Gender at the Edge

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This article develops an analysis of Gender whereby D-gender enters grammar as a feature variable (edge linker), without a fixed value, either probing n or scanning the context for a value. Only the latter strategy is available in pronominal gender languages such as English, as they lack n-gender, whereas both strategies are applicable in n-gender languages, variably so for variable DPs, depending on their nP content and on context. The article adopts the idea that context linking does not merely involve pragmatic context scanning but also has a syntactic side to it, edge computation, whereby context-scanned and recycled features are computed at the phase edge in relation to CP-internal elements, via edge linkers. The context-linking approach has been previously launched for Tense and Person. This article extends it to Gender, thereby generalizing over context-sensitive grammatical categories and developing a novel view of the overall architecture of grammar.

Keywords: context linking, edge computation, edge linkers, D-gender, Gender, feature recycling, Icelandic, n-gender, pronominal gender languages

1 Introduction

The prevailing view in generative syntax, adopted in Chomsky 1995 and much related work, is that ϕ-features are part of presyntactic lexical items, treated as units in syntax ("a unit, the set of ϕ-features"; Chomsky 2000:121). The opposite view is that individual features are distinct objects. Under such an approach, ϕ-feature bundles are not provided by a presyntactic lexicon, instead being computed in syntax and subsequently bundled up and externalized as units in the externalization component (morphology/PF). I adopt this alternative view here. More generally, like many other researchers, I adopt a Minimalist atomic view of grammatical features.

On this atomic view, the category of Gender is underlyingly distinct from Person, Number, and Case, even though it is commonly expressed in tandem with these categories, within a single lexical item, such as English M.SG.3P.NOM *he* or Icelandic M.PL.3P.NOM *stólar*, M.PL.3P.DAT *stólum* 'chairs', and so on.[1] The lexical externalization of feature bundles is a murky issue that I will not address here. However, being "the most puzzling of the grammatical categories" according to Corbett (1991:1), Gender poses further puzzles. One is that Gender is sometimes semantic (interpretable in the sense of Chomsky 1995), as in *he*, sometimes formal, as in Icelandic *stólar*, *stólum.* A second one, closely related to the semantic/formal puzzle, is that Gender is sometimes

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[1] I refer to the general category of Gender with a capital *G*, otherwise using a lowercase *g*.

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independent of the CP-external context, as in *stólar*, *stólum*, but sometimes dependent on the CP-external context, as in *he*, where the pronoun somehow relates to the linguistic or pragmatic context (*John$_i$ is nice. He$_i$ . . .*).[2] A third puzzle is that Gender is a category both of nouns and of DPs more generally, including pronouns.[3]

These are the problems I aim at explicating. An initial caveat is relevant here: I will not discuss numerous other issues that concern Gender in one way or another, including typological aspects of Gender (Corbett 1991) (with one exception in section 4), the semantics and markedness of individual ϕ-values (Sauerland 2008, Spathas 2010, Percus 2011), and Corbett's (1979) famous Agreement Hierarchy (for a recent study of the latter, see Wurmbrand 2017).[4] Most importantly, even though the article addresses the relation *between* n-gender and D-gender, it is not *about* n-gender as such. That is, it is not about the correlation between noun roots and n-gender in individual languages, sometimes predictable, sometimes not (idiosyncratic or idiomatic), nor is it about lexical aspects of n-gender (apart from "natural" gender). I simply adopt the widely held view that n-gender is located in n (alternatively in the n-edge, if it contains more than just n-gender). See the discussion in, for example, Josefsson 1998, Kramer 2014, 2015, 2016, Kučerová 2018.[5] Detailed discussions of ϕ-features other than Gender and of DP structure also fall outside the scope and ambitions of this article.

This article is primarily about the syntax of Gender, in particular, the above-mentioned three problems: the context/noncontext split, the semantic/formal split, and the D/n-gender split. As it turns out, these problems are all related. They all concern relations across domains, and that is what I will largely restrict my discussion to. In pursuing these issues, I adopt the view that there are both high and low Gender locations within the (full) DP. I refer to these locations as D and n and argue that D-gender and n-gender must be distinguished, despite commonly being "in agreement." This is not a new idea; I share it with many others (see, e.g., Steriopolo and Wiltschko 2010, Matushansky 2013, Pesetsky 2013, Landau 2016b, Kučerová 2018). The novel-

[2] The noncontext/context and formal/semantic splits commonly overlap, formal gender thus normally being insensitive to context. However, there are cases where formal gender is contextually active. See section 4.

[3] This third issue might seem to be unproblematic if the gender of a DP is simply in agreement with its noun gender. However, that does not extend to pronouns, which do not have any internal noun gender. Elaborating on Postal 1966, Elbourne (2005) and Collins and Postal (2012) argue that pronominal DPs contain a silent nP complement of D: *Mary$_i$ is nice. [She [~~Mary~~]]$_i$* . . . (which would automatically yield the gender of the pronominal D if a name like *Mary* is inherently feminine; see also the conceptually related approach in Kayne 2002). I adopt the more traditional view that pronominal gender is context-dependent, arguing for that position in sections 3–5.

[4] The Agreement Hierarchy is a catchy descriptive tendency generalization, saying, roughly, that agreement between two elements is the more likely the structurally closer to each other they are (which is entirely compatible with much generative work on agreement and with the present approach). In his pioneering work on Gender and agreement, Corbett (e.g., 1979, 1991, 2006) has presented voluminous data from numerous languages that bear on the generalization.

[5] Even under this common assumption, n-gender may be conceived of as either presyntactic, syntactic, or postsyntactic. I assume that it is both syntactic and a postsyntactic morphology/PF category, but not presyntactic. Kučerová (2018) adopts the view that n-gender is presyntactically lexical, developing a detailed analysis of Italian n-gender. The processes she describes are in my view partly syntactic, partly postsyntactic (PF-lexical), as suggested by the fact that different processes would have to be assumed for other gender languages, including Icelandic. However, as I am not concerned with lexical aspects of Gender (apart from natural gender), I abstain from discussing this in more detail. These different views on how noun roots combine with n-gender have no bearing on my analysis of the relation between n- and D-gender, or on my understanding of D- and DP-gender.

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ties here are the claims (a) that D-gender is a reflex of an edge linker, (b) that D-gender is commonly assigned under pragmatic context scanning, yielding recycling of contextual gender, and (c) that the recycled gender values are computed at the D-edge in relation to CP-internal categories, including case.

The context/noncontext split is the least understood of the three splits. It has been widely discussed in the typological literature (in Corbett 1991 and many other works), but it has received limited attention in Minimalist approaches. Kučerová 2018 is an exception, presenting a serious discussion of the problem, arguing that transfer or spell-out to PF takes place either prior to transfer to the conceptual-intentional (C-I) interface (noncontextual gender) or after transfer (contextual gender). This interesting albeit unorthodox idea is not without problems. First, it raises a number of questions, not addressed by Kučerová: why there should be two distinct transfers (or spell-outs) to PF and only one to C-I, what the relation (and the division of labor) between the distinct PF transfer processes is, and what principles decide when each of the two applies. Second, as the C-I interface is the meeting place of extrasyntactic pragmatics and semantics provided by syntax, spell-out to PF after transfer to C-I would seem to suggest that pragmatics has free access to formal PF morphology.

Pragmatics has *some* access to syntax, hence also some access to postsyntactic formal morphology, but in the approach pursued here this access is strictly confined to context linking via phase edge linkers (see sections 2–5). The present approach thus enables us to retain the standard assumption (Chomsky 2001, 2008) that transfer to both the interfaces takes place at one and the same point in the derivation.[6] There is a converging aspect to Kučerová's and my approaches, though, in that I argue and present evidence that gender interpretation of the DP as a whole is delayed until the CP containing the DP meets its context, which means that transfer must have some (limited) sight of C-I (suggesting, in turn, that transfer to both C-I and PF is a later process than commonly assumed). However, as this applies to DPs *in general*, including even formally gendered DPs (see section 4), it contradicts Kučerová's central claim that formally gendered DPs are spelled out prior to (rather than parallel to) C-I transfer or C-I access.[7]

As a key to understanding the context/noncontext Gender split, I adopt the nonlexicalist *context-linking* approach developed in a series of earlier works (e.g., H. Á. Sigurðsson 2004, 2011a,b, 2014, 2016, 2017). In this approach, phase edges contain abstract edge linkers that serve to link the phase to its context, either to the silent speech act context or to the overt linguistic

[6] That the externalization component, from formal morphology to phonetics, is complex and layered is a distinct matter.

[7] Kučerová's (2018) perspective is rather narrowly Italian. She claims that vocalic suffixes in Italian, such as *-o*, are markers of both class and gender in some nouns, such as *il libro* 'the.M book', while being markers of class only in nouns like *il/la chirurgo* 'the.M/F surgeon'. Accordingly, she can analyze gender interpretation of the latter type as exclusively semantic. This may be correct for Italian (see section 3), but it does not extend to other gender languages. Compatible nouns in many other gender languages (Icelandic *læknir* 'doctor', etc.) are formally D/n-gendered, but their DPs as a whole may nevertheless receive semantic gender interpretation that contradicts their formal D/n-gender (as will be discussed in section 4). As we will see in sections 3 and 4, formal gender need not always project to DP, which offers a simple account of the fact that DP-gender interpretation may contradict formal D/n-gender (in case there is a semantic basis for such a split).

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context in discourse or a superordinate phase, under context scanning (including control). Two such linkers are the speech time feature, T_S, and the logophoric agent (speaker) feature, Λ_A, which normally link CP-internal Tense and Person to the coordinates of the speech act but may alternatively (in sequences of tenses and Person shift phenomena) link them to overt antecedents in the immediately preceding linguistic context. I adopt this approach here, aiming to develop it further. Invariably, I hypothesize, there is also a syntactic side to context linking, whereby context-scanned features are computed at the phase edge in relation to CP-internal elements. I refer to this phenomenon as *edge computation.* This linking-and-computation approach goes against the widely adopted assumption that syntax is autonomous and context-free: even though Merge as such is context-independent, the linking of one phase to another or to the wider context is not. That is, contra Chomsky (1957:17), we are *not* "forced to conclude that grammar is autonomous and independent of meaning," at least not if "meaning" includes contextual grammatical relations, such as the relations between event participants and speech act participants (commonly expressed by Person), between speech time and event time (commonly expressed by Tense), or between event participants and discourse participants (commonly expressed by Gender).[8]

In this article, I explore the nature of Gender under this nonlexicalist linking-and-computation perspective. The empirical issues bearing on the approach include above all the three aforementioned splits, but I also address a number of other empirical issues: pronominal gender in languages that lack noun gender, such as English; distant gender valuation across CP-boundaries; combined edge computation (resolution) of gender values under split antecedenthood; general delayed gender interpretation of DPs; and gender assignment to PRO. Some of these issues have been widely discussed in the typological literature, but none has been given a generally received account in Minimalist approaches. The last three (gender valuation under split antecedenthood, general delayed gender interpretation, and gender assignment to PRO) have not been highlighted elsewhere, as far as I am aware.[9] In addition to presenting previously unnoticed data on these issues (mainly from Icelandic), the most important contributions of the article, not found elsewhere, are as follows. First, it presents arguments that D-gender can be coherently understood as a reflex of an edge linker and that Gender thereby yields support to the context-linking approach. Second, it further develops and extends a theory of the intriguing phenomenon of edge computation.

Before I address the Gender issue, I offer preparatory comments on the more general lexical(ism) issue and edge computation, in section 2. Readers familiar with the edge-linking approach can go directly to section 3, which contains initial observations about the D/n-gender split and pronominal gender. Section 4 analyzes the relations among n-, D-, and DP-gender in n-gender languages. Section 5 discusses context linking and edge computation of Gender. Section 6 summarizes.

[8] However, I make no overall claims about the context-syntax interface(s). The linking-and-computation approach is minimalistic, aiming at furthering our understanding of *formal* feature relations across domains; see section 2. The arguments in favor of syntactic autonomy in Chomsky 1957 are in my view valid (see also Adger 2017); they just do not apply to feature relations across domains (i.e., the approach must be broadened by taking context linking into account).

[9] Apart from scattered observations in some of my own work. Gender resolution under coordinated antecedenthood has been widely discussed in the Gender literature (in Corbett 1991, 2006 and many other works), but I have not been able to detect any work that considers gender resolution (combined gender computation) under split antecedenthood. See section 5.

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2 Background: The Lexical Issue in Minimalism and Edge Computation

Words or lexical items are traditionally taken to be the building blocks operated on in syntax, even though it has been commonly assumed (as in Chomsky's work, 1957 onward) that syntax also operates with or on more abstract elements, such as C, T (I, Aux), v, n, and Case. Chomsky (2007:6) thus suggests, "In addition to Merge . . . , U[niversal] G[rammar] must at least provide atomic elements, lexical items, each a structured array of properties (*features*) to which Merge and other operations apply to form expressions." Referring to a structured array of properties as atomic is a contradiction if taken literally, but if this is understood as "atomic to syntax," the paradox might disappear. On this more generous interpretation, however, a thorny issue arises: the *composition problem.* If syntax operates with complex items, with a structured array of properties, then there must be some presyntactic item factory where such items are composed out of more atomic elements (Pustejovsky 1995 and related work; also, de facto, Chomsky 1995). However, while there must be a postsyntactic item factory (see shortly), a presyntactic generative lexicon is incompatible with the basic tenets of the Minimalist Program. There is nothing minimalistic about assuming both a presyntactic generative lexicon and generative syntax, and even if we were to adopt such an approach, there is nothing minimalistic about assuming a presyntactic generative lexicon per se, comprising, say, 40,000 items, most of which are composite, containing elements such as roots, categorial markers (v, n, p, . . .), and even categories that express relations, such as Case, Person, and Tense (as in *I*, *us*, *talked*). A generative lexicon + generative syntax approach is much too unconstrained and powerful, hence nonexplanatory.

The lexicalist approach yields severe complications. To give one simple example: Regular Icelandic adjectives have 144 different feature combinations (of case, number, gender, definiteness, degree; see Pfaff 2015), expressed by 30 distinct forms. Assuming a full-fledged inflected presyntactic lexicon, as in Chomsky 1995, suggests feature access in syntax and 144 different syntactic computations (both inescapable on any account), *plus* 144 different lexical formations (yielding "only" 30 forms), *plus* 144 or 30 different lexical searches (depending on how the mechanism works), *plus* feature access in a presyntactic lexicon (raising nontrivial questions about the division of labor between syntax and the putative presyntactic lexicon).

Internalization of already established externalized expressions (the second factor in the sense of Chomsky 2005) is obviously part of language acquisition in communities with full-fledged externalized languages, but it can hardly have played any part in the emergence of language. At its initial historical state (say, 100,000 years ago), the faculty of language or Universal Grammar (UG) cannot plausibly have had access to thousands of complex "lexical items, each a structured array of properties (*features*)"—at least not if the emergence of language was due to a sudden and minimal biological change in our species, "involving some slight rewiring of the brain" (Berwick and Chomsky 2011:27). Chomsky has expressed more abstract views on the lexical issue (see, e.g., 2001:10, 2008:139), but these alternative formulations do not resolve or escape the composition problem. Tensed verb forms, pronouns, cased nouns and adjectives, and so on, *are* composite elements, and they must be composed somewhere.

On a biological view of the language faculty (as in Berwick and Chomsky 2011, 2016), the natural assumption is that UG is not only computationally minimal but also item-minimal. If so,

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UG provides the general premises for item building rather than the items themselves. Pursuing an approach along these lines, I have suggested (in H. Á. Sigurðsson 2011b) that the only building elements provided by UG are two empty cells—*Root Zero* and the initial edge feature, *Feature Zero*—propagated by fission and filled with content from the *Concept Mine*, a conceptual capacity that is not specifically linguistic but is accessible to syntax, feeding it with raw material for item and structure building. According to this Zero Hypothesis, all item formation in I-language takes place in syntax, Root Zero and Feature Zero being the parents of all I-language items and structures, and complex items and structures being formed by Agree and iterated Merge (internal and external) of content-filled roots and features.[10]

This applies to I-language. Individual externalized languages have large storages or lexicons of complex signs or expressions, auditory, visual, or tactile, created in the externalization compartment of language. Thus, full-fledged languages contain two distinct factories: the minimalistic syntactic machinery, building I-language items and structures, and a nonminimalistic postsyntactic externalization machinery, building externalized expressions, such as English *grandmother* or Icelandic Sign Language *two-fingers-across-forehead* (roughly), also meaning 'grandmother' (*one-finger-across-forehead* meaning 'mother'). Within generative syntax, this externalization compartment is traditionally referred to as PF—which, given the existence of visual and tactile sign languages, should stand for *Perceptible Form* (alternatively, *Produced Form*). Intriguing questions arise about the structure of the PF lexicon in individual languages and its relation to I-language syntax, but I must set these issues aside here.[11] Let me just say that it is obvious that the role of the PF lexicon in communication expands dramatically as the individual matures (in a linguistically communicating society), but it should be equally obvious, at least to the linguist, that there is no general one-to-one correlation between the items and structures of I-language and PF expressions.[12] This is most straightforwardly evidenced by various kinds of systematic, meaningful silence or "dark matter" in externalized languages: full clause silence in *yes* and *no* answers (Holmberg 2016), null arguments, gapping, VP-ellipsis, sluicing, and so on.

One example, relevant for our purposes, is the extensive "darkness" or silence of C and other phase edges. So-called phase "heads," such as C, v, and D, are arguably not discrete elements

[10] Merge is a prerequisite for structure building, but it is not obvious or evident that it is language-specific (Katz and Pesetsky 2011), nor is it obvious that the emergence of language only involved Merge. Plausibly, access of syntax to the Concept Mine was a crucial step (see also Reinhart 2006, 2016, Reuland 2017; my criticism of lexicalism does not bear on the "conceptual lexicalism" in these works). There are nontrivial constraints on the syntax-concept relation, as evidenced by the fact that only a limited set of central conceptual categories enter formal grammars (numerosity and time in contrast to color or brightness, for example). I must set this aside here, but for relevant discussion, see Cinque 2013 and Adger 2017.

[11] Notice, for example, that late language learning (including second language learning and learning of scholarly fields) involves a large amount of word and concept internalization, raising the question of whether internalized concepts are analyzed in terms of innate concepts and whether innate and internalized concepts are stored side by side or separately. Plausibly, internalized concepts must be compatible with or licensed by the innate Concept Mine. These and related questions are far beyond the scope of the present study.

[12] Contra the Frege/Montague tradition in philosophy. As Berwick and Chomsky (2011:40) state, "Communication is a more-or-less affair, in which the speaker produces external events and hearers seek to match them as best they can to their own internal resources."

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but edge domains, containing an "array of functional categories" (Chomsky 2001:43n8) that are each below the level of materialization. If so, edge categories start out atomic and distributed and get wrapped up in the derivation (perhaps as part of labeling; see Kučerová 2018).

Consider regular English main vs. subordinate clauses, as in (1).

(1) a. $[_{CP}$ ___ $[_{TP}$ Mary smiled]]. C contains Ø
b. $[_{CP}$ *Did* $[_{TP}$ Mary smile]]? C contains *did*
c. $[_{CP}$ (*that*/*if* . . .) $[_{TP}$ Mary smiled]]. C contains *that*/*if* . . . or Ø

Obviously, C is not Ø, *did*, *that*, *if*, and so on. Rather, C is a domain of largely silent categories that are either not materialized at all or jointly materialized, meagerly and differently so in different contexts. *C* is just a label or a name for the *edge domain of CP*, useful as such. PF building blocks (auditory, visual, or tactile) are quite distinct and much farther removed from syntactic atoms than commonly assumed in linguistic theorizing (including Distributed Morphology approaches). If I-language syntax is a (or even *the*) language of thought (as in Berwick and Chomsky 2011 and much related work), then it is not surprising that some of its structures ("thoughts") are barely spelled out or remain silent in PF.

Another thorny background issue must be addressed here, albeit only briefly; call it the *materialization problem*. If phase edge categories are "quarks," each below the level of materialization, then there is no way of studying their interrelations or the putative internal structure of phase edges by merely looking at phase edges and their in-situ PF exponents (such as Ø and *that* in (1)).[13] Trying to explicate the internal properties of phase edges is thus like studying chemistry without a microscope. The best we can do at the present state of knowledge and understanding is discover indirect evidence that phase edges do contain silent elements by studying visible effects of these elements at a distance (somewhat similarly, although there is no way of measuring gravity directly, the bending of light provides indirect evidence for gravity and general relativity). Here, I will briefly review some indirect evidence for the syntactic activity of the speech time feature, T_S, and the logophoric agent (speaker) feature, Λ_A (for much more detailed discussion, see my previous work, including H. Á. Sigurðsson 2014, 2016).

T_S is normally valued as identical to (simultaneous with) the speaker NOW under context scanning, as sketched in (2). I refer to context scanning as *control* here (control being a subcase of context scanning).

(2) NOW $[_{CP} \ldots T_S \ldots]$
↑ identical ↑ Control (yielding identity)

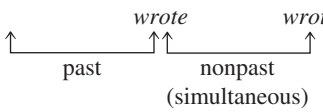
Clause-internal event time and reference time (in the sense of Reichenbach 1947), here denoted as T_E and T_R, are in turn computed in relation to the T_S value, as past, nonpast (in effect, simultane-

[13] It is a nontrivial challenge to define the cutoff point of materialization under the present approach, as under any other. A related intriguing issue is "how far" internal language can develop without externalization (consider the example of Helen Keller; for discussion, see Tallerman 2014 and the references there).

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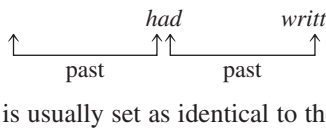
ous or future in languages like English), and so on. Obviously, I cannot go deep into tense logic here (but see, e.g., Hornstein 1990, Giorgi and Pianesi 1997), so I only illustrate this in (3) for the simple past tense, where $T_E = T_R$ (as in, e.g., *Mary wrote the letter*), and in (4) for the *past-in-the-past* reading of a past perfect clause (as in, e.g., *Mary had written the letter*).

(3) $[_{CP} \ldots T_S \ldots [_{TP} \ldots T_R \ldots [_{vP} \ldots T_E \ldots]]]$ Simple past: $T_S > T_R = T_E$



Agree (yielding valuation)

(4) $[_{CP} \ldots T_S \ldots [_{TP} \ldots T_R \ldots [_{vP} \ldots T_E \ldots]]]$ Past-in-the-past: $T_S > T_R > T_E$



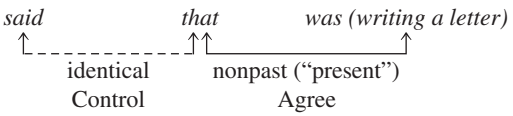
Agree (yielding valuation)

Much as T_S is usually set as identical to the speaker NOW, the logophoric agent feature, Λ_A, is set as identical to the actual SPEAKER by default. Being defaults, these settings are nonsyntactic, but the values of T_S and Λ_A become syntactically active CP-internally, as evidenced by overt tense and person markings. In certain cases, also, T_S and Λ_A themselves are syntactically controlled. This is what happens in *sequences of tenses* (SOT) and in *Person shift* (a subcase of indexical shift; see, e.g., Anand 2006).

Consider this first for SOT. Subordinate clauses have a secondary, embedded T_S (the perspective time in Kiparsky 2002) that may be set either as identical to the speaker NOW (via the matrix T_S), by default, or as identical to the matrix clause event time, T_{E1}, the latter being the case in SOT clauses, as in (5).[14]

(5) a. (When I called her) Mary_i said that she_i was writing a letter.

b. $[_{CP} \ldots T_{E1} \ldots \quad [_{CP} \ldots T_{S2} \ldots \qquad T_{E2} \ldots]]$



Notice that past tense forms in SOT, such as *was* in (5), are uninterpreted at the semantic or the C-I interface, arguably being assigned morphology in PF (i.e., after transfer); hence, they are invisible at C-I, as suggested by the fact that languages such as Russian and Japanese have the same SOT semantics as English in examples comparable to (5) without concomitant overt Tense agreement: *(When I called her) Mary said that she* is *writing a letter* (see, e.g., Comrie 1986, Ogihara 1996). What is Tense interpreted at C-I in (5), as in the corresponding Russian and Japanese structures, is the syntactic relations between T_{E1}, T_{S2}, and T_{E2}, and not the overtly tensed form *was.*[15]

[14] The subordinate reference time (T_{R2}) is simultaneous with the subordinate event time (T_{E2}) in (5), thus not indicated.

[15] The morphological PAST being passed down the Tense chain under uninterpreted top-down PF agreement. There is abundant evidence that uninterpretable PF agreement, as opposed to abstract Agree, applies postsyntactically in a top-down fashion, but discussing this here would take us too far afield. For some observations, though, see section 4.

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Much like T_S, the logophoric agent feature, Λ_A, may be set under matrix control (instead of receiving the default speaker value). This is what happens in Person shift contexts, as in the English (6).

(6) **He$_i$**'s like **I$_i$** don't care.

Under the edge linker approach, the Person shift in (6) receives the control analysis in (7).

(7) $[_{CP} \ldots$ **he$_i$** $\ldots [_{CP} \ldots \{\mathbf{\Lambda_A}\}_i \ldots [_{TP} \ldots$ **I$_i$** $\ldots$

identical Control — $DP_{+\Lambda_A}$ Agree

That is, it is the Λ_A linker that is shifted (the pronoun itself receiving the same local $+\Lambda_A$ reading as elsewhere). Person shift thus parallels the Tense shift seen in SOT: in both phenomena, an edge linker is shifted under local control.[16]

Both Tense shift (SOT) and Person shift are subject to minimality. As for Person shift, compare (8) with (7) (potential reference to the speaker "Mary" does not involve a shift and is thus irrelevant here).

(8) ["Mary"$_j$ speaking:] And he$_i$'s like **she$_k$**'s like **I$_{k/*i}$** don't care.

While the shifted pronoun refers to the matrix subject (*he*) in (7), it cannot do so across the intervening subject *she* in (8), due to minimality.

The same limitation applies to SOT, as illustrated in (9); here, the indexing indicates Tense identity (simultaneousness).

(9) a. Mary **said$_i$** that she **was$_i$** writing a letter.
b. At dinner Bill claimed$_i$ that Mary **said$_k$** at breakfast that she **was$_{k/*i}$** writing a letter.

Much as the first person pronoun cannot refer to the matrix subject in (8), the time of Mary's writing in (9b) cannot be distinct from the time of her saying (under an SOT reading) and instead the same as some different event time, such as that of Bill's claim at dinner. This locality is what is expected on a syntactic approach to Person and Tense computation, while it would be mysterious on a global semantic account. The computation of both Person and Tense is evidently subject to minimality and immune to pragmatics.[17]

[16] This is only a very brief sketch, not doing justice to the complexities involved in Person valuation, as a reviewer rightly remarks. Issues that I cannot discuss here include *de se* vs. *de re* readings (e.g., Chierchia 1989, Anand 2006), bound variable readings of pronouns, including fake indexicals (Rullmann 2004, Kratzer 2009), and the interaction of number and inclusiveness with Person. For discussions of these and related problems, see H. Á. Sigurðsson 2014, 2017. The purpose of this section is to only briefly outline the general gist of my context-linking approach, so as to be able to extend it to Gender.

[17] But, obviously, it is open to pragmatic input under context scanning via the edge linkers, a phenomenon distinct from and independent of the computational mechanism itself. Even double-access Tense readings are accommodated (H. Á. Sigurðsson 2016), but I refrain from discussing this here.

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As seen in the examples above, CP-internal Person and Tense are assigned values that are computed at a phase edge, via an edge linker. I hypothesize that edge computation is a general property of phase edges and adopt the informal approach in (10).

(10) *Edge computation*
For any phase edge, P_E, it holds that
a. P_E has syntactically active edge linkers;
b. P_E recycles features (properties) from the phase context, either the overt linguistic context or the silent speech act context, via the edge linkers;
c. the recycled features are computed at P_E in relation to an element or elements in the inner phase.

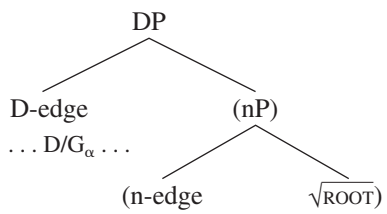
This raises intriguing questions: namely, what contextual features are involved, how they are "received" in the phase edge (i.e., by which edge linkers), how they are computed in relation to the inner phase, and what elements in the inner phase are involved. I do not pretend that I have answers to all these questions; this is largely unexplored territory. Let me just contend that we need to step cautiously here, so as not to open Pandora's box. I assume that edge computation is limited to *formal* feature relations across phases, and that the set of edge linkers is accordingly limited to elements that enter formal feature computations. By "virtual conceptual necessity," this includes the coordinates of the speech event (the *origo* in Bühler 1934), minimally a speaker feature, a hearer feature, and the time and location of speech. Definiteness and topicality are presumably also computed via edge linkers, although I will not explore that here. What I will do in the rest of this article is present arguments and evidence that D-gender is a reflex of a D-edge linker, D/G_α, and illustrate how edge computation works for Gender. This is only a small step on a long journey toward further understanding of formal context linking and edge computation, but, without access to a "microscope," it will have to do for the present.

Let us now leave this general background and return to the category of Gender.

3 The D-Gender/n-Gender Split and the Gender of Pronouns: Initial Observations

Most gender languages have n-gender (see Corbett 1991). However, some languages, including Afrikaans, Defaka, English, and Zande (Audring 2008), have pronominal gender but no n-gender. That is, they have D-gender in the D-edge of the pronominal DP phase, without any gender support from the lower nP-domain.

(11)



Following Audring (2008) and others, I refer to languages with exclusively pronominal gender, such as English, as *pronominal gender languages.* Regardless of whether we assume that pronomi-

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nal DPs contain a silent nP complement of D or not (see footnote 3), the gender of pronouns in such languages is not provided by n or the n-edge. Thus, these languages simply demonstrate the D/n-gender split; we need to distinguish between the two, as stated in section 1. Crucially, the D-gender linker enters grammar without a fixed value (as do T_S and Λ_A); as we will see, it can be assigned a value on the basis of either information external to the DP or information internal to it (the latter strategy being prominent in n-gender languages).

Some languages with n-gender actually also have cases of D-gender in noun DPs without any evident n-gender support. This applies for example to Italian noun DPs like *il*/*la musicista* 'the.M/F musician' and *il*/*la chirurgo* 'the.M/F surgeon'. There are two ways of analyzing such DPs: either they have two different but homophonous roots, each selecting its own n-gender, or they have a single root, not selecting any n-gender (see the discussion in, e.g., Percus 2011, Kramer 2014, 2015, 2016, Kučerová 2018). On the latter assumption, which I adopt here (see also Kučerová 2018), these DPs are like pronouns in having D-gender but no n-gender, their D-gender being semantically or pragmatically assigned, on the basis of the biological gender of the referent, without any n-gender aid.[18]

A somewhat different kind of evidence for the D/n-gender split comes from DP-internal gender schisms between the D-domain and the n-domain, showing that D-gender is accessible to context-bound semantic gender interpretation, albeit only in certain exceptional cases. One type involves a handful of examples like Icelandic *hans æruverðuga hátign* 'his.M honorable.F majesty.F', where the possessive genitive is masculine (referring to a male) while the noun meaning 'majesty' (*hátign* in Icelandic) is feminine, triggering feminine agreement of the adjective 'honorable' (*æruverðug**a***; the masculine would be *æruverðug**i***, ungrammatical in this example). Another type involves a handful of examples like Russian *%naša novyj vrač* 'our.F new.M doctor.M'. This has been widely discussed in the Gender literature, so I will not go into details here (see Corbett 1979, 1991 and many other works, including Audring 2009, Steriopolo and Wiltschko 2010, Matushansky 2013, Pesetsky 2013, Landau 2016b, E. F. Sigurðsson 2017). Plainly, there is evidence, coming from several types of data, that D- and n-gender are distinct; exceptionally, they can even be assigned distinct values within a DP, although they are most commonly "in agreement."[19]

Gender assignment/interpretation in pronominal gender languages is widely conceived of as semantic (e.g., Corbett 1991, Audring 2008, 2009). The semantics involved is lexical in the sense that it relates to the semantics of the noun referred to by the pronoun, primarily in the case

[18] On the other hand, the double-root analysis might apply to noun DPs like *il ragazzo* 'the boy' and *la ragazza* 'the girl' (but for a different analysis, see Kučerová 2018). The double-root analysis would in any event seem to be plausible, for example, for Swedish pairs like *en*/*ett studerande* 'a.C student'/'a.N study', despite the complete homophony of the common-gender vs. the neuter nouns, and also for frequent Icelandic short-name pairs like *Dóri*, *Siggi* (males) vs. *Dóra*, *Sigga* (females).

[19] I do not have a theory of why DP-internal D/n-gender schisms of this sort are heavily lexically restricted, impossible in most gender languages but sporadically possible in a handful of languages/constructions, nor does anyone else to my knowledge (but for descriptions and discussions, see the above-cited works).

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of nouns with so-called natural gender semantics, such as *girl*, *boy*, *daughter*, *son*.[20] However, lexical information is accessible to postsyntactic semantics/pragmatics (the C-I interface), so I assume that gender access to noun semantics of this sort is contextual (and not narrowly CP-internally syntactic): a pronoun interprets its antecedent in discourse in terms of ϕ-values, but that does not mean that the antecedent itself is provided with a formal gender feature (in pronominal gender languages; in n-gender languages, it often is). See the discussion around the English noun *girl* and the structure in (17) below.

Gender assignment in pronominal gender languages is evidently always semantic/pragmatic, based on knowledge and presuppositions about the world (one such presupposition being that regular names like *Mary* and *John* refer to a female vs. a male). Consider the examples in (12)–(13), where (13a–b) are understood as being stated without any previous mention of the persons referred to.

(12) a. Clinton$_{\mathbf{i}}$ campaigned hard, but **she$_{\mathbf{i}}$** lost in the end.
b. Clinton$_{\mathbf{i}}$ campaigned hard, and **he$_{\mathbf{i}}$** won in the end.

(13) a. Look at this! **She** is strong!
b. Look at this! **He** is strong!

It is obvious that the antecedent *Clinton* in (12a–b) is not an unambiguous source of gender assignment to the coreferential pronouns, *she* vs. *he*; instead, assignment is based on knowledge or presuppositions about the individual referred to as *Clinton*.[21] The deictic gender assignment to the pronouns in (13a–b) is even more obviously unrelated to noun properties, instead being based on speaker assumptions about the persons in question.

The gender of pronouns is obviously PF-lexical, but on the Minimalist atomic view of grammatical features adopted here (as stated in section 1), it could not be *pre*syntactically lexical (see also Kratzer 1998); on this atomic view, complex feature bundles are built in syntax and not spelled out as units until morphology/PF (the externalization component, where the bundles are presumably stored as units, in relation to a phonological matrix; see Distributed Morphology approaches as in, e.g., Embick and Noyer 2007). However, even though gender values (like other ϕ-features) are not presyntactically given, Gender is syntactically present in some form; otherwise, it could not be expressed CP-internally. The question is, in what form—there are reasons to doubt that it is syntactically present with a specific gender value (as F, M, N, etc.) until late in the

[20] The relations between lexical semantics and gender assignment are mostly rather straightforward in pronominal gender languages. In n-gender languages, in contrast, they can be intricate, a research field that I will not enter here, as already stated (but see for example Audring's (2009) detailed study of gender in Dutch, showing that individuation plays a significant role, in addition to better-known gender correlates such as sex and animacy).

[21] Alternatively, one might want to assume that *Clinton* is three items, one of them being inherently feminine, one inherently masculine, and one neither (one might wish to use *Clinton* as a name for a bar or a house or a car or whatever). However, this is a costly approach, as the use and interpretation of the name *Clinton* requires world knowledge and pragmatic context scanning in any case. Notice also that this would imply that the set or collection of animate nouns is multiplied by the number of genders in pronominal gender languages as opposed to genderless languages and languages with fixed n-genders.

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derivation. These specific values seem to be interpretations of a more abstract feature, a Gender variable G_α.

In pronominal gender languages (setting n-gender languages aside for the moment), Gender is always dependent on the CP-external context, either pragmatic (as in (12)–(13)) or linguistic (as in *Mary$_i$ said that she$_i$ was happy*). In other words, CP-internal gender in such languages is not assigned a specific value until the $[_{CP} \ldots [_{DP} \ldots D/G_\alpha \ldots] \ldots]$ structure meets its context, as sketched simply in (14).[22]

(14) CONTEXT $[_{CP} \ldots [_{DP} \ldots D/G_{\alpha\,=\,F/M/N,\ etc.} \ldots] \ldots]$
↑_____↑ Control/Context scanning

This is compatible with the common view that Gender is indexical in some sense (see Wechsler and Zlatić 2003, Wechsler 2011, Landau 2016b, Kučerová 2018), but I will not pursue the issue here. D/G_α is an edge linker, with a context-linking capacity similar (albeit not identical) to that of the T_S and Λ_A features discussed in section 2. The context-linking approach thus generalizes over context-sensitive grammatical categories, a novel insight.

Consider the simple cases of *distant ϕ-valuation* in (15), where I mark only the gender valuation.

(15) a. The girl$_\mathbf{i}$ said that DP$_\mathbf{i}$ was happy. DP$_\mathbf{i}$ > DP$_\mathbf{i/F}$ = *she* in PF
b. We bought the book$_\mathbf{i}$. DP$_\mathbf{i}$ was good. DP$_\mathbf{i}$ > DP$_\mathbf{i/N}$ = *it* in PF

Distant ϕ-valuation is commonly referred to as agreement in the Gender literature and taken to be the lowest-ranked or weakest sort of agreement in the Agreement Hierarchy, postulated by Corbett (1979) and adopted in much related research. However, even though distant ϕ-valuation across CP-boundaries involves "agreement" in some general, unspecific sense, it expresses another type of relation than is seen in more local agreement phenomena, such as subject-predicate agreement and DP-internal agreement or concord: it does not involve syntactic Agree, whereby a probe searches for a relation with a goal within its c-command domain (Chomsky 2001).

In pronominal gender languages, Gender is always interpretable (in the sense of Chomsky 1995). In n-gender languages, on the other hand, pronominal gender may or may not be interpretable. It is interpretable when a pronoun refers to an antecedent with semantic gender, as in Icelandic *Stelpan$_i$ . . . Hún$_i$* 'The girl.F . . . She.F', but it is uninterpretable when the antecedent does not have any animate gender semantics, as in Icelandic *Bókin$_i$ . . . Hún$_i$ . . .* 'The book.F . . . "She".F (= 'it')'. In the latter case, the pronoun itself is interpretable, but its F gender feature is not. In Chomsky's Minimalist Program (1995, 2001, etc.), uninterpretable formal features are deleted under transfer to the semantic/pragmatic interface, C-I, by entering an Agree relation in syntax. If we were to analyze the uninterpretable gender feature of pronouns in cases such as *Bókini$_i$ . . . Hún$_i$ . . .* 'The book.F . . . "She".F (= 'it')' as being deleted by virtue of entering an agreement or an Agree relation with its antecedent, we would have to extend the notion of Agree beyond syntax, such that it applies across CP-boundaries, often many of them (see the next section). It

[22] As will be discussed in section 4, this applies generally to pronominal gender, also in n-gender languages.

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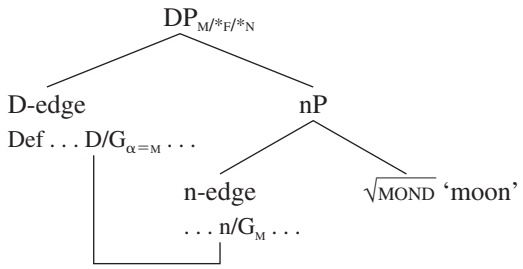
is unclear how such a relation could be defined and constrained so as to make the correct predictions (when and how it applies, when it does not, and so on). Plainly, distant ϕ-valuation is not a narrowly syntactic process, although it can access syntax, as sketched in (14). I will address distant ϕ-valuation in more detail in section 5, arguing that it involves recycling under nonsyntactic and nonlocal context scanning plus syntactic and local edge computation.

To make the issues at stake clearer, in the following sections I will take a closer look at the relation among n-gender, D-gender, and DP-gender, and also at formal vs. semantic gender.

4 n-Gender, D-Gender, DP-Gender

In languages with n-gender, a formal gender feature is assigned to the n-edge—for example, n/G_M (masculine). This is sketched in the (simplified) structure in (16) for German masculine *der Mond* 'the moon.M', where the (so far unvalued) D-gender feature probes the n-edge for a value. (Def = definite)

(16)



Notice, in passing, that there seems to be a commonly unnoticed typological gap in observed Gender systems: there are D-gender languages without n-gender, but not the other way around, as far as can be judged from the extensive Gender literature (e.g., Corbett 1991, Audring 2008, 2009, Kramer 2015). Call this the (putative) *D- over n-gender universal.* It falls out naturally if the primary function of Gender is to contribute to context linking via D and DP.

As shown, the D/n-gender value projects to DP in (16). This, then, is the relation between n-gender and D(P)-gender *within inanimate* noun DPs in n-gender languages. Such DPs have no access to gender semantics, either from the noun root or from the context; thus, the only way of assigning gender to them is to project their formal D/n-gender value to DP (perhaps as part of labeling; Kučerová 2018).[23] The value of the gender feature in cases of this sort is commonly idiosyncratic/idiomatic. Icelandic *tungl* is neuter, Icelandic *máni* masculine (like its German cognate *Mond*), Italian *luna* feminine, all meaning 'moon'. Nouns of this sort obviously have no gender semantics.

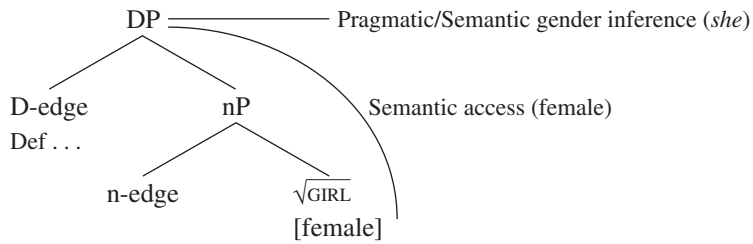
The gender of noun DPs enters two other types of relations, one DP-internal and one DP-external. The DP-external one relates DPs with pronouns (and vice versa), as we have already seen for Icelandic *Bókin*$_i$ . . . *Hún*$_i$ . . . 'The book.F . . . "She".F (= 'it')', and also with predicates, an issue I will return to shortly. The DP-internal relation in question is lexically semantic, seen

[23] In normal language use. For important nickname exceptions, see below.

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for naturally gendered nouns like the above-mentioned Icelandic *stelpan* 'the girl.F', which has both a formal D/n-gender feature and a lexically semantic gender interpretation. Access to lexical gender semantics in naturally gendered nouns is independent of their having a formal gender feature, as seen by the simple fact that it is available in languages that lack grammatical gender: Finnish *tyttö* 'girl', *poika* 'boy'; Hungarian *lány* 'girl', *fiú* 'boy'; and so on. As for pronominal gender languages like English, one could possibly argue or believe that natural gender noun DPs, such as *the girl*, have a D-gender feature like pronouns, albeit an invisible one (in contrast to the visible D-gender in Italian *il/la chirurgo* 'the.M/F surgeon', discussed in section 3). I assume instead that all noun DPs in pronominal gender languages like English lack D-gender as well as n-gender. That is, I adopt the analysis in (17) for English *the girl*.

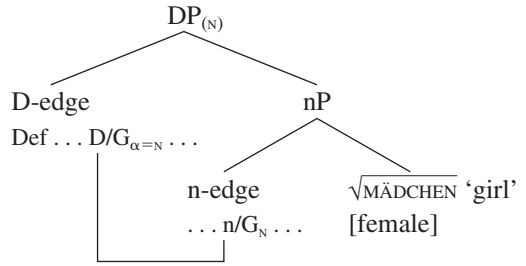
(17)



The reason why I adopt this analysis is not the invisibility of a putative D-gender feature per se. Rather, access to lexical gender semantics in naturally gendered nouns seems to be universally available (Corbett 1991), so postulating an invisible D-gender feature here would be an unnecessary extra stipulation. In contrast, English third person singular pronouns do have D-gender. Reference to *the girl*, across CP-boundaries, by the pronoun *she*, involves pragmatic/semantic inference under context scanning, as sketched in (14) and (17), plus edge computation via the pronominal D-edge gender linker (see section 5).

In some cases, nouns with natural gender semantics are assigned some "unnatural" formal gender. One example is Icelandic masculine *kvenmaður* 'woman.M'; another is the much-discussed German neuter *Mädchen* 'girl.N'. This is illustrated in (18).

(18)



In cases like this, the n-edge is idiosyncratically assigned some idiomatic gender (as in the case of inanimate nouns like *Mond* in (16)).

As indicated, the projection of the formal D/n-gender value to DP is only optional in (18). Hybrid nouns like *Mädchen* may be referred to in discourse either with pronouns that pick up

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their formal D/n-gender or with pronouns that pick up their natural gender. In other words, *Mädchen* may be referred to either as *es* 'it' or as *sie* 'she'. Notably, it may be referred to with the feminine pronoun even though its definite article in the D-domain obligatorily takes the neuter form *das*, and not the feminine form *die*, as illustrated in (19).

(19) . . . [das/*die Mädchen]$_i$ . . . Sie$_i$/Es$_i$ . . .

I assume that the female interpretation of the DP here (reflected by *sie*) is due to access to lexical semantics plus postsyntactic semantic/pragmatic inference, as illustrated for the English noun *girl* in (17) (the formal neuter gender of *Mädchen* then not projecting to DP). A parallel optionality is observed for number in some languages, including varieties of English, as illustrated in (20).

(20) a. **This** government **has/have** approved the measure.
b. ***These** government **has/have** approved the measure.

Either the formal singular feature of *this government* in (20a) projects to DP, triggering singular agreement, or it does not, in which case semantic/pragmatic plural agreement may step in (see Smith 2017). Just like the German article *das* in (19), demonstrative *this*, also a D-domain category, must heed formal DP-internal agreement (in accordance with Corbett's (1979) Agreement Hierarchy), hence the ungrammaticality of *these* in (20b) and of *die* in (19).

Postsyntactic semantic/pragmatic gender inference is also commonly available for animate nouns that lack inherent gender semantics and may thus refer to individuals regardless of biological gender: *doctor*, *minister*, *hero*, *poet*, *dog*, *horse*, and so on (e.g., Corbett 1991). This is generally the case in pronominal gender languages, but it also holds true of many n-gender languages, despite the formal gender of most such nouns in n-gender languages. Some Icelandic examples are given in (21). The label *formal* refers to formal D/n-gender (and not to formality, even though D/n-gender reference to nouns of this sort is often rather formal in a communicative/social sense). The boldfaced suffix is the definite article.[24]

(21)	*Formal*	*Semantic*	*Impossible*
a. Læknir**inn** . . .	Hann . . .	Hann/Hún . . .	*Það . . .
doctor.the.M$_i$	"he"$_i$	he$_i$/she$_i$	it$_i$
b. Hetja**n** . . .	Hún . . .	Hann/Hún . . .	*Það . . .
hero.the.F$_i$	"she"$_i$	he$_i$/she$_i$	it$_i$

[24] As discussed by Sauerland (2008), Spathas (2010), and Percus (2011) (and as pointed out by a reviewer), the genders are not always "even," masculine for example commonly being less marked than feminine. As (21) suggests, this is not the case for personal pronouns in Icelandic (nor is it for predicate agreement), but a similar effect is seen for Icelandic quantifiers and indefinite pronouns, where for example masculine *allir* 'everybody' may refer either to males only or to people in general, as opposed to feminine *allar* (only females) and neuter *öll* (a specific group of both biological genders but not people in general). See Þórhallsdóttir 2015, Friðriksson 2017, E. F. Sigurðsson 2017, Þorvaldsdóttir 2017. As stated in section 1, I am not concerned with factors of this sort. I suspect that this imbalance is pragmatic/conventional (the LGBTQ movement is actually trying to change this in present-day Iceland), but I will not pursue the issue here. This of course shows that the gender features are amenable to semantic/pragmatic interpretation, but it does *not* imply that they are lexical in a presyntactic sense.

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c. Skáld**ið** . . .	Það . . .	Hann/Hún . . .
poet.the.N_i	"it"$_i$	he$_i$/she$_i$

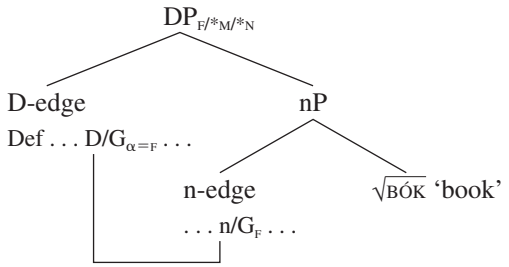
Pronominal reference is syntactically accidental (Lasnik 1976) or free (Reinhart 1983, Grodzinsky and Reinhart 1993) in the sense that it is independent of narrowly CP-internal syntactic properties (apart from the abstract edge linkers), but it is subject to context scanning and thus context-bound, even in cases like (12)–(13). This is clearly seen in fixed gender reference to inanimate noun DPs in n-gender languages. Consider the Icelandic facts in (22), illustrating a crosslinguistically widespread and well-known pattern.

(22) a. Kaflinn$_i$ . . .	**Hann$_i$**	var	**nýr**.
chapter.the.M.SG.NOM	"he".M.SG.NOM	was	new.M.SG.NOM
b. Bókin$_i$ . . .	**Hún$_i$**	var	**ný**.
book.the.F.SG.NOM	"she".F. SG.NOM	was	new.F.SG.NOM
c. Blaðið$_i$ . . .	**Það$_i$**	var	**nýtt**.
paper.the.N.SG.NOM	it.N.SG.NOM	was	new.N.SG.NOM

'The chapter/book/(news)paper . . . It was new.'

Any forms other than those shown in (22) are excluded under the intended coreference (regular Icelandic adjectives, such as *ný-* 'new', have 13 distinct forms in the simple indefinite positive). The structure I assume for inanimate noun DPs was given in (16) for German *der Mond* 'the moon'. For convenience, I repeat it for feminine Icelandic *bókin* 'the book' in (23).

(23)



In subsequent discourse, as in (22), the ϕ-values of the DP are picked up by a pronoun under context scanning.

I will discuss context scanning shortly. First, though, recall that the specific gender value of pronouns, as in (22), is assigned late in the derivation. That is, their abstract D-edge gender linker cannot receive a specific gender value until the [$_{CP}$ . . . [$_{DP}$ . . . D/G$_\alpha$ . . .] . . .] structure containing the pronoun meets its context, as plainly seen in (22) and sketched in (14). When the D-gender of the pronoun and its other ϕ-features have been assigned specific values, they trigger regular overt CP-internal predicate agreement, as in (22). That is, abstract CP-internal Agree builds an agreement path between the subject and the predicate, DP$_\phi$ . . . PRED$_\phi$, and when the ϕ-values of the subject have been specified, under context scanning and edge computation, they percolate down to the predicate (for similar approaches to agreement, see H. Á. Sigurðsson 1989: 114–118, E. F. Sigurðsson 2017, Kučerová 2018). The percolation of the specified or valued

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features (in contrast to abstract Agree) is presumably a PF process (see Landau 2016a and the references there). Overt agreement reflects the PF resources a language has at its disposal, but it seems plausible that even languages that lack such means, largely (like English) or completely (like Mandarin), have abstract syntactic Agree.

This applies to pronouns. Full DPs also trigger predicate agreement, as well as DP-internal agreement (concord), as in for example Icelandic *Bók-in var ný* 'book.F.SG.NOM-the.F.SG.NOM was new.F.SG.NOM'. In this case, the ϕ-specification of both n and D, as well as that of the subject DP as a whole, is independent of context. Nevertheless, it seems plausible that both the concord and the predicate agreement paths involve only abstract Agree in syntax (prior to ϕ-specification), the overt ϕ-percolation not taking place until the externalization process. If so, the n-$\sqrt{\text{ROOT}}$ relation must be visible to PF at the CP/DP levels (like lexical information in general).

This applies to formal ϕ-specification in examples like 'the book was new'. A closer look suggests that the gender *interpretation* of a DP is *generally* delayed until it meets its context (the delay applying not only to pronouns but also to full DPs). The evidence that suggests this is well-known for noun DPs like *the doctor* (with animate nouns that can refer to individuals regardless of biological gender), namely, the availability of semantic agreement for such DPs. A few Icelandic examples are given in (24). The phenomenon is crosslinguistically familiar and has been widely discussed in the Gender literature, by Corbett (1991) and others. For more (attested) Icelandic examples of this sort, see Friðriksson 2017, E. F. Sigurðsson 2017 (and for a general discussion in terms of the Agreement Hierarchy, see Corbett 1979, 1991, 2006).

(24) a. Læknirinn var mjög hæfur/hæf.
doctor.the.**M** was very competent.**M/F**
'The doctor was very competent.'
b. Hetjan var mjög hugrökk/hugrakkur.
hero.the.**F** was very brave.**F/M**
'The hero was very brave.'
c. Skáldið var mjög ungt/ungur/ung.
poet.the.**N** was very young.**N/M/F**
'The poet was very young.'

The information that the individuals here referred to as 'the doctor', 'the hero', and 'the poet' have biological gender that contradicts the formal gender of the nouns is obviously based on world knowledge or presuppositions, thus context-dependent. Much as for German *das Mädchen* 'the girl', though (see (19)), DP-internal concord must heed formal agreement (as shown by the forms of the article in (24), *-inn*, *-n*, *-ið*).[25]

There is actually commonly unnoticed evidence that this delay analysis extends to DPs in general, even inanimate DPs. Inanimate (as well as animate) DPs can freely be used as nicknames for persons: English *The Hammer*, and so on (and similar DPs can be used as regular proper

[25] This is the crosslinguistically common pattern, in contrast to the exceptional Icelandic and Russian DP-internal D/n-gender schisms, mentioned in section 3.

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names in some cultures). A DP such as Icelandic feminine *litla öxin* 'small.F ax.the.F' is usually used to refer to just 'the small ax', then triggering obligatory feminine agreement (as in 'The small ax was sharp.F'), but it can also be used as a nickname. In case the biological gender of the person in question contradicts the formal gender of the DP, semantic predicate agreement is available (and commonly preferable to formal agreement): *Litla Öxin var reið**ur*** 'small.F ax.the.F was angry.**M**' ('The Small Ax was angry'). Generalizing, the simplest analysis is that the gender interpretation of a DP as a whole is always delayed until the DP meets its context, even when there are no visible effects of the delay, as in the normal use of inanimate DPs, suggesting that even such DPs are checked against their context prior to final gender interpretation of the DP as a whole.[26] Like the putative D- over n-gender universal, mentioned at the beginning of this section, this falls out naturally if the primary function of Gender is to contribute to context linking.

Context scanning is not part of narrow CP syntax, but it serves to link CP syntax to the linguistic and deictic context. The restrictions on it are mostly pragmatic and not easy to pin down (see, e.g., Rohde, Kehler, and Elman 2006), but it is powerful, as examples like the Icelandic (25) indicate.

(25) **Bókin$_{i/F}$** hafði verið niðri í kjallara heima hjá foreldrum mínum í mörg ár. En ég hafði verið upptekinn og margt hafði komið upp á. Pabbi dó og ég fluttist í annan bæ og sótti um og fékk nýtt starf. En allt í einu, einn góðan veðurdag í nóvember, fór ég að hugsa um **hana$_i$** (*hann$_i$/*það$_i$) og ákvað að ná í hana$_i$ (*hann$_i$/*það$_i$).
Roughly: '**The book$_{i/F}$** had been in the cellar at my parents' for many years. However, I had been busy, and a lot of things had come between. Dad died, and I moved to another town and applied for and got a new job. But all of a sudden, one nice day last November, I began thinking about **"her"$_i$** (*"him"$_i$/*"it"$_i$) and decided to pick "her"$_i$ (*"him"$_i$/*"it"$_i$) up.'

As clearly seen here, distant ϕ-valuation is trivially CP-accidental in the sense that the ϕ-valuation of pronouns (in contrast to their case marking; see shortly) is not based on CP-internal grammar (apart from the edge linkers; see section 5). In contrast, it is not context-accidental or context-free, and it also has CP-internal effects. First, it triggers overt ϕ-marking of the pronoun itself. Second, as seen in (22), the ϕ-values of the pronoun trigger CP-internal agreement (in languages that have such agreement).

There are two sides to the coreference and the form of the pronoun *hana* "her" in (25). First, the pronoun links to the ϕ-values of its antecedent under context scanning. The linking is context-bound but it is syntactically unbounded ("free"). Second, however, the context-bound ϕ-values are computed in relation to local case, the computation yielding the 3SG.F.ACC form *hana*. This computation, I claim, is syntactic, taking place at the edge of the DP phase containing the pronoun. I take a closer look at this in the next section.

[26] As mentioned in section 1, this contradicts Kučerová's (2018) central claim that formally gendered DPs are spelled out prior to C-I transfer or C-I access. The facts in (21) and (24) do so as well, and that also applies to parallel and widely discussed facts in many other gender languages (see, e.g., Corbett 1991).

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5 Edge Computation of ϕ/Case

Context-dependent ϕ-values of a pronoun are incorporated into the DP containing the pronoun (regardless of whether it has formally or semantically gendered antecedents). When two or more antecedents are involved, this is usually referred to as *resolution* (Corbett 1991, 2006). It is a composite phenomenon, consisting of both feature recycling under context scanning and computation, thus involving more than just plain copying. Icelandic offers clear data here, as it makes gender distinctions in plural as well as singular third person pronouns (in contrast to many related gender languages). The general Icelandic gender/number resolution pattern is shown in (26).[27]

(26) *Icelandic third person gender/number resolution*
   a. All antecedents are M > M.PL þeir 'they'
   b. All antecedents are F > F.PL þær 'they'
   c. All other combinations > N.PL þau 'they'

Two examples with split antecedents are given in (27).[28]

(27) a. Jón$_i$ var bróðir Maríu$_{\mathbf{j}}$ og frændi Rutar$_{\mathbf{k}}$, en fjölskyldan var stór og
   John was brother Mary's and cousin Ruth's but family.the was big and
   [$_{CP}$ **þær$_{\mathbf{j+k}}$** voru ekki nánar].
   they.F.PL.NOM were.3PL not close.F.PL.NOM
   'John was Mary's brother and Ruth's cousin, but the family was big and **they**.F (Mary and Ruth) were not close.'
   b. María$_i$ var systir Jóns$_{\mathbf{j}}$ og frænka Péturs$_{\mathbf{k}}$, en fjölskyldan var stór og
   Mary was sister John's and cousin Peter's but family.the was big and
   [$_{CP}$ **þeir$_{\mathbf{j+k}}$** voru ekki nánir].
   they.M.PL.NOM were.3PL not close.M.PL.NOM
   'Mary was John's sister and Peter's cousin, but the family was big and **they**.M (John and Peter) were not close.'

The case of the pronouns (here nominative) is of course assigned CP-internally, regardless of context. The pronominal forms thus combine ϕ-values from outside the CP with case from inside it. To accomplish this, the grammar must compute clause-internal case in relation to recycled and incorporated ϕ-values, by edge computation. Consider the resolution in (27a), sketched in (28).

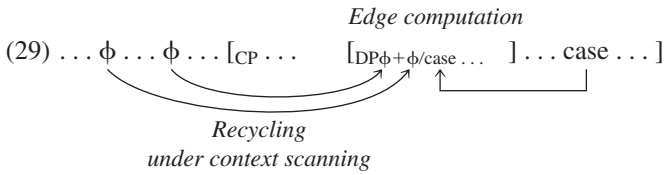
(28) . . . [$_{DP}$ [Mary's]$_{\mathbf{j}}$ brother] . . . [$_{DP}$ [Ruth's]$_{\mathbf{k}}$ cousin] . . . [$_{CP}$ . . . [$_{TP}$ [$_{DP}$ . . . they]$_{\mathbf{F/j+k}}$ . . .]]

[27] Gender/number resolution shows some variation across and within languages, which I set aside here (but see Wechsler 2009; also Friðjónsson 1991, Marušič, Nevins, and Badecker 2015, E. F. Sigurðsson 2017).

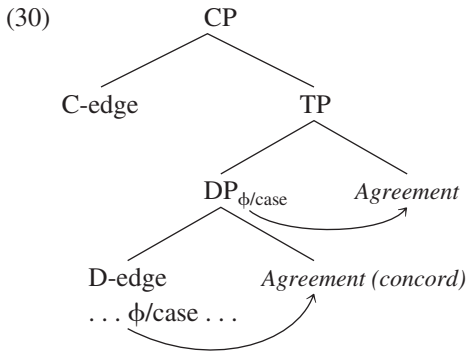
[28] It is important that the antecedents are split (i.e., do not form a single constituent, as in coordination), as it excludes analyses in terms of movement (on standard assumptions). For such an analysis, however, see Kayne 2002.

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Not only are the antecedents split, they are also embedded as possessive genitives in their DPs, thus not c-commanding out of their DPs on standard assumptions. The resolution is thus based on semantic/pragmatic inference, and not on structural syntactic relations, despite the formal n-gender of Icelandic names (cf. also the examples in (22) and (25)).[29] Nevertheless, the ϕ-values yielding $[_{DP} \ldots \text{they}]_{F/j+k}$ are syntactically activated or recycled within the CP containing the pronoun. This is simply illustrated in (29), where *case* is shorthand for the mechanism that underlies the relevant case marking.[30]



As we have seen, the ϕ/case-values of the D-edge usually project to the DP, from which position they trigger agreement under c-command at the clausal level (of verbs, predicates, etc.). In full DPs, the D-edge ϕ/case-values normally trigger DP-internal agreement/concord, also under c-command.[31] This is sketched for a subject DP in (30).



Edge computation of ϕ/case is also at work in $[_{DP}$ PRO], as illustrated for Icelandic in (31), where the nominative and ϕ-valued $[_{DP}$ PRO$]_{ϕ/NOM}$ triggers regular ϕ/case-agreement of the infinitival predicate. Notice that the matrix subjects are quirky subjects (nonnominative), hence incapable of triggering ϕ/case-agreement (see further below). That is, even though the ϕ-values

[29] This is therefore additional evidence that the final gender interpretation of a DP is delayed until it meets its context.

[30] Alternatively, one might want to assume that the ϕ-computation as such takes place in the C-edge, with the outcome (F.PL in (28)) being assigned to the D-edge under Agree, the ϕ/case-computation in turn taking place in the D-edge (complementizer agreement in West Germanic varieties (see Haegeman and Van Koppen 2012) might suggest that). The incorporated ϕ-values also enter CP-internal Person and Number computation/licensing, but I abstract away from that.

[31] "Usually" and "normally." This is the common pattern, but there are D/n-gender schism as well as semantic agreement exceptions, as already discussed.

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come from outside the infinitival CP, the agreement is locally triggered by ϕ-valued nominative PRO (see H. Á. Sigurðsson 2008 and the references there).[32]

(31) a. Hana$_{\mathbf{i}}$ langaði [$_{CP}$ að [$_{DP}$ PRO]$_{\mathbf{i}}$ verða **rík**].[33]
her.ACC longed.3SG C become rich.F.SG.NOM
b. Hann$_{\mathbf{i}}$ langaði [$_{CP}$ að [$_{DP}$ PRO]$_{\mathbf{i}}$ verða **ríkur**].
him.ACC longed.3SG C become rich.M.SG.NOM
c. Þær$_{\mathbf{i}}$ langaði [$_{CP}$ að [$_{DP}$ PRO]$_{\mathbf{i}}$ verða **ríkar**].
them.F.ACC longed.3SG C become rich.F.PL.NOM
d. Þá$_{\mathbf{i}}$ langaði [$_{CP}$ að [$_{DP}$ PRO]$_{\mathbf{i}}$ verða **ríkir**].
them.M.ACC longed.3SG C become rich.M.PL.NOM
'She/He/They$_{/F}$/They$_{/M}$ wanted to get rich.'

Icelandic adjectives (in the indefinite positive) have 24 case/number/gender combinations (4 × 2 × 3), expressed by 13 distinct forms, but any forms other than those given in (31) are ungrammatical under the intended coreference.[34]

In the case of speaker-inclusive PRO, the pragmatic gender interpretation of the speaker is activated in the infinitival CP, as partly illustrated in (32).[35]

(32) a. Þá var gott (fyrir **mig**$_{\mathrm{i}}$) [$_{CP}$ að [$_{DP}$ PRO]$_{\mathrm{i}}$ vera svona **rík**].
then was good.N.SG (for me) C be so rich.F.SG.NOM
["Mary" speaking about herself:] 'Then it was good (for me) to be so rich.'
b. Þá var gott (fyrir **okkur**$_{\mathrm{i}}$) [$_{CP}$ að [$_{DP}$ PRO]$_{\mathrm{i}}$ vera svona **ríkar**].
then was good.N.SG (for us) C be so rich.F.PL.NOM
["Mary" speaking about herself and some other female(s):] 'Then it was good (for us) to be so rich.'

A parallel analysis applies to generic/arbitrary PRO, assigned M.SG in Icelandic (like impersonal *maður* 'one', accusative *mann*).

(33) Þá var gott (fyrir **mann**$_{\mathrm{i}}$) [$_{CP}$ að [$_{DP}$ PRO]$_{\mathrm{i}}$ vera **ríkur**].
then was good.N.SG (for one.M.SG.ACC) C be rich.M.SG.NOM
'Then it was good (for one) to be rich.'

On a lexicalist approach to ϕ-bundles, one might perhaps want to assume that there are as many lexical ϕ/case-bundled PROs as there are ϕ/case combinations in a language. In Icelandic, the number would be 72: 2 numbers × 3 persons × 3 genders × 4 cases (4 cases as Icelandic has quirky subjects, including quirky PRO). I discard this without discussion. However, two other

[32] In passing, notice that this is an additional reason for abstaining from referring to distant ϕ-valuation across CPs as "agreement."

[33] The marker *að* 'that; to' is standardly assumed to be in C in Icelandic control infinitives (which have infinitive verb raising to T).

[34] For most speakers and most examples; some speakers accept transmission of matrix ACC (mainly object ACC rather than subject ACC) into some infinitives (by top-down PF case agreement); see H. Á. Sigurðsson 2008.

[35] The same applies to hearer gender of hearer-inclusive PRO (i.e., PRO behaves like an overt pronoun with respect to gender (and other ϕ-features)).

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conceivable alternatives need to be excluded here: that ϕ/case-interpretation of PRO is free or that predicate agreement is free.

The ϕ/case-interpretation of PRO is not free. First, the ϕ-interpretation is obligatorily the same as that of the matrix controller of PRO, as seen in (31) and (34). Second, PRO is normally assigned case from within the PRO infinitive, as seen by agreement, including regular predicate agreement and floating quantifier agreement. This is illustrated in (34) (adapted from H. Á. Sigurðsson 2008:410; DFT = a default nonagreeing form).

(34) a. Bræðrunum$_{\mathbf{i}}$ líkaði illa [að [PRO]$_{\mathbf{i}}$ vera ekki **báðir$_{\mathbf{i}}$**
brothers.the.M.PL.DAT liked.DFT ill to [NOM] be not both.M.PL.NOM
kosnir].
elected.M.PL.NOM
'The brothers disliked not being both elected.'

b. Bræðurnir$_{\mathbf{i}}$ æsktu þess [að [PRO]$_{\mathbf{i}}$ vera **báðum$_{\mathbf{i}}$**
brothers.the.M.PL.NOM wished(for).3PL it to [DAT] be both.M.PL.DAT
boðið].
invited.DFT
'The brothers wished to be both invited.'

The participle *kosnir* 'elected' in (34a) is a regular nominative-taking predicate, hence the NOM of both the *PRO–báðir* chain and the predicate itself—despite the DAT of the matrix controller and the default nonagreement of the matrix verb. In contrast, the participle *boðið* 'invited' in (34b) is a quirky dative-taking predicate, hence the DAT of the *PRO–báðum* chain and the default form of the predicate itself—despite the NOM of the matrix controller and the agreement of the matrix verb. In both infinitives, the agreement facts are the same as in the corresponding finite clauses (*Bræð**urnir***.NOM *voru ekki báð**ir** kos**nir*** vs. *Bræð**runum***.DAT *var báð**um** boð**ið***). These patterns are entirely general.

Predicate agreement is not free either. As seen in (34), it is strictly regulated or preconditioned by local case. Nominative subjects, including PRO, trigger obligatory agreement of adjectival and participial primary predicates, while nonnominative (quirky) subjects never do, instead requiring a nonagreeing default form, such as *boðið* 'invited' in (34b). We need not go into further detail here; these facts have been repeatedly and extensively established in the voluminous literature on Icelandic agreement (see, e.g., H. Á. Sigurðsson 1989, 2008, Thráinsson 2007, Bobaljik 2008, Preminger 2014, E. F. Sigurðsson 2017, and the references cited in these works).

The case of PRO in the examples above is locally assigned within the PRO infinitive, while its ϕ-values come from outside the infinitive. Under the present approach, the CP-external ϕ-values are recycled in [$_{DP}$ PRO] and computed there under edge computation in relation to the CP-internal case.

6 Summary

D-gender is a reflex of a D-edge linker, D/G$_{\alpha}$, assigned value in either of two ways: by DP-internal probing for n-gender or by DP-external context scanning. While both strategies are available in

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n-gender languages, only the context-scanning strategy is applicable in pronominal gender languages, such as English, as they lack n-gender. In D/n-gender languages, the formal D/n-gender value usually projects to DP, from which position it enters distant ϕ-valuation correlations and triggers gender agreement at the clausal level. In certain cases, however (for DPs with hybrid nouns and the like), the D/n-gender need not project, the DP alternatively receiving semantic/pragmatic gender interpretation under context scanning. Distant ϕ-valuation across CP-boundaries, including resolution, involves feature recycling under context scanning plus edge computation, whereby the recycled and incorporated gender features are computed in relation to phase-internal case. Like Person and Tense, Gender thus has both a contextual and a syntactic side to it, linking syntax and context—at the edge.

Importantly, the present approach builds bridges between syntax and context, in terms of context scanning and edge linking, and develops a theory of the fascinating phenomenon of edge computation. It thereby develops a novel conception of the overall architecture of grammar as well as contributing to a clearer understanding of Gender.

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