; Szabolcsi 1981). Hungarian has a distinguished pre-verbal position for focus. For instance, É. Kiss (2016) compares:

(26)   a.   János   fel-hívta   Évát.

        John   up-called   Eve-ACC

        'John called up Eve.'

      b.   János ÉVÁT hívta fel.

        'It was Eve whom John called up.'

      c.   Évát JÁNOS hívta fel.

        'It was John who called up Eve.'

We start with the neutral (26a), but we see in (26b) that *Évát* can occupy a focus position, and in (26c) that *János* can. This position is usually described as immediately before the

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[19] This is not all that surprising. We see something similar with tense. Many languages contain past and present tenses, but cross-linguistically, they show somewhat different properties. See Sharvit (2003).

verb. So at the very least, distinct word order marks focus in Hungarian. Many theories propose that there is a syntactic Focus Phrase (e.g. Brody 1990; É. Kiss 1998, 2002). See Szendrői (2003, 2017) for an alternative view.

You will notice that elements in focus position are marked with capital letters. Focus in Hungarian typically goes with phonological prominence. É. Kiss (2016) glosses it as an H+L* pitch accent. But as she goes on to note, Hungarian is not a 'pitch accent language'; it is not as flexible for where intonational prominence falls as languages like English. It has been proposed that the prominence of focus in Hungarian is more a matter of the relations between stress and syntactic structure. See Mády (2015) and Szendrői (2017) for further discussion.

Perhaps most important for our concerns is the semantics of focus in Hungarian. You will notice that the English translations rendered focus positions with clefts, as with *It was John who called up Eve*. Intuitively, clefts seem to go with exhaustivity. Consider:

(27)   It was Sam and Alex who solved the problem.

This appears to indicate that among the salient individuals who could have solved the problem, it is Sam and Alex who did so, and only them. A leading idea about the semantics of focus in Hungarian is that it somehow provides an exhaustivity operator, which indicates what exhaustively satisfies a predicate (É. Kiss 1998; Horváth 2007; Szabolcsi 1981). Alternative approaches abound. See the more recent É. Kiss (2006) and Surány (2009) and

Wedgwood (2005) for alternative views that at the very least make exhaustivity not asserted.[20]

If we assume that the semantics of focus in Hungarian is that of an exhaustivity operator, it may look quite different from focus in English. It may pragmatically indicate an alternative set, if exhaustivity is understood as within a contextually given alternative set. As we have seen, any match-up between focus and new information is complicated at best. So, we might suspect that English and Hungarian focus are just two different phenomena. But there is substantial disagreement about this. Exhaustivity typically evokes alternatives, so that is not really a good test. It allows that Hungarian focus is merely stronger than English focus, in including exhaustivity. Perhaps the main issue is whether focus in Hungarian figures in question-answer congruence. This issue remains under dispute. É. Kiss says no (e.g. É. Kiss 2016), and offers examples to show that a non-focused constituent in Hungarian can be the main answer to a question (though it does have some phonological prominence). Such authors as Bende-Farkas (2006), Roberts (1998), and Szendrői (2003) argue that other factors explain the main differences away, such as exhaustivity and the optionality of focus in Hungarian.

The brief moral of our glance at Hungarian is that we can find focus in many languages, but they can show complex differences. They can be realized differently, and show different semantic properties. Such cross-linguistic comparisons are often difficult.

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[20] Though note that Horn (1981) argues that the exhaustiveness of clefts is merely an implicature.

We also see one more philosophical moral here. Our intuitions about what an expression means can be unreliable guides. We already saw that we could miss the semantic properties of focus if we were not careful. But when we see the range of cross-linguistic variation in focus (or focus-like phenomena) we see even more ways we can, as speakers, be uncertain just what our words and grammatical constructions encode.

5. Topics

We began with a natural idea that we can package the information in a sentence into what is new and what is old or given. We then turned to ask how that really shows up in our languages. And what we saw was complicated. English and many other languages have focus, which seems roughly to overlap with new information. But it turns out not to be exactly new information, and also turns out to show a number of other important properties. Indeed, that it often maps to new information may be a minor aspect of focus.

What about given or old information? Certainly some information is old, and established by any number of the criteria we reviewed in section 3. But how do we encode that in language? One leading idea is that what is old or established is what we are talking about, and we mark what we are talking about as opposed to what new information we are adding about it. Traditionally, the latter is focus, while the former is what we will loosely call *topic*.

You should be aware that topic is, to put it simply, a very messy subject. If focus already showed a range of theories and data, topic is way worse. There is relatively little agreement about what the basic phenomenon is, and what theories are promising. Even so, it is a

central and traditional aspect of information structure. So, in this section, I shall give a very brief, and sometimes telegraphic, overview of some important ideas about topic.

For a rough introduction, let us try to make use of some of the insights from our look at focus. In particular, we can make use of questions. Questions can set what intuitively what we are talking about, but also make referents salient in the sense of making them given:[21]

(28)   a.   Tell me about John. What did he do?

        b.   Well, John hit a HOME RUN.

Note that *John* seems to be answering to a set topic, given by the question, while *hit a home run* seems to be in focus, and offers what happened to that topic.

But especially for English, topic is a more complicated notion than focus (even given all the complexity we saw for focus!). Though naturally we can think of *John* as in a special topic position, it carries no obvious intonational marking, and seems just to be an ordinary subject of a sentence. And, we can manipulate what questions are appropriate in delicate ways. Try:

(29)   a.   What happened at the baseball game?

        b.   John hit a HOME RUN.

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[21] At the level of abstraction we are now working, it is hard to know who to credit, and ideas about questions and topics are implicit in a lot of work. But von Fintel (1994) and Kuppevelt (1995) are important sources, and Roberts (1996) sets the current framework.

Whether this is acceptable will likely depend on other factors. If the team is a persistent disappointment, and never hits home runs, and John is known to be a team member, then it sounds fine. But other assumptions may make it sound bad. This is in keeping with the idea that in some way we have given information, like that John is a team member, and new information, like that he hit a home run. But it gives us poor guidance about how the grammar is marking this. There is no obvious way that John the subject-matter of the question in this case, unlike in (28).

English does have a grammatically marked topic, but it is not quite the one we are asking for now. To anticipate what we will see below, and to fix ideas about English, consider again example (5), repeated here:

(30)   a.   What did the pop stars wear?

       b.   The FEMALE pop stars wore CAFTANS.

As we noted in section 2, here we have *caftans* in focus, and marked with an H* accent, while *the female pop stars* is marked with an L+H* accent, carrying a different content. In English, this accent marks something like topic or *aboutness*: the claim is about the female pop stars. But it does so in a 'contrastive' way. It contrasts the female pop stars with other pop stars, and so is not just answering the question asked, but refining it. We will return to this below in section 5.3, but for now we note that the clearerst case of topic in English is this complex form, known as *contrastive topic*.

With focus we were happy to look closely at English, and then see how it compared with other languages. In the case of topic, it turns out other languages show clearer topic

properties, and it will be useful to look at them before returning to English and contrastive topics.

5.1. The Syntax of Topic

It has become quite common to see distinct syntactic positions glossed as topic positions. In many languages, these positions play an important role in word order and other overt syntactic phenomena. I shall briefly discuss one case: yet again Hungarian. This barely touches upon the range of languages for which topic positions have been proposed, which also includes Gungbe (e.g. Aboh 2004), Italian (e.g. Cinque 1990; Rizzi 1997), Japanese (e.g. Watanabe 2003), Korean (e.g. Choe 1995), and Modern Greek (e.g. Tsimpli 1995), among many others. Yet, the cases of Hungarian is a good representatives of the highly developed views in the current literature, and it will lead naturally to a brief discussion of English.

The idea that there are distinguished syntactic positions for the information-structural elements of topic and focus has been an important idea in Hungarian linguistics. We have already seen that Hungarian has a pre-verbal focus position. It also has a distinguished pre-verbal topic position, more or less the beginning of the sentence, but more importantly, the sentence is partitioned into the topic and the 'comment', which predicates of the topic. Many analyses, such as É. Kiss (2002), analyze the topic position as part of a full topic

phrase (TopP).[22] One way or another, the topic is understood as what the sentence is *about* (hence its being called a topic).

There are a number of important features of the topic position, i.e. the specifier of TopP itself. Following É. Kiss (2002), we can observe that it requires an expression (often but not always a noun phrase) that is both referential and specific (i.e. the position carries features [+referential] and [+specific]). The referential requirement reflects the fact that for the most part, quantifiers cannot be topics. The specificity requirement reflects the fact that in some cases, indefinites can be topics, if they are given an appropriate specific reading.

É. Kiss (2002) glosses this as specificity in the sense of Enç (1991), which in turn is spelled out generally in terms of the novelty and familiarity conditions of Heim (1982). But the main idea is simple enough: specifics (including specific indefinites) pick out something or things that are already appropriately salient in the discourse, and so, something that is *familiar* in Heim's sense. But unlike definites, specifics need not function as if they were anaphoric on an already identified familiar discourse referent. It is sufficient for specificity that an identifiable familiar referent be available. Hence, specifics are subject to a somewhat modified form of familiarity. In this way, specificity is close to, but not the same as, definiteness.

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[22] Among many other references, see É. Kiss (1998, 2007), Puskás (2000), and Szabolcsi (1981, 1997); but see Surányi (2004) for a dissenting view. For a discussion of these issues in a different syntactic theory, see Steedman (1991).

There are a number of ways in which the requirements of referentiality and specificity need to be treated with care. In addition to issues of specific indefinites, generics can be topicalized when they are understood as referring to kinds. Contrastive topics allow a surprising range of topicalized elements, including some universal quantifiers. According to É. Kiss (2002) following Szabolcsi (1983), when they do so, they function to pick out a set or property, and so basically function as [+referential] and [+specific].

As I mentioned, many languages have syntactically marked topic positions. Some mark topic with morphology.[23] With English we started with intonational marking of information structure, but now we see that syntax can play an important role as well. Cross-linguistically, this seems to be important for topic marking. As we saw with focus, cross-linguistic comparisons can be delicate, but it is valuable to see how topics can be marked in various languages.

We now turn to English. Does English have a topic position? It is not obvious that it does, and many analyses suggest it does not. But even so, there is a widely discussed *topicalization* construction in English, such as:

    (31)   This book$_i$, you should give e_i to Paul.

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[23] A much-discussed example is the Japanese *wa*. See Kuno (1972) and Portner & Yabushita (1998).

The distribution of topicalization in English is somewhat uneven, and there is some variation among speakers as to whether this is acceptable. But this sort of construction is widely enough attested to be confident that it is allowed, in at least some forms.

The analysis of English topicalization has been a contentious issue. Even so, it can be brought in line with the analyses of Hungarian we have seen, as has been argued by Cinque (1990) and Rizzi (1997). Effectively updating Chomsky (1977), they propose that the fronted noun phrase occupies the specifier of TopP, as it does in Hungarian.[24]

English imposes semantic constraints on the constituents that occupy the topic position that are, again, strikingly reminiscent of those we saw in Hungarian. The rich data set of Birner & Ward (1998) suggests that topics in English require an element or set of elements they pick out to be identifiable in the discourse (with additional complications for contrastive topics). Indefinites can be topic when they meet this condition (Ward & Prince 1991). These conditions are in line with the [+referential] and [+specific] conditions we saw above, and at least roughly, it appears safe to assume that English shares with Hungarian and with Italian some strong constraints on the interpretation of topic phrases.[25]

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[24] A Very different approach which identifies a position that looks like a topic position can be found in Beghelli & Stowell (1997) and Szabolcsi (1997).

[25] Even so, we should be careful in supposing the constraints are exactly alike. English is very permissive in the constituents it allows to be preposed (Birner & Ward 1998), and it is

We have observed that some languages have a position for topic, which partitions the sentence into what the sentence is about, and what it says about it. Those positions carry some semantic restrictions, like being referential or specific. We can once again draw some immediately morals. Much as we saw with the intonational marking of focus, we see what languages can encode in grammar all sorts of information-structural notions. They can use a variety of means to do so.

But once we identify positions in sentences that can count as topics, we should also ask if they have any semantic properties. With focus, we found that they do.

5.2. The Semantics and Pragmatics of Topics

Some languages display structurally visible topic positions. Perhaps English does, but that is less clear. When we do find topic positions, they intuitively seem to tell us what the sentence is about. This can go with partitioning into a topic and a comment, where the topic what the sentence is about. It also seems to place some restrictions on what sorts of terms can occupy topic positions. But we still would like to understand better how topic positions function semantically and pragmatically.

As with focus, there are two leading ideas. Analyses based on given versus new and based on questions are both available. With topic, it is much less well-established what the right analysis is.

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doubtful that every preposing is a TopP-like construction. Indeed, so-called 'Yiddish dialects' of English are extremely permissive in preposing in many ways (Prince 1981b).

With topic, it is very natural to start with the idea that a topic constituent must pick out something given. In many cases it does, and the restrictions we saw on what can occupy topic positions might go with givenness. And the idea that what we are talking about should be in some sense given seems natural.

However, it is not clear if this can work as an analysis. It appears the match between topics and given is rough. At the very least, topic expressions can pick out entities that are merely inferable, and not given by any more demanding standards. É. Kiss (2016) gives clear examples of this for Hungarian. For English, see the extensive discussion of Birner & Ward (1998). Also, simply insisting that a referent be given does not distinguish aboutness. Many things can be given, and they are not always what we are talking about.

A number of recent theories try to build on the idea of aboutness, in ways that also capture the initial idea that topics should be given. Most of these theories rely on some some kind of structured representation of the content of a sentence, which singles out some element as what the sentence is 'about'. This is naturally captured in the apparatus of dynamic semantics, as a distinguished index to a file in the sense of Heim (1982) or a DRS in the sense of Kamp (1984). Such approaches are pursed by a number of authors. Notably Vallduví (1990) uses a DRT-like structure to capture what he views as a distinguished level of information structure (making the representational properties of DRT essential), while Portner & Yabushita (1998) and Reinhart (1981) pursue non-representational approaches

more akin to file change semantics.[26] For our purposes, the details of these theories will not matter. All we need is to suppose that semantically, topic distinguishes an individual (or other element), which is the thing the sentence is about. These frameworks also allow for encoding various requirements on the status of the referent. They can be familiar in the sense of Heim (1982), or specific in the sense of Enç (1991).

As we noted above, the other leading idea about the semantics of topics, is that it relates questions and answers. We have already seen that questions and answers are important for focus. They also relate to topic. The idea is that sentences are uttered in the presence of a discourse topic. Rather than thinking of a discourse topic as a thing, think of it as like a question, that sets what we are talking about. The discourse topic may be set implicitly or explicitly, and when set explicitly, it is set by asking a question. Following Roberts (1996), we may call this the question under discussion (QUD). The sentence is supposed to be *about* the QUD, acting as a discourse topic, and so the topic of the sentence must in the right way be congruent to, or match, the discourse topic.

This captures a clear notion of aboutness, and it also captures a specific sense in which topics can be said to be old information, as they must relate to an already established discourse topic. Hence, we do not need to see this idea as conflicting with the motivations of either the aboutness or old information approaches. But, it allows for an elegant formal

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[26] See McNally (1998) for some discussion. The idea of 'aboutness' as a characteristic of topic is quite common, though it is often put in more pragmatic terms, as a relation between a speaker and the thing they are talking about (cf. Gundel 1985; Strawson 1964).

model of the semantics of topic, and relates closely to work on the semantics of focus. Topic, especially looking cross-linguistically, is a complicated matter, so I would hardly be surprised if aspects of all these approaches are needed before a theory is completed. But still, to my mind, the question approach holds a lot of promise.

Here is a simple sketch of this approach. Consider a topicalization again:

(32)   a.   i.   What should I do with this book?

              ii.   This book, you should give to Paul.

        b.   i.   What should I do with this pen?

              ii.   #This book, you should give to Pau.

Here the overt question sets up the QUD. As we saw with focus, semantically, a question is interpreted as a set of answers (Groenendijk & Stokhof 1984; Hamblin 1973). Topic marking seems to set up a distinct congruence condition, that requires the semantic value of the sentence to be in the QUD. Of course, there is more to the story than this, but answering a question is one of the things that topic marking can do.[27]

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[27] A real theory in this vein is given by von Fintel (1994), though using the framework of Rooth (1992) rather than the QUD framework. Related ideas about QUD are found in Büring (1999), van Kuppevelt (1995), and of course, Roberts (1996). The most developed theory I know is from Büring (2003), which we will discuss later.

We have now seen some ideas about what the semantics of topic might be. I do not think there is yet a full consensus on what the right semantics is, and it may be that ideas from several of the approaches we just reviewed could combine to build a refined analysis. But, we have seen enough to see what the semantics of topic may be like.

One area that is still under investigation is how to see the division of labor between semantics and pragmatics for topic. On the one hand, we might see the partition into topic and comment as mostly triggering a pragmatic effect, where we infer that there is something pragmatically distinguished about the topic. The two theories we just reviewed put much more emphasis on semantics. The aboutness theories make the topical element distinguished in some form of semantic representation. The question theories place a great deal of emphasis on the semantics of questions and answers, though for English topic marking, just what further semantic properties are needed remains under investigation.

5.3. Contrastive Topics

As we already have seen, the nearest cousin to intonationally marked focus when it comes to topic in English is contrastive topic. This is marked by an L+H* accent, and has a range of interesting properties. Contrastive topic has a richly explored semantics.

It is typically assumed that as with focus, there is an underlying syntactic feature for contrastive topic that is realized by intonation (Büring 1999, 2003, 2016b). Contrastive topic shows a more complicated pattern for question-answer congruence. Contrastive topic is called topic, as it signals aboutness. But as its name suggests, it also signals a kind of contrast. This is made vivid in the question-answer congruence of the original example from Büring (1999), repeated from (5) yet again:

(33)   a.   What did the pop stars wear?

      b.   The FEMALE pop stars wore CAFTANS.

The topic the sentence is about refines the one set by the QUD.

One way to approach the semantics of contrastive topics, following Büring (2003) who builds on Roberts (1996), is to make use of sub-questions. Rather than thinking of simply one QUD, we want to think of a question as bringing with it sub-questions, and answering sub-questions can be a way to answer the main question. Thus, Büring puts it, we have strategies for answering questions. A contrastive topic selects a sub-question within a strategy. It thus indicates a strategy around the current question under discussion, and answers one of the sub-questions in the strategy.

Contrastive topic appears widely cross-linguistically. As in English, Hungarian contrastive topics, bearing what appears to be the same accent, can occur in TopP positions (Molnár 1998). In Hungarian, quantifiers appear easier to topicalize with contrastive topic marking. Contrastive topic is a rich subject, about which there is much more to say. See the overview of Büring (2016b) for more discussion.

6. Final Morals

We have now seen a few of the important elements of information structure. We have looked at how it can be marked via intonation, or via syntax. We have seen how it relates to traditional ideas like given and new information. We have also seen some specifics of topic

and focus (if in very abbreviated form). There we have seen a range of specific grammatical features, and specific semantics.

On thing this brief overview shows, as I mentioned at the outset, is that information structure is a rich and complex part of the study of language. It runs from phonology to syntax to semantics, and it can be cross-linguistically complex. It is just complicated.

But we have seen more. One thing we have seen is that a lot can be encoded in grammar, including things we might not expect. We started with the idea that phonological prominence was just a kind of highlighting, maybe starting a Gricean process. We have seen that in many cases, it is highly conventional, fully grammatical, and carries very specific semantic information.

But we have also seen that our languages can encode things in specific ways, that do not always fit our initial intuitions. I take it that even if it is theoretically complicated, we have an intuitive grip on given versus new information. We also have an intuitive grip on such notions as aboutness and contrast. But our languages code these up in highly specific ways, that do not always exactly track our intuitive ideas. Focus turns out to encode contrast, but in a very specific way that invokes alternatives. Just how our languages encode aboutness remains unclear. Maybe in terms of distinguished entities. Maybe in terms of questions.

We also see that language contains a number of discourse-regulating elements. Both topic and focus seem to encode aspects of how discourse progresses. Focus does so in a highly specific way, relating to congruence. Contrastive topic also does so in a different, also highly specific way. We also see constraints from discourse on where accents can be placed.

We see a variety of meanings encoded in language. Focus might have seemed to indicate only a pragmatic notion of contrast, but turns out to have truth-conditional effects. Just how to analyze aboutness remains an open question.

We also see, especially with focus, an interesting variety of context dependence. We find that context needs to restrict alternatives, perhaps by providing C. But how this relates to meaning is, again, highly specific, perhaps in terms of the $\sim$ operator.

Information structure shows us many important features of language related to what sorts of meanings our languages express, and how they do so. I think philosophers will benefit from the richness it provides.

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