The Minimalist Program
最简方案

（美）Noam Chomsky ／著

满在江　麦涛 ／译

戴曼纯 ／审订

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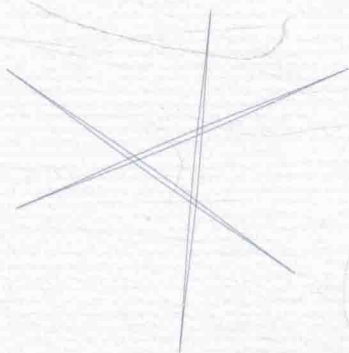
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Preface *

Noam Chomsky

As discussed in the introduction to the first (1995) edition, the essays included here draw from ongoing work from the late 1980s through the early 1990s.

It is important to recognize that the minimalist program (MP) under development in this work, and since, is a *program*, not a *theory*, a fact that has often been misunderstood. In central respects, MP is a seamless continuation of pursuits that trace back to the origins of generative grammar, even before the general biolinguistics program, as it is now often called, began to take shape in the 1950s.

In particular, a leading concern from the outset had been to clarify the concept "simplest grammar" and to determine how to choose the simplest grammar for each language.[1] The basic reasons are just normal science. Since Galileo, modern science has been guided by his maxim that nature is simple and it is the task of the scientist to show that this is the case. It has long been clear that the quest for simplicity is closely related to the quest for explanation, matters clarified by the important work of Nelson Goodman at mid-century. At about the same time, the basic point was expressed by Einstein in his characteristic way:

> Time and again the passion for understanding has led to the illusion that man is able to comprehend the objective world rationally, by pure thought, without any empirical foundations—in short, by metaphysics. I believe that every true theorist is a kind of tamed metaphysicist, no matter how pure a "positivist" he may fancy himself. The metaphysicist believes that the logically simple is also the real. The tamed metaphysicist believes that not

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[1] See Chomsky (1951) and subsequent publications from the 1950s.

all that is logically simple is embodied in experienced reality, but that the totality of all sensory experience can be "comprehended" on the basis of a conceptual system built on premises of great simplicity. The skeptic will say that this is a "miracle creed." Admittedly so, but it is a miracle creed which has been borne out to an amazing extent by the development of science (Einstein 1950, 13).

As discussed in the 1995 introduction, two distinct notions of simplicity were pursued in early generative grammar: the general notion that Einstein refers to and that Goodman sought to sharpen, holding of rational inquiry generally; and a theory-internal evaluation procedure designed to select the optimal grammar for given data, within the format determined by Universal Grammar (UG), which is understood in the modern literature to be the theory of the biological endowment of the relevant components of the faculty of language (FL). In effect, this yields an abstract language acquisition device (LAD)—but one that is unfeasible, as was recognized at once.

A more specific concern arose as the biolinguistic framework took shape from the 1950s. Any complication of UG poses barriers to some eventual account of evolution of FL.[2] There is, then, an additional and compelling reason to seek the simplest formulation of UG, eliminating stipulations, redundancy, and other complications, insofar as possible. MP is the current version of this quest, within the general framework under consideration here.

MP was a natural development after the crystallization of the Principles and Parameters framework (P&P) in the early 1980s. P&P overcame fundamental quandaries of the earlier framework, eliminating the need for an evaluation procedure, as discussed in the 1995 introduction. That leaves us with only the general notion of simplicity and the specific concern for reducing UG to the minimal extent possible, now motivated in addition by concern about language origins that began to be discussed more seriously, but without much progress, in

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[2] Commonly misnamed as *evolution of language*; languages change, but do not evolve.

the 1970s.[3]

P&P has been pursued very productively providing a vast array of new empirical materials in languages of great typological variety, studied in much greater depth than heretofore. It also revitalized psychology of language, historical and comparative linguistics, and other related disciplines, and has led to innovative and highly insightful theoretical/empirical inquiry (see, e.g., Baker 2003, Longobardi 2003, Kayne 2013).

The 1995 introduction takes note of "a problem for the biological sciences that is already far from trivial: how can a system such as human language arise in the mind/brain...?" The problem is no doubt a significant one. To address it seriously, one must satisfy two elementary conditions. The first requirement is to determine as best one can the nature of the phenotype—that is, what has evolved, namely FL. One must begin with the most satisfactory version of UG. No biologist, for example, would present a proposal about the evolution of the eye without presenting a clear account—preferably, the best available one—of what an eye is. That is close to truism, as is the second condition: pay attention to the empirical evidence about the origin of language.

The evidence is slim, but not zero. There are two empirical theses about origin of language (and, it can be plausibly argued, little more than these[4]). One, established with considerable confidence, is that there has been little if any evolution of FL since our ancestors left Africa, some 50,000-80,000 years ago. The second, proposed with fair confidence, is that not long before this, there is no reason to believe that language existed at all (Tattersall 2012). If so, then FL emerged suddenly (in evolutionary time), and we would expect it to be quite simple, its basic properties largely determined by laws of nature and by extralinguistic contingencies. Since language is clearly a computational system, the relevant laws of nature should include (and perhaps be limited to) principles

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[3]   Piatelli (1974), where the term *biolinguistics* was introduced, by the editor, to refer to the approach that was being pursued in work in generative grammar.

[4]   On the dubious character of much current work, see Hauser et al. (2014).

of efficient computation. These considerations lend some independent reason to suspect that the research program of MP is on the right track.

While a direct continuation of work from the earliest days, the MP did formulate a new research program, sometimes called "approaching UG from below." Pursuing this program, we seek to formulate a "perfect" solution to the conditions that language must meet, and then ask to what extent the many complex and varied phenomena of actual languages can be accounted for in these terms. By *language* here we mean I-language, what was called *grammar* in earlier work, in one of the uses of this systematically ambiguous term.[5]

The basic principle of language, henceforth BP, is that each language yields an infinite array of hierarchically structured expressions, each interpreted at two interfaces, conceptual-intentional (C-I) and sensorimotor (SM)—the former yielding a "language of thought" (LOT), perhaps the only such LOT; the latter in large part modality-independent, though there are preferences. The two interfaces provide external conditions that BP must satisfy, subject to crucial qualifications mentioned below. If FL is perfect, then UG should reduce to the simplest possible computational operation satisfying the external conditions, along with principles of minimal computation (MC) that are language-independent. The Strong Minimalist Thesis (SMT) proposes that FL is perfect in this sense.

SMT is not precisely formulated. MC can be interpreted in various ways, though some of its properties are uncontroversial, and reliance on these carries us a long way, as work stimulated by MP has shown. There is a plausible suggestion

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[5] See the 1995 introduction. The term *I-language* (internal language viewed intensionally) was suggested in Chomsky (1986) in an effort to resolve the confusions caused by the ambiguity of the term *grammar*, which had been used both to refer to the object under investigation (I-language) and to the theory of that object. I also introduced another term, *E-language* (external language), referring to any other conception of language, and observed that there may be no coherent notion of "E-language". Since then the term has been used in a variety of ways, sometimes to refer to a (necessarily) finite corpus of data, sometimes to the set of expressions weakly generated by a generative grammar, analogous to the well-formed formulas of invented logical systems—a notion that may not even be definable for natural language, as discussed in Chomsky (1955), but at best is derivative from the more basic notion of strong generation of structures. My own feeling is that the term *E-language* should simply be ignored.

as to what the simplest computational operation is: Merge, as defined within MP.[6] SMT accords with the guiding principle of the natural sciences, and there is reason to expect something like this to be correct on evolutionary grounds. But of course, evaluation of the thesis is based on the empirical consequences of pursuing it.

When the first edition of *The Minimalist Program* was published, the thesis seemed too extreme to be seriously proposed. In the years since, I think that skepticism has been considerably lessened. There have been some results that seem to me to provide substantial evidence that the pursuit of this program is on the right track.

One result has to do with the strange property of displacement that is ubiquitous in natural language: phrases are understood both where they are heard, and in a position that is not articulated. To take a very simple case, the sentence *which book did John read?* is understood to mean roughly "for which book X, John read the book X"; the phrase *which book* is interpreted both where it appears and as the direct object of *read*, where it is not articulated. The same holds for quite intricate expressions. Displacement had always seemed—to me in particular—as a curious imperfection of language. Why should languages resort to this device in a very wide range of constructions? Pursuit of SMT reveals that displacement with this property of multiple interpretation ("the copy theory of movement") is the simplest case. Some stipulation would be required to block it, and correspondingly, any devices designed to yield the result that comes free under SMT has an even heavier empirical burden to bear. This is a significant discovery I think—too long in coming, and insufficiently appreciated, as are its consequences.

One immediate consequence is that SMT yields structures that are appropriate for C-I interpretation, but obviously wrong for the SM interface, where all but the hierarchically most prominent copy is deleted (with interesting

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[6] For discussion of this topic, see the papers collected in Graff and van Urk (2012). And for some recent updates, see Chomsky (2013a, 2014). And see sources cited in these papers.

qualifications, which in fact support the conclusion). That follows from another application of MC: in externalization, reduce computation and articulation to the minimum. The result is that the sentences that are heard have gaps, leading to serious problems for parsing and perception, so-called "filler-gap" problems. We therefore have strong evidence that the basic design of language determines a crucial asymmetry between the two interfaces: the C-I interface is privileged; externalization in one or another sensory modality (or none at all, as in thought) is an ancillary feature of language. If so, then specific uses of externalized language, such as communication, are peripheral to the core elements of language design and evolution of FL, contrary to widespread doctrine.

There is a great deal of additional evidence supporting this conclusion, and none that I know of that is inconsistent with it. One important case is another curious property of language: structure-dependence of rules, a universal property that has been a puzzle since the 1950s. To illustrate, consider such simple sentences as *instinctively, eagles that fly swim* and *Can eagles that fly swim?* Here the initial adverb or auxiliary verb does not relate to the linearly proximal verb *fly* but rather to the linearly remote but structurally proximate verb *swim*. The observation holds for all relevant constructions in all languages, and it has been shown that children know the facts and make no errors as early as testing is possible (Crain and Nakayama 1987). It is next to inconceivable that these facts are learned.[7] The long-standing puzzle is that the procedure that is universally rejected, based on linear distance, is computationally far simpler than the one that is universally adopted, based on structural distance. The only known reason is that linear order is simply not available to acquisition of I-language, despite the fact that it is everywhere in the data. It appears that the internal system, biologically-determined, observes SMT and therefore ignores linear order in

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[7] There have been heroic efforts to demonstrate the contrary (in the case of the auxiliary, not adverb construal). Every attempt that is clear enough to investigate fails, irremediably (see Berwick et al. 2011), but more interestingly, it would be of little interest even if some such effort were to succeed. The attempts fail to address the only significant question: Why? Why is it the case that this property is ubiquitous and exceptionless? I know of no answer other than the one repeated here.

favor of structural distance.

Linear order and other arrangements therefore appear to be reflexes of the SM modalities for externalization, having nothing particular to do with core elements of language design (though of course they have a variety of secondary effects). That conclusion fits with the very limited evidence about origin of language. The SM systems long antedate the apparent emergence of language, and do not seem to have been modified significantly afterwards (not surprisingly, given the very brief time period prior to the departure of *homo sapiens* from Africa).

It is a familiar fact that the complexity and variety of language appears to be localized overwhelmingly—and perhaps completely—in externalization (which includes Saussurean arbitrariness of the lexicon). In learning a language, the real problem is mastering externalization. Principles of semantic interpretation are virtually unlearnable, beyond the most superficial cases, and are probably simply determined by UG; and the same appears to be largely or completely true for the syntactic operations ("narrow syntax") that yield the structures at the C-I interface. A possible account of the origin of language is that some rewiring of the brain, presumably the result of some mutation, yielded the simplest computational operations for BP, including the link to some preexisting conceptual structures CS,[8] providing a LOT. Since this emergent system would have been subject to no selectional pressures, it would have assumed an optimal form in accord with natural law—specifically, MC—rather the way a snowflake forms. A subsequent task is to relate this system to some sensory modality for externalization, a nontrivial cognitive problem since input and output have no intrinsic relations (apart from possible effects of later adaptation). It is a task that can be solved in many ways, leading to the variety of languages, each easily

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[8] For further discussion, see Chomsky (2010). It is important to recognize that CS for humans appears to be radically different from the elements of symbolic/communication systems in other animals (See Petitto 2005, Chomsky 2013a), a fact that poses very serious problems for the study of origin of human cognitive capacities.

subject to the effects of historical accident. There are doubtless constraints on how externalization takes place—the principles of morphology, phonology, prosody, etc. But it may be that evolution played a slight role in establishing these constraints.

The general picture accords pretty well with what we know about language. The crucial question, of course, is to what extent SMT can in fact account for the relevant phenomena of language. There has, I think, been substantial progress in moving towards this goal, with some significant results, such as those just mentioned.[9] Needless to say, there remain vast areas to explore to determine how far SMT can reach, but the prospects seem exciting and certainly challenging.

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[9] For some recent ideas, see Chomsky (2013a, 2014).

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序 言（一）

诺姆·乔姆斯基

如 1995 年出版的第一版《引言》所述（以下简称"引言"），本书所收论文来自上个世纪 80 年代后期至 90 年代早期持续研究的成果。

该研究工作自开始以来致力发展的"最简方案"只是方案，而非理论，明白这一点非常重要，可这一事实常常被误解。最简方案就其内核而言是对初创伊始追求目标的自然延续。该目标的提出甚至早于成形于上个世纪 50 年代的另一方案，即我们今天所说的生物语言学方案。

最简方案从一开始就特别关注如何明确何谓"最简语法"，以及确定如何为每一种语言选取最简语法。[10] 根本的原因就在于常态科学。自伽利略开始，现代科学一直以"自然是简单的"这一格言为指引，科学家的任务就是要揭示出情况恰是如此。长久以来人们都很清楚，对简单性的探求与对事物解释的探求紧密相关。在上个世纪中叶，相关问题在纳尔逊·古德曼的重要研究成果中已经得到澄清。几乎在同一时间，爱因斯坦也以他特有的方式阐述了这一基本观点：

> 对知性的激情屡次导致人们产生出这样的错觉：在不借助任何经验基础，而依靠单纯思维的情况下，人能够理性地理解客观世界。简言之，就是依靠形而上学的深奥推理。我相信每一位真正的理论家不论如何标榜自己是纯粹的"实证主义者"，都是某种意义上驯服的形而上学学家。形而上学学家相信逻辑为简者即为实。驯服的形而上学学家则相信并非所有逻辑为简者都会体现在经验实体之中，而应该是在以高度简约为前提的概念系统的基础之上，所有感官经验的总和能被"理解"。怀疑论者会说这是"奇迹信条"。即便承认如此，这一奇迹信条被科学发展所证实的程度

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[10] 请参看 Chomsky（1951），以及上个世纪 50 年代以来的文献。

令人震惊（请参看 Einstein 1950）。

如引言中所述，生成语法早期探索了两类不同的简单性：一是爱因斯坦所指，并由古德曼进一步明确的一般意义上的简单性，它普遍适用于理性探索；二是理论内部评价程序，即在普遍语法所决定的格式内为特定语言挑选最优语法。该程序在现代文献中被看作是语言官能相关组成部分的生物遗传属性。实际上，生物遗传属性决定了抽象的语言获得机制——但是这种机制并不可行，原因立刻可以察觉。

随着上个世纪 50 年代生物语言学框架逐渐形成，人们开始关注更为具体的问题。任何将普遍语法复杂化的做法都会阻碍对语言官能进化的最终阐释。[11] 如此，必须另有强有力的理由来寻求普遍语法的最简构想，尽可能取消各种规定、冗余以及其他的复杂情况。最简方案是这一探索的现行模式，处于本文考虑的总体框架之内。

上个世纪 80 年代原则与参数框架（以下简称"原–参框架"）逐渐清晰具体之后，最简方案也就自然应运而生。正如引言所述，原–参框架克服了之前框架中的种种困惑，不再需要评价程序。这样我们就只剩下一般意义上的简单性概念，只需要具体考虑如何使普遍语法尽可能达到最简。此外，目前对语言起源问题的关注也推动了相关探索。有关语言起源问题的探讨今天更为严肃，而上个世纪 70 年代的研究则进展甚微。[12]

原–参框架指导下的研究卓显成效，提供了大量涉及各种类型语言的新经验材料，并且其深度也是前所未有。原–参框架也给语言心理学、历史和比较语言学以及其他相关学科注入了新的活力，并将研究指向一条富有创新精神和具有高度洞察力的理论 / 经验探索之途（请参看 Baker 2003、Longobardi 2003 和 Kayne 2013，以及其他文献）。

引言注意到"一个已经非常重要的生物科学问题：在心智 / 大脑中如何会出现人类语言这样的系统……？"这无疑是一个意义重大的问题。要严肃地探讨这一问题，就必须满足两个基本条件。第一个条件是尽可能确定表现型的本质，也就是要确定是什么进化了（即语言官能）。我们必须

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[11] 通常被错误地命名为"语言进化"。语言会变化，但不会进化。

[12] "生物语言学"这个术语在 Piatelli（1974）一文中首次由编者提出，用于指称生成语法研究中所采用的方法。

要对普遍语法有最令人满意的认识才能开始探讨这一问题。例如，在还无法清楚解释（最好是可获得的最佳解释）眼睛是什么的情况下，没有任何生物学家会提出有关眼睛进化的观点。这几乎是不言自明之理。第二个条件也是不言自明之理，那就是要关注语言起源的经验证据。

证据虽少，却也并非没有。关于语言起源有两个经验命题（可以进行合理论证，结果可能不止两个 [13]）。我们有充分的信心确立第一个命题，即从我们的祖先大约在五万至八万年前离开非洲至今，语言官能几乎没有经历任何进化。我们对于第二个命题也比较有信心，即没有理由相信此前不久的一段时间内曾存在语言（请参看 Tattersall 2012）。如果情况如此，那么（在进化期间）语言官能是突变的结果。我们可以预料语言官能相当简单，其基本属性在很大程度上由自然法则和语言之外的偶然事件所决定。既然语言毫无疑问是一个运算系统，那么相关的自然法则应当包括（有可能仅限于）高效运算的原则。这些考虑可以提供独立的理据来检测最简方案的研究方向是否正确。

作为最初研究工作的直接延续，最简方案的确形成了新的研究方案，有时被称为"自下而上的普遍语法研究"。沿着这一方案，我们的目标是要找到一个"完美"的解决方案，用来解决语言必须满足的条件问题，然后我们还要探询真实语言中许许多多、各种各样的现象能在多大程度上用这些方法来阐释说明。此处所说的"语言"是指 I- 语言，在早期的研究中被称为"语法"。"语法"这个术语有系统性歧义，我们采用的是其中一个用法。[14]

语言的基本原则是：每种语言产生出具有层级结构的表达式，这些表达式构成一个无限矩阵。每个表达式都在概念－意图接口和感觉运动接口两个接口处进行解读。前者产生"思维语言"，可能是唯一的思维语言。后

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[13]　目前许多研究工作还令人存疑。有关这一特点请参看 Hauser et al. (2014)。

[14]　请见序言。"I- 语言"这一术语是 Chomsky (1986) 提出，目的是解决"语法"这一术语歧义引起的混淆。人们既用"语法"指研究的对象（I- 语言），也用它来指该对象的理论。我还引入了另一术语，"E- 语言"（外部语言），用以指任何其他的语言概念。我注意到人们对于"E- 语言"并没有连贯一致的概念。因此，这个术语的使用方式也各不相同。有时它指的是（必须为）有限的语料库，而有时它指的是生成语法弱生成出的表达式集合，类似于创造出的逻辑系统中形式完好的公式——正如 Chomsky (1955) 所述，对于自然语言而言，这甚至也许是一个无法定义的概念。不过这个概念充其量也就是从更基本的结构强生成概念派生得出。我自己的感觉是，应该忽略 E- 语言这个术语。

者在很大程度上产生的是独立的模态，不过会有优先选择的情况。两个接口提供语言基本原则必须满足的外部条件，这些条件受制于下文提及的关键条件的制约。如果语言官能是完美的，那么普遍语法应该可以连同独立于语言的最简运算原则一起简化为满足外部条件的最简运算操作。强势最简命题认为在这一点上语言官能是完美的。

强势最简命题尚未得到精确表述。最简运算条件可以有多种解读，尽管在某些属性上不存在争议。在最简方案框架下的研究工作已证明了这一点。关于什么是最简运算操作的合理建议是：最简方案中的合并操作就是最简运算操作。[15] 强势最简命题符合自然科学的指导原则。从进化的角度来看，我们有理由期待这样的命题是正确的。不过，该命题的评价基础当然是探求这个命题所产生的经验后果。

在第一版《最简方案》中，强势最简命题似乎过于极端，考虑还不够成熟。在此后的几年中，我想人们已经极大地改变了怀疑的态度。在我看来，某些研究成果提供了大量的证据表明这一方案的探索方向是正确的。

成果之一与移置的奇特属性相关。移置是自然语言中的普遍现象：短语既在它们被听到的位置获得释义，也在没有发音的位置得到解读。举个很简单的例子，which book did John read?（"约翰读了哪本书？"）这个句子的意思大致是 for which book X, John read the book X（"对于书 X，约翰读了 X"）。短语 which book 既在它出现的位置被解读，也被解读为 read 的宾语。但在宾语位置并未发音。复杂的情况也是如此。移置现象是语言不完美性的表现，一直令人感到好奇，我个人尤其认为如此。为何语言在众多的结构式中采用这一机制？对强势最简命题的探索显示，具有多重解读的位移（"移动的拷贝理论"）是最简单的情况。要阻止强势最简命题的探索就必须做出某些强制规定。相应地，为了产出在强势最简命题下无需花费成本即可得到的结果而设计的任何机制都要承受更沉重的经验负担。我认为这一发现意义重大，尽管发现得太晚，认识也还不够充分。与之相应的后果亦是如此。

直接后果之一是：强势最简命题产生的结构适于概念－意图接口的解

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[15] 关于此话题的讨论，请参看 Graff and van Urk（2012）收录的论文集。关于近期更新的讨论，请见 Chomsky（2013a, 2014）。

读，但是这样的结构对于感知运动接口而言显然为错。在感知运动接口，层级排列最显著的拷贝得以保留，其余的拷贝都被删除（删除的限制条件值得探讨，这些条件实际上支持了该结论）。上述现象来自最简运算的另一应用，即：在外化过程中，将运算和发音减至最低。由此产生的结果是，我们听到的句子带有许多空位，造成严重的分析和感知问题，即所谓的"填充语－空位"问题。因此，我们有强有力的证据表明语言的基本设计决定了两个接口间具有重要意义的不对称特性：概念－意图接口优先，某种知觉模态的外化（或根本没有任何知觉模态，如在思维时）是语言的辅助特征。如果情况如此，外化语言的具体使用，如交际等，相对于语言设计和语言官能进化的核心成分而言是边缘现象。这与人们普遍了解的说法相反。

还有大量其他的证据支持这一结论，而且据我所知，还没有任何与此相悖的证据。其中一个重要现象与语言的另一个奇特属性，即规则的结构依赖性相关。这是上个世纪 50 年代以来一直令人困扰的普遍属性。为了说明的需要，请看这样一些简单的例句，如："instinctively, eagles that fly swim"（"本能上，会飞的鹰会游泳"）和 "can eagles that fly swim"（"会飞的鹰能否游泳"）。两句中句首的副词或助动词与在线性顺序上最近的动词 fly 无关，却与线性顺序距离远，而结构上最近的动词 swim 相关。这一事实存在于所有语言中的所有相关结构式中。研究表明儿童知道此类事实，并且从最早能进行测试时开始儿童就不会在这些方面犯错（请参看 Crain and Nakayama 1987）。要说这些事实是儿童学会的，那是令人难以置信。[16] 长期以来，大家都普遍摒弃基于线性距离的程序，而普遍接受基于结构的程序，但是前者在运算上却比后者更简单，这是为什么。已知的唯一原因是，虽然线性语序在语料中无处不在，但却在 I- 语言获得中不可用。生物属性所决定的内部系统似乎遵循强势最简命题，结果就是内部系统会选择结构距离而忽视线性语序。

由此看来线性语序以及其他排列是感知运动接口外化模态的体现，与

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[16] 也有学者勇气可嘉，试图论证相反的情况（助动词的情况，而非副词的识解）。每次尝试只要足够清晰到可以开展调查研究，就都失败了，而且无可补救（请参看 Berwick et al. 2011）。然而让人觉得更有趣的是，即使这类努力还要继续进行下去，但是已毫无益处。这些努力都没有涉及唯一意义重大的问题：为何如此？为何情况会是，这一属性普遍存在且没有例外？除了在此重复的答案外，我觉得别无他法。