Summary

In this monograph, Reinhart addresses the question of whether the derivation of grammatical utterances relies on comparisons of alternative derivations. She proposes that the grammar sometimes performs comparisons on “reference sets” of <derivation, interpretation> pairs, in order to determine whether some desired interpretation is possible only by means of a derivation that includes some otherwise illicit operation, and that the grammar may then license that derivation. She offers theoretical, empirical, and experimental arguments in favor of this view.

The book is organized into an introduction and five chapters. Chapter 1 is a theoretical overview, Chapters 2 through 4 are case studies, and Chapter 5 discusses evidence from processing and acquisition.

In the introduction and Chapter 1, Reinhart traces the idea of reference set computation to the concept of Optimal Design. This concept is based on the premise that syntax (in the broad sense) is a computational system (CS) that serves as an interface between several otherwise unconnected brain systems, which include concepts, inference, context, and the sensorimotor system. If the CS is optimally designed, then it’s complex enough to translate information between brain systems, but as simple as possible in order to minimize the burden on memory and computational resources, both in production (derivation) and in comprehension (parsing).

CS operations that don’t translate perfectly between brain systems are deemed imperfections, whereas costly strategies that burden brain resources are deemed inefficient. Naturally, the design of the CS involves tradeoffs between perfection (Optimal Design) and efficiency (Economy).

Reinhart’s principal claim is that the CS decides when illicit (inefficient) operations should be licensed by performing reference set computation. That is, a computation over a reference set of <d,i> pairs, where each pair consists of a derivation (d) and an interpretation (i). A derivation that includes an illicit operation is permitted only if there’s no corresponding <d,i> pair with the same interpretation and a simpler derivation.

Ironically, although reference set computation makes derivations as economical as possible, the computation itself is a costly procedure in terms of memory and computational resources. This is because, in contrast to local operations and conditions that are evaluated on portions of a derivation, reference set computation is global, comparing two or more entire derivations and...
their interpretations. Therefore, Reinhart argues, the CS performs reference set computation only when necessary, and should cause a significant processing load when it does.

Reinhart identifies four phenomena that are mostly accounted for by a few simple, local operations and conditions, but which sometimes require costly, otherwise illicit operations in order to derive certain interpretations. These phenomena are quantifier scope, prosodic focus, interpretation of anaphora, and interpretation of scalar implicatures. In each case study, Reinhart first evaluates and refines the analysis of the particular phenomenon, then shows that some costly operation is allowed only when no alternative derivation yields some desired interpretation. This, in turn, shows that reference set computation is needed.

Chapter 2 is a case study of scope shift, where quantifiers are interpreted in positions different from where they’re pronounced, by Quantifier Raising (QR). Reinhart takes QR to be an imperfection in the CS, because it involves covert movement. Reference set computation occurs when a speaker considers applying QR in order to get a desired interpretation. For example, sentence (1a) is ambiguous between in situ and QRed interpretations. The reference set that licenses QR consists of the \ tearrow pairs in (1b) and (1c). The derivation with QR (1c) is allowed because its interpretation is distinct from that of (1b).

\begin{enumerate}
\item \textbf{a.} A student read every book  
\item \textbf{b.} \textltr{d: [some f] [every book (x)] [f (student) read x], i: one student, many books>  
\item \textbf{c.} \textltr{d: [every book (x)] [some f] [f (student) read x], i: a student for each book>  
\end{enumerate}

Also key to Reinhart’s account of QR is that indefinites are choice functions, bound by an arbitrarily wide scope existential quantifier, and therefore not governed by QR.

Chapter 3 is a case study of focus, specifically, of how to account for when non-default focus is signaled by stress shift. First, Reinhart distinguishes real stress shift for focus from apparent stress shift caused by destressing given information. Then she argues that, unlike default phrasal stress, which is determined by an efficient, local operation, stress shift requires global computation over an entire utterance, and is therefore licensed only when necessary.

In (2), default stress assignment puts phrasal stress on the object (2a). By focus projection, this can indicate focus on the object DP, on the VP, or on the entire IP. Therefore, stress shift to, say, the verb (2b), is licensed only if the intended focus is the verb, and not the object, VP, or IP. Such stress shift is licensed by consulting the reference set consisting of (2c) and (2d).

\begin{enumerate}
\item \textbf{a.} [IP My neighbor is [VP building [DP a DESK. ] ] ]  
\item \textbf{b.} My neighbor is [V BUILDING] a desk  
\item \textbf{c.} \textltr{d: default stress, i: focus = object, VP, or IP>  
\item \textbf{d.} \textltr{d: default stress + stress shift to V, i: focus = V>  
\end{enumerate}

Chapter 4 treats the licensing and interpretation of (pronouns and) anaphora. Reinhart begins by distinguishing binding, where two entities are equated because one saturates a predicate that
contains the other, from covaluation, where entities are equated by discourse-determined variable assignment. She then appeals to reference set computation to account for the observation that, if binding is ungrammatical, then covaluation is ungrammatical too, unless it would yield a different interpretation from binding.

For example, in (3a), _he_ is positioned to bind _Max_, but can’t because _Max_ isn’t a variable. Therefore, covaluation of he and Max (3c) is conceivable, but permitted only if binding and covaluation have distinct interpretations. The reference set containing (3b) and (3c) shows that they do, hence covaluation is licensed.

\[(3)\]
\[
\begin{align*}
  &a. \text{Only he [still thinks that Max is a genius].} \\
  &b. <d: *he binds Max, i: only Max considers himself a genius> \\
  &c. <d: he is covalued with Max, i: only Max considers Max a genius>
\end{align*}
\]

Reinhart reasons that covaluation is illicit and constrained because it’s less economical than binding. Binding resolves a predicate quickly and locally, whereas covaluation requires variable comparison over a larger structure.

In Chapter 5, Reinhart claims that evidence from acquisition experiments shows that reference set computation is psychologically real, because children are sometimes unable to correctly interpret utterances in exactly those contexts that require reference set computation. In such contexts, children’s responses indicate two kinds of bypassing strategies: either guessing, yielding an otherwise unexplained 50 percent success rate, or an invariant default parsing strategy that doesn’t require the computation.

Reinhart justifies this claim by examining experimental evidence on children’s interpretations of contexts involving anaphora, stress shift, and scalar implicatures (she doesn’t find sufficient experimental data to show this for QR). In each case, she argues that children are aware of the required computation, but can’t perform it. In the case of the interpretation of scalar implicatures (not discussed until this chapter), Reinhart argues that this requires reference set computation in order to determine whether implicature along a scale is informative enough to use.

Evaluation

I have a few observations and questions concerning the claims in this book. First, the theory outlined here is appealingly verifiable. Reinhart claims that, given a theory of how the CS derives some construction, reference set computation occurs only in order to license interpretations for which the normal CS is insufficient, and furthermore, that this exceptional computation is observable as processing load in mature speakers, and by guessing or arbitrary parsing in children. In this vein, Reinhart outlines several promising directions for future processing and acquisition experiments.

However, I found myself wondering whether this theory predicts that utterances involving two or more illicit operations (such as QR and stress shift) should be correspondingly more difficult to
process, and whether this is falsified by, for example, cases where stress shift actually serves to
disambiguate quantifier scope. This sentence seems to be such a case:

(4) ALL students didn’t cheat on the test. (not > all)

Perhaps Reinhart has an account of such cases, but it wasn’t addressed in this book.

Reinhart also makes several comparisons between this restrictive theory of reference set
computation, and the evaluation of output candidates in Optimality Theory (OT). She criticizes
OT on two general counts: that OT constraints are unrealistically costly to evaluate because
they’re evaluated globally over an entire derivation, and that since constraint evaluation applies
across all kinds of constructions, this predicts roughly equal processing loads across
constructions.

I suggest that whether these criticisms hold depends on how OT is implemented. In a sense,
Minimalism and OT work from opposite directions on the problem of explaining grammaticality.
In Minimalism, the principles of grammar are the operations and conditions that derive
grammatical utterances, and generalizations over grammaticality are epiphenomena.

In OT, by comparison, the principles of grammar are constraints that generalize over
grammaticality, and it’s the operations that realize these generalizations that are epiphenomena.
However, just as a parser need not be a mirror image of the grammar, the grammatical operations
that implement a formal constraint ranking need not be a mirror image of the ranking. Therefore,
the processing cost of selecting an optimal candidate according to a constraint ranking depends
on its practical implementation. For example, many constraints apply only in a syllable, word, or
phrase, and are therefore compatible with local computation during a derivation.

Last, regarding this study’s relevance for linguistic theory in general, Reinhart evaluates several
decades of research in quantifier scope, focus, anaphora, and implicatures. The unified theory
that results from their collation should therefore be considered by anyone undertaking formal
analyses of these topics.

The reviewer

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