1 An Interface Theory of Universal Grammar and Iconicity

This work investigates the relation between Universal Grammar (UG) and iconicity.

By definition, Universal Grammar is (a theory of) the innate and dedicated mechanism for generating language expressions up to the sentence level. While many technical details remain unsettled, unknown amounts of linguistic facts are yet to be discovered, and the gap is still huge between such a model of language and the neurology of the brain, a decent amount of in-depth and fairly accurate understanding has accumulated in the past few decades regarding how languages in general construct sentences – they all appear to exhibit these two traits:[1]

1. a. combinatorial operations creating hierarchical and recursive structures;
   b. locality constraints.

(1a) is recognized among linguistic researchers, at least at some level of description, whether its implementation takes the form of phrase structure rules plus feature-percolation, X′-theory assisted by movement, or Merge and Copy (Gazdar et al. 1985, Chomsky 1981, 1995 and Nunes 2001; see Chomsky 2012, 2013, 2015 and Berwick and Chomsky 2016 for highlighting the role of Merge, and Müller 2013 for comparing different generative theories). (1b) includes islands, minimality and binding domains, regardless of whether some such constraints can be further unified (e.g. Chomsky's 2000, 2001a probe-goal, extended in Pesetsky and Torrego 2007 and Wurmbrand 2011). In this book, a mixed model and terminology of syntax from the principles-and-parameters tradition and its more recent Minimalist Program variant will be adopted – depending on how useful a specific technical tool proves to be in accounting for relevant facts – provided that the analysis and outcome are consistent and incur no self-contradiction throughout the chapters.

Iconicity, "a resemblance between properties of linguistic form … and meaning" (Perniss and Vigliocco 2014: 1), plays a key role in the functionalist approach to language. The notion is usually traced to the seminal work on signs by Peirce (1867/1931), whose identification of "diagrammatic" iconicity, with

signs representing "the relation ... of the parts of one thing by analogous relations in their own parts" (Peirce 1902/1932: 157), is most pertinent to linguistics. Subsequent works relating iconicity to language include Haiman (1980, 1983, 1985, 2008), Bolinger (1982), Tai (1985), Dik (1989), Givón (1990), Croft (1990, 1995, 2003), Newmeyer (1992, 1998), Y. Li (1993), Kaiser (1999), Fischer (2006), Fortescue (2014), among many others; see Haspelmath (2003) for a critique. Furthermore, much work has been done to dissect and/or identify different types of iconicity in linguistic behaviors. Haiman (1980, 1985), for instance, decomposes diagrammatic iconicity into two elements: isomorphism and motivation.

As expected, iconicity has received continual attention in a wide range of linguistic and related areas of research: sign languages (Perniss et al. 2010, Meir et al. 2013, Oomen 2017), morphology (Aissen 2003, Fortescue 2014), syntax (Gärtner 2003, Huang and Su 2005, Y. Li and Ting 2013), grammaticalization (Fischer 2006), word-order origin (Christensen et al. 2016), vocabulary (Dingemanse et al. 2015, Winter et al. 2017), corpus linguistics (Diessel 2008), language acquisition (Perry et al. 2015) and cognitive semiotics (Ahlner and Zlatev 2010), to name just a few representatives.

The two sets of literature (and the comparable efforts thereunder) on UG and iconicity, respectively, are immense. With rare exceptions to be examined in the course of this book, however, there is remarkably little attempt to look at these two significant aspects of language put together. It is the goal of this book to demonstrate that UG and iconicity not only coexist but in fact collaborate in intricate and predictable ways, and that a theory of their interactions, call it the theory of the UG–iconicity interface – UG-I hereafter – should and can be formulated.

1.1 The Central Question: When and How of UG-I

The overall design of the theory of UG-I, to be motivated by the various facts in the ensuing chapters, consists of two hypotheses, one to capture *when* UG and iconicity will start to interact and the other to regulate *how* this interaction is carried out.

The when-question is answered by the Functional Iconicity Complementation Hypothesis (FICH):

2. Solicit help from iconicity where UG is not programmed to perform.

Given our current understanding of how language operates, an obvious scenario where the FICH is put to work is "above" the sentence level. As an example, two consecutive sentences tend to be interpreted as expressing a temporally iconic relation between the two reported situations. This is

where certain Gricean conversational implicatures are in full display, including their contextual breakdowns. Such an application of the FICH will not be the concern of this work (with a small exception in the beginning text of Chapter 4) because it reveals little on how iconicity interacts with UG. As far as we know, UG is limited to the generation of linguistic entities up to the sentence and not beyond.[2] Iconicity operating above sentences targets the end-products of UG and therefore rarely incurs any bi-directional interactions between the two mechanisms.

Which brings us to what this book focuses on: identifying the functional voids of UG within the domain of sentence-generation and figuring out exactly how iconicity aids UG in creating, say, a simple clause. To borrow the metaphor in Y. Li and Ting (2013), UG may be compared with a chunk of Swiss cheese (Figure 1.1). While the entire cubic space occupied by the chunk represents the complete capacity of the human language faculty for sentence-generation, the solid (and quantitatively dominant) portion of the chunk corresponds to UG. The holes in the chunk are where UG is inherently unable to act.

If the process of constructing a clause happens to involve one such hole, other cognitive mechanisms such as iconicity are called in to help UG assemble all the involved components into the clause, as is postulated in (2). In sum, the FICH treats UG as the primary apparatus for sentence-generation and activates iconicity only when UG is not up to the job.

One naturally wonders about the validity and/or plausibility of a functionally handicapped UG. An argument will be put forward later in this chapter on the basis of comparing biolinguistics, another appellation for UG for scholars in this framework, with biology. For now, I simply make two points. First,

Figure 1.1 Swiss cheese
Author's own photograph

whether the FICH is tenable and in case it is, how many functional gaps exist in UG, where they are located and exactly in what manner iconicity lends a hand, are all questions to which ultimate answers can be sought only on empirical grounds. Three chapters of this book take up the task and explore where UG can be shown to give up and iconicity to take over in the middle of building a simple clause. Second, the idea of UG having functional gaps is logically separate from the Minimalist view (Chomsky 1995) that whatever functions UG *does* have are optimized, especially when we, presumably, are talking about a biological system (see 1.2.3 below).

It indeed matters to the tenability of the FICH, though, to explicitly identify exactly what UG is and does – lack of a clear definition of the applicational domain of UG can easily void claims about UG's functional voids. To this end, I will assume with the general UG framework that the human language, via the mechanisms in (1), implements at least two layers of mapping: (i) from conceptual entities and relations to linguistic structure and (ii) from linguistic structure to linear order. Mapping (i) is characteristically accomplished by way of lexical items that encode the outcome of our conceptual partitioning of the world. Following the tradition, the study of the relation between lexical items and concepts is called *lexical semantics*, and semantics for short since this work is largely not concerned with how the meaning of a clause is compositionally computed from its components, presumably at logical form (LF). See Jackendoff (1990, 2002) for a theory of lexical semantics and its relations with the other components of language. Given our understanding of UG, it is lexical items that are used for constructing various linguistic constituents in accordance with algorithms in (1).[3]

Mappings (i–ii) are summarized in (3) below, where a conceptual relation is taken to be the meaning of the corresponding lexical item. As such, (lexico-) semantic relations are simply lexically encoded conceptual relations. Thus, the two will be used interchangeably depending on the context (and where no confusions arise). Now let R_C be a conceptual/semantic relation, R_S be a structural relation and R_L be a linear relation. It is expected of UG to participate in two mappings:

3. a. Map R_C to R_S (characteristically with lexicalization being an intermediate step)
   b. Map R_S to R_L

As an example, the R_C 'participant of an event that undergoes change', aka theme, once lexicalized into the argument structure of a verb, will map to the R_S 'the complement of V' (regulated by the θ-criterion; see Larson (2014) for a recent implementation). The X′-theory initially proposed in Chomsky (1970) – as well as its more recent Minimalist variant (Chomsky 1995, 2001a, b) – guarantees this mapping in (3a) to be algorithmic. Different

proposals exist on the R_S-to-R_L mapping in (3b), a particularly notable one being Kayne's (1994) antisymmetric theory of phrase structure. An alternative will be presented in Chapter 4 which I argue to be both empirically and theoretically more desirable. Until then, any analysis having to do with word order will adopt the conventional linearity parameterization usually found in the UG framework.

Building on the mapping model in (3), I postulate (4) as the answer to the *how*-question for UG-I; that is, once iconicity is called in for help under the FICH, in exactly what manner will UG and iconicity interact for clause-generation?

4. The Uniform Structure Mapping Principle (USM)
   Implement a deterministic R_C-to-R_S mapping.

The USM is meant to operate in the same domain as the standard theory of UG in (1), namely up to the sentence level. Evidence will be presented case by case that UG can fail to implement a certain instance of the R_C-to-R_S mapping in (3a) so that a functional void of UG is encountered, which in turn effectively disrupts further mapping in (3b) due to the unavailability of R_S in the first place. When this happens, non-UG mechanisms like iconicity will be mobilized, under USM's regulation, to assist UG in representing the conceptual relation at issue with a fully predictable structural relation, resulting in possibly non-trivial but regulated interactions between UG and iconicity.

I conceptualize that the USM acts as a meta-rule that both UG operations in (1) and general cognitive facilities such as iconicity must comply with so as to generate clauses in a deterministic manner. To wit, one doesn't just call in iconicity and set it loose. Rather, iconicity is allowed to take part only in the same manner as UG, both banned from unpredictable acts while converting a given semantic relation to a structural relation – in fact, something like the USM is conceptually necessary so that the encoding of what we mean with language is not a totally random choice. I argue that it is this collaboration of the FICH and the USM that our brain depends on to carry out any UG–iconicity interactions.

I take it to be conceptually straightforward that the FICH is not part of UG but a natural strategy in problem-solving: If one can't finish a job with the default tool (e.g. UG), then one looks elsewhere (e.g. iconicity) for help. The USM indeed has the flavor of UG due to its clause-level deterministic nature, but I admit that it is not *a priori* clear whether this "rule" is a proper part of UG (in the sense, for instance, that the USM came into existence from the same genetic mutation(s) bringing about UG in (1)) or is a more general principle operating beyond language (at least in certain circumstances). As a more radical alternative, it may even be that UG only encodes the USM and the most basic recursion-capable Merge, with everything else attributed to

UG-external factors (for the latter portion of this option, see Berwick and Chomsky 2016; see Progovac 2016 for a critical review; also see section 1.2 of this chapter and Chapter 5 for related discussions).

Fortunately, finding the answer to this higher-level question is separate from assessing the explanatory capacity of the USM. Therefore, my focus will be on demonstrating that the USM provides better solutions to a few types of facts that have remained recalcitrant to the theory of UG adopted by most of us working in this framework today. Both to put aside the nature of the USM that otherwise does not affect any part of this book, and to minimize possible confusions, I will continue using UG to name the system in (1) like many other scholars do, but will call the sum of UG and the USM (and possibly other similar linguistically indispensable mechanisms beyond the scope of this work) the human language faculty F_{HL}. In this sense, Baker's (1988) Uniformity of Theta-Assignment Hypothesis, to the extent that it captures an inherent bond between θ-relations and syntax (but see Y. Li 2005 for a different view), may be viewed as a specific reflection of the USM. See the starting text of Chapter 4 for related thoughts.

1.2 Putting UG-I in More Perspectives

The essence of the UG-I theory presented above, namely the FICH, was initially articulated in two early works (Y. Li 1991, 1993) on the serial verb constructions. As UG-I amounts to the first attempt at explicitly formulating such an interface, it is of utter importance to make sure that it is empirically founded, technically detailed and, quoting Karl Popper's expression, logically falsifiable. To accomplish this goal, the protocol in (5) will be rigorously followed throughout the subsequent chapters:

5. a. Identify functional voids $Void_F$ of UG with fact-based argumentations.
   b. Articulate precise ways in which a form of iconicity interacts with UG to functionally fill up $Void_F$ while yielding an otherwise UG-compliant outcome.

Just like the FICH, the strategies described in (5) were employed, though not so explicitly stated, in the same initial works. (5a) establishes the empirical base for the FICH and helps reveal that UG inherently lacks the capacity to deal with or make sense of certain significant language facts and that there is no fix via plausible theory-internal revisions. Critically, this is also when the effects of iconicity are observed. The "UG-compliant outcome" requirement in (5b) is taken to be the only plausible expectation of the UG-I model. The whole point of soliciting help from iconicity is to generate R_S in (3a), and R_S is by definition within the jurisdiction of UG in the sense that it must satisfy all of UG's principles. In other words, iconicity may help complete a syntactic structure *S* where UG is incapable, but *S* must be such that UG can still interpret it. For

the purpose of sentence-generation, creating something not interpretable by UG principles is no help to UG at all.

To further solidify the foundation of UG-I, the rest of this section will look at it from a few different angles.

1.2.1 Related Works

Compared with the huge quantities of works exclusively studying either UG or iconicity, there has been much less non-casual effort to examine the two side by side. Occasionally, iconicity-based analyses of certain linguistic phenomena are refuted in defense of UG or other perspectives (e.g. Baker 1989, Carstens 2002, Newmeyer 2004, Haspelmath 2008). There appear to be more functionalist criticisms of UG which, as Anderson (1999) points out, are rarely at an explicit and detailed enough level for in-depth assessment (see Darnell et al. 1999 for related works). The same general situation also characterizes the rare occasions when one side tries, not as successfully as one would hope in my opinion, to see the values of the other (e.g. Newmeyer 1992, Croft 1999). Lastly, Aissen 2003 explores how languages make use of "the tension" between iconicity and the principle of economy, an approach conceptually closer to the FICH than most other published works in the sense that an explicit and falsifiable way for iconicity to interact with the rest of the language system is articulated on the basis of factual details.

To my knowledge, the most systematic examination of the iconicity–UG relationship in the existing literature is Newmeyer (1992), further elaborated on in Newmeyer (1998). In particular, he dissects the functionalist claim that "linguistic structure . . . has an iconic motivation" into three sub-claims:

> Iconic principles govern speakers' choices of structurally available options in discourse; structural options that reflect discourse-iconic principles become grammaticalized; and grammatical structure is an iconic reflection of conceptual structure. (Newmeyer 1992: 789)

Each of these sub-claims was then positioned with respect to UG:

> The first claim is irrelevant to generative grammar, since the set of structural options for any language need to be characterized independently. The second claim, if correct, poses no challenge to generative grammar, because the autonomy of grammar is compatible with system-external triggers for system-internal changes. And the third claim has literally been built into standard versions of generative grammar, as is revealed by an examination of the properties of the levels of D-structure, S-structure, and logical form. (Newmeyer 1992: 789–790)

For easier reference later on, these three claims are summarized in (6):

6. a. Iconicity affecting the finished products of UG;
   b. Grammaticalization of iconicity-motivated options into UG;
   c. Some UG principle(s) being inherently iconic.

We already echoed his assessment of (6a): It is outside UG how its products are used under iconicity for discourse purposes. This is the first scenario for the FICH which we set aside early on in this chapter.

Newmeyer considers (6b) to pose no challenge to the theory of UG. The matter is not as simple, though, as it all depends on what one considers to be a challenge and how much the nature of grammaticalization is understood. We postpone the second question till section 1.2.2 and focus on the first one for now. In the most general sense, it is surely not conceptually challenging – at least to a researcher willing to entertain such possibilities – to connect what looks like a product of UG to a "system-external trigger" such as an iconic motivation. The devil is in the details, however. Take, for example, the serial verb constructions, which are documented from a fairly wide range of languages and language families. The linear order of the verbs in such a construction has long been claimed in functionalist works to be iconic to the temporal sequence in which the denoted events take place (e.g. Tai 1985). There are also efforts to derive this fact from (revisions of) UG or some other independently postulated principles. As will be shown in Chapter 2, the latter approach has never succeeded and in fact is often amiss by a wide margin, thereby posing a serious challenge to the attempt at letting UG internalize what appears to be iconicity at work. More cases of the same nature are presented in Chapter 3. In addition, the relation between UG and grammaticalization, taken to mean a set of grammatical behaviors captured by a rule, may not be as straightforward as Newmeyer's "system-external triggers" and "system-internal changes" appear to suggest. Related cases will be brought up as we proceed.

So with respect to (6b), challenges not only exist but may well be non-trivial. And such a challenge is at least partially due to the lack of a theory of UG-I. Without the latter's guidance, a suspected connection between UG and iconicity may take any expedient form and one can easily be at a loss on where to look for proof or disproof. Reducing uncertainty in this largely uncharted area of linguistics is precisely the motivation for a theory of UG-I, with the FICH defining the general condition for the two mechanisms to intermingle, while the algorithm in (5) offers instructions on exactly how to argue for it.

In a sense, (6c) is another case of grammaticalizing iconicity by having the latter directly built into the core of UG. Newmeyer makes the intriguing suggestion that "D-structure and LF developed in order for predicate-argument relations and quantifier-scope relations to be expressed iconically"

(p. 788).[4] Chapter 4 of this book will look into part of the clausal structure, typically regarded as a central element of UG, where iconicity seems to be the ultimate solution. Again, the UG-I theory will play a critical role in this investigation. For sure, some specific proposals on how UG internalizes (certain forms of) iconicity may prove to be wrong/misled in the long run – as might any specific idea in the literature of UG (e.g. the notion of government in the 1980s; see Chapter 5), but even failed attempts are to be favored over casual acknowledgments of iconicity without concrete content.

The UG-I theory presented in this book may also be viewed in the context of Chomsky's (2007) "third-factor principles":

> Development of language in the individual must involve three factors: 1) genetic endowment . . . ; 2) external data . . . ; 3) principles not specific to [the faculty of language]. (p. 4)

Though separately motivated and almost certainly with familiar interface elements in mind (e.g. sensorimotor), Chomsky's model for language development echoes the FICH, with UG being genetic endowment and iconicity belonging to a "third-factor" principle. At the same time, it must be noted that Chomsky's tripartite division, as conceptually clean as it can be, appears to be blurred by Newmeyer's view that some form of iconicity is built into UG, namely (6b–c). The ultimate question is where the boundaries of the language-specific genetic endowment lie. See different perspectives in Hauser et al. (2002) vs. Pinker and Jackendoff (2005), Jackendoff and Pinker (2005); also see Berwick and Chomsky (2016) and the critiques by Progovac (2016). While inclined to side generally with those colleagues whose views are the opposite of those of Chomsky, I take it to be self-evident that the final solution can be found only by understanding all relevant facts. Consequently, this book will concentrate on what can be done at the moment: to assess what linguistic facts in sentence-generation can be proven to depend on the FICH, the USM and the algorithm in (5) for adequate explanations.

That more attention should be paid at the current stage of linguistics to formulating a concrete model of UG-I is also substantiated by what I consider to be a thought-provoking contrast in the literature.

On one hand, the generative enterprise has recognized from the very start the general roles of factors external to UG in overall linguistic behavior. Newmeyer (1992, 1998) takes multiple quotes from Chomsky's original writings as proof that the UG approach to language never denies the possibility of external factors helping shape the grammar of human language. Section 4.1.1 of Newmeyer (1992), for instance, starts with "[e]very generative model ever proposed has posited a systematic relationship between form and meaning" (with the same content repeated in Newmeyer 2017, subsection 7.3.3), as evidenced by Chomsky's own words:

> Nevertheless, we do find many important correlations, quite naturally, between syntactic structure and meaning . . . These correlations could form part of the subject matter for a more general theory of language concerned with syntax and semantics and their points of connection. (1957: 108)

Newmeyer's interpretation of these words on the relevance of external factors – in this case the structure-meaning correlations – is confirmed by the afore-quoted and more recent "third-factor" remark from Chomsky, whose primary concern is "[h]ow little can be attributed to UG while still accounting for the variety of I-languages attained, relying on third-factor principles?" (1957: 5).

On the other hand, there are few published works in the principles-and-parameters tradition that take more than casual notice of iconicity. And with rare exceptions (Y. Li 1993, Gärtner 2003, Y. Li and Ting 2013), such works, including Newmeyer's own, present a continual effort to dismiss iconicity despite lack of success (see Chapter 2 for detailed discussions).[5]

The mismatch between the positive general talk and the opposite specific practice regarding iconicity is a good indicator, in my opinion, that if we as a field are sincere about admitting external factors collaborating with UG to produce language in its entirety, then it is our responsibility to start developing effective protocols for discovering exactly how UG and iconicity interact. After all, the ultimate goal of linguistics is to understand what exactly language is, including how each part operates, how they interact with one another, and how they came into existence in the first place. Well-established sub-areas of linguistics, such as phonology and syntax, embody fruitful investigations of language components per se; the various interface studies explore the laws behind their interactions. If sentence-generation, the designated territory of UG, can be proven to rely conditionally on a general cognitive capacity like iconicity to complete certain tasks, be it directly coded in UG or called into action by the FICH, an explicit theory is the only means for us to gain better insights into this part of UG in particular and the F_{HL} in general.

1.2.2 On Grammaticalization

In addition to explaining a miscellaneous pool of cross-linguistic facts that UG alone is incapable of handling, the theory of UG-I, and in particular the USM, also offers a window to see into the nature of grammaticalization, a term so commonly used when what is suspected to be iconicity at work acts as an inherent part of a language's grammar. Newmeyer's (1998) discussions on iconicity, for instance, appeal to the term many times. But in this context, grammaticalization is purely descriptive, reporting nothing more than the fact that a form of iconicity appears obligatory. As will be seen in later chapters, the USM forces specific interactions between iconicity and UG