CHAPTER 18

AMERICAN DESCRIPTIVISM ('STRUCTURALISM')

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18.1 A GENERAL REAPPRAISAL

FROM a contemporary standpoint, the period from the early 1940s to the late 1950s may appear as a minor interregnum between the Bloomfieldian and Chomskyan eras. It is difficult to identify any single work from this period with the iconic status of Bloomfield's *Language* (1933) or Chomsky's *Syntactic Structures* (1957a), and many of the works that are still cited from this time, such as Newman's 1944 grammar of Yokuts or Hockett's 1939 Potawotami studies, are referenced more for their descriptive content than for their theoretical insight. The breadth and diversity of the material covered in textbooks such as Gleason (1955) and Hockett (1958) can also make these works seem like relics of an era before scientific specialization took hold in the field. The assessments offered in transformational histories (Newmeyer 1986) and in critiques of what are sometimes termed 'taxonomic linguistics' (Chomsky 1964a) reinforce the impression of a period dominated by descriptive and methodological concerns that retain little current relevance.

Yet a re-examination of the work from this period shows the popular conception to be a crude caricature. By any objective measure, the decade between 1945 and 1955 was decisive for the development of modern linguistics. This period saw the ascendance of a distinctive American school of general linguistics that placed an explicit emphasis on synchronic analysis. Over the course of the decade, the focus of study within this school also shifted gradually from the description of languages to the investigation of methods, techniques, and theories about languages. Together, these developments ushered in an approach to the study of language which is now largely taken to define the field of linguistics.

Any attempt to assess the impact of the school that dominated American linguistics through most of the 1940s and 1950s must begin by acknowledging a number of

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striking anomalies. Although the members of this school identified themselves as 'descriptivist,' they have come to be known by a term, '(American) structuralist,' that was mainly applied to them by their detractors. They collectively looked on Leonard Bloomfield as a mentor and sought to develop a Bloomfieldian programme, but scarcely any of them studied with Bloomfield and virtually all quickly abandoned fundamental aspects of Bloomfield's model. Despite the fact that their own models laid the foundations for much of modern linguistics, the 'revolutionary' rhetoric of their Chomskyan successors denied them a role in the intellectual developments that they had set in motion.

A greater irony concerns their effect on the basic subject-matter of linguistics. Although the descriptivists admired Bloomfield for his mastery of languages, both ancient and modern, their efforts to redefine linguistics as a science effectively cut the field off from the older philological tradition in which Bloomfield had been trained. Within a generation, the focus of linguistics had shifted from the detailed study of languages by language specialists to meta-level investigations of the methods and devices employed in linguistic analysis.

For many contemporary linguists, this shift in focus is to be welcomed, as it is precisely what distinguishes what they see as the science of linguistics from other, ostensibly more humanistic approaches to the study of language. But this scientific shift was initially motivated—and has since been sustained—by the belief that the formal analysis of language would reveal fundamental commonalities and bring out a rich deductive structure that is masked by surface variation. By some measures, the field of linguistics is no closer to being a science that trades in these kinds of generalizations than it was in the 1940s (Blevins 2008), and may even be further away, insofar as the philological expertise required for detailed linguistic analysis is disappearing nearly as quickly as languages. So there is perhaps a further irony in the fact that any rehabilitation of the descriptivists must acknowledge that their largely uncredited contributions ultimately undermined the traditions out of which they had grown, without establishing a secure basis for a deductive science of language.

At the same time, some of the aspects of the descriptivists' programme that were most vigorously repudiated by their generative successors have received a new lease on life within current statistically and corpus-based paradigms. Although Chomsky's scepticism about the usefulness of corpora[1] and statistical models[2] came to set the tone for theoretic studies during the transformational period, his initial objections to statistical models have since been addressed in works such as Pereira (2002), while an entire subfield of corpus linguistics has grown up to provide a sustained argument for the value of corpora and corpus-based methods. The interest in information theory

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[1] 'Any natural corpus will be skewed . . . The corpus, if natural will be so wildly skewed that the description [that it provides] would be no more than a mere list' (Chomsky 1962: 159).

[2] 'It would, incidentally, not be surprising if statistical models turn out to be of little relevance to grammar' (Chomsky 1957b: 224).

shown by Harris (1951) and Hockett (1953) likewise finds a contemporary resonance in the application of information theory in models of psychological processing (Moscoso del Prado Martín et al. 2004, Milin, Kuperman, et al. 2009) and, increasingly, in analyses of complex synchronic systems (Ackerman et al. 2009, Malouf and Ackerman 2010b).

18.2 THE BLOOMFIELDIAN LEGACY

In order to appreciate the breadth of the descriptivists' contributions and gauge their influence on the contemporary field of linguistics, it is useful to place their school in the intellectual context in which it arose, and identify the principal developments within this tradition. Despite the fact that a number of leading descriptivists were in fact trained by Edward Sapir, it is the work of Leonard Bloomfield that provides the point of origin for this school. Four broad tributaries lead off from the Bloomfieldian source. The first and best known is the theoretical tradition associated with figures such as Charles Hockett, Zellig Harris, and Bernard Bloch, among others. Since this group has had the greatest contemporary influence, they will be the primary focus of this chapter.

The development of Bloomfield's 'tagmemic' theory associated with Kenneth Pike is even more distinctive, though its influence is now largely confined to the Summer Institute of Linguistics. The two other main tributaries have since merged with more general linguistic currents. The first of these was devoted to theoretical and pedagogical treatments of English. Prominent members of this community included George Trager, Henry Lee Smith, and Charles C. Fries, though these linguists tended to have other linguistic interests as well, while figures such as Kenneth Pike, Eugene Nida, and Bernard Bloch also took an interest in English description and pedagogy. A second tradition applied methods of descriptive analysis to Algonquian and Austronesian languages, though this tradition is now largely remembered for its surviving descriptions and for the inscrutable nomenclature that Bloomfield bequeathed to Algonquian studies.

18.2.1 The Post-Bloomfieldians

In light of the shadow that the towering figure of Leonard Bloomfield casts over the entire descriptivist period, there is some justification in designating this tradition as 'Post-Bloomfieldian' (Matthews 1993). Many of the works that appeared in the first flush of descriptivism in the early 1940s had something of the character of Bloomfieldian exegesis. Throughout the period, Bloomfield's position on a range of issues continued to provide a standard point of departure for further discussion. To a large degree, this impact reflected the influence of Bloomfield's scholarship, particularly his

monumental work *Language*, which served the dual function of a reference work and textbook from its publication in 1933. Bloomfield's influence on the teaching of linguistics was also amplified by his participation in Linguistic Institutes of the Linguistic Society of America.

Yet Bloomfield exerted far less influence through the students that he trained, initially at the University of Chicago and later at Yale. Charles Hockett, who was Bloomfield's literary executor and, in many ways, his intellectual heir, studied under Sapir at Yale. Zellig Harris, Hockett's opposite number at the University of Pennsylvania, originally trained there as Semiticist in the Oriental Studies department. Kenneth Pike, the only Descriptivist to take up the task of developing Bloomfield's tagmemic theory, studied with Sapir at the University of Michigan (where, however, Bloomfield served as a member of his dissertation committee). Eugene Nida also studied at Michigan, Stanley Newman again under Sapir at Yale, George Trager at Columbia, Rulon S. Wells III at Harvard, and Robert A. Hall Jr at the University of Rome. Bernard Bloch, nearly the only leading Descriptivist actually to have studied with Bloomfield, summed up Bloomfield's paradoxical influence in remarking, 'He had almost no students, yet most American descriptivists look up to him as a teacher' (Bloch 1941: 91).

The discrepancy between Bloomfield's direct and indirect influence goes a long way towards explaining his paradoxical impact on the descriptivist period. While looking on Bloomfield as a mentor, the descriptivists mostly found themselves in the position of extrapolating from his writings, which were then as now notoriously difficult to interpret. The scale of the challenge is reflected in the striking divergence between Bloomfield's own work and the elaborations of the 'Bloomfieldian' programme. In some cases, it was possible to sidestep interpretive difficulties by acknowledging a debt to Bloomfield's methods rather than to substantive principles or results. Thus one finds the opening footnote in Hockett (1942: 3) declaring: 'This paper . . . owes most to Bloomfield, though rather to the methodological rigor of his work than to his phonemic theories.' Fortunately, the descriptivists—with the exception of Harris—did not aspire to the same economy of expression that they professed to admire in Bloomfield.

Studies that explicitly aimed to clarify or develop Bloomfield's principles mostly ended up missing their mark and redefining the original principles beyond all recognition. The theory of tagmemics developed by Pike provides a celebrated example, but nearly all of the extensions of Bloomfield's programme have a similar character. Pike (1943) sets out initially to address problems of interpretation that faced students who attempted to use Bloomfield's *Language* as a model for descriptive analysis. Noting that this 'material proves more elusive in application than it did in appreciation,' Pike proceeds to suggest 'that part of the difficulty of Bloomfield's material for the beginning student was the lack of clarity in his statements of the relationship between taxemes and tagmemes, and the actual operation with these principles,' declaring his intention 'to point out this confusion, and . . . to outline a procedure which a student can apply to the easier stages of syntactic analysis' (p. 65). Yet the approach that Pike (1967) developed to 'clarify' these relationships was an entirely new theory, with little more than a terminological resemblance to Bloomfield's original model.

The difficulties that the descriptivists encountered in interpreting Bloomfield are candidly acknowledged in their claims at the time that his model seemed to them to contain 'contradictions' (Harris 1942: 169) or in later admissions that it 'didn't make sense' (Hockett 1968: 20). It is easy for today's observer to underestimate these difficulties, given that Bloomfield is in some ways more accessible now than he was to his immediate successors. This change is due in part to the anthologies that bring together a range of Bloomfield's writings (Hockett 1970) and in part to the secondary literature that has since grown up around Bloomfield (Matthews 1993, Fought 1999). In addition, Bloomfield's use of features of arrangement (or 'taxemes') to classify the properties of larger constructions ('tagmemes') resonates with construction-based perspectives. But to Bloomfield's successors, the model appeared convoluted and inconsistent, and they proceeded in their own work to isolate and develop the aspects which seemed to them to be most comprehensible and promising.

18.2.2 The Representational Turn

The invisibility of the descriptivist model is in part a reflection of its success. Many of the innovations that originated in the descriptivist period have come to define what it means to do linguistics, at least linguistics of a formal or theoretical nature. In particular, the practice of analysing language in terms of a set of REPRESENTATIONS, assigned to hierarchically organized levels, is a feature of the descriptivist model that has since been incorporated into most theoretical approaches. Yet this conception of linguistic analysis, like other aspects of the descriptivist model, cannot be understood in isolation. In essential respects, the descriptivist model is an attempt to clarify the model set out in Bloomfield (1933) or to solve problems that the Descriptivists perceived, perhaps unjustly (Matthews 1993), to arise within that model. Hence the descriptivist model must be interpreted in the context in which it evolved: as a development of, and reaction to, the conception of grammatical analysis in Bloomfield's model.

Two of the most influential aspects of Bloomfield's model are the separation of lexical form from grammatical arrangement and the recognition of a separate component, termed the 'lexicon,' which consists of minimal lexical forms.

> A linguistic form which bears no partial phonetic-semantic resemblance to any other form, is a SIMPLE form or MORPHEME . . . The total stock of morphemes in a language is its LEXICON. (Bloomfield 1933: 161f.)

It is natural for a contemporary reader to anticipate later developments and interpret this passage in terms of a hierarchy of linguistic levels, one in which phonemes combine to form morphemes, morphemes combine to form words, words combine to form phrases, and so on. However, the Bloomfieldian conception is more intricate, closer in character to a construction-based approach.

The most challenging aspect of this model is the relation between 'forms' and 'arrangements.' Arrangements are the more transparent notion, corresponding to 'dimensions of grammatically distinctive variation.' Of the four types of arrangement that Bloomfield distinguished, three are relatively straightforward.

> The meaningful arrangements of forms in a language constitute its grammar. In general, there seem to be four ways of arranging linguistic forms. (1) ORDER is the succession in which the constituents of a complex form are spoken . . . (2) MODU-LATION is the use of phonemes which do not appear in any morpheme, but only in grammatical arrangements of morphemes . . . (3) PHONETIC MODIFICATION is a change in the primary phonemes of a form . . . (4) SELECTION of forms contributes a factor of meaning because different forms in what is otherwise the same grammatical arrangement, will result in different meanings. (Bloomfield 1933: 163f.)

The order of formatives is one obvious dimension of variation, and the suprasegmental properties (such as stress or intonation) that Bloomfield subsumes under modulation are another. His notion of phonetic modification likewise covers a range of contextually conditioned phenomena, including devoicing or sandhi patterns. Although arrangements do not form a classificatory system in later accounts, each arrangement type has a counterpart in descriptivist models.

The notion of 'selection' is what gives Bloomfield's model its distinctive character. The basic idea is simple, and even familiar to those accustomed to thinking in construction-based terms. Rather than treating forms solely as the sum of independently assembled parts, the Bloomfieldian model integrates a top-down perspective in which constructions are described in terms of characteristic choices of components. The reason that this is not merely a different perspective on the bottom-up assembly of forms from minimal elements is that selection is associated with a meaning (what Bloomfield calls an 'episememe') in addition to the meanings contributed by the parts selected (which he terms 'sememes'). As elsewhere, Bloomfield's terminology makes an already difficult conception even more obscure. However, the key feature of this conception is that meaningful 'units of form' do not just comprise segmental material, but include any distinctive characteristics that can be ABSTRACTED from a form. It is of course possible to think of minimal lexical forms, i.e. 'morphemes,' as being represented independently of the forms from which they are abstracted. But it is not possible to conceive of minimal units of grammatical form, i.e. 'tagmemes,' in the same way. In later post-Bloomfieldian accounts, the notion of selection is encapsulated in rules or complex lexical entries. But Bloomfield describes selectional taxemes with reference to forms or construction types that exhibit them. It is therefore misleading to think of Bloomfieldian analysis as consisting of the disassembly of complex forms into minimal units of lexical and grammatical form, and the assignment of these units to separate lexical and grammatical inventories. Analysis is more a process of classification in which complex forms perform a dual function, providing the data to which procedures of analysis are applied, and at the same time serving as the repository of units of grammatical form.

18.2.3 From Phone to Utterance

The attempt to combine both perspectives in a single model seems to have confounded even Bloomfield's own followers, and the various strands of descriptivist thought largely reflect different reinterpretations of Bloomfield's positions. A key simplifying assumption accepted by nearly all the descriptivists—apart from Pike—was the idea that units at one level of analysis were directly COMPOSED OF units at the next lower level of analysis. Hence, morphemes were composed of phonemes, complex forms composed of morphemes, etc. The justification for this assumption is set out most explicitly in Hockett (1961).

> The simplest and earliest assumption about the relation between morphemes and phonemes was that a morpheme is COMPOSED OF phonemes: the morpheme *cat* is composed of the phonemes /k/, /æ/, and /t/ in that arrangement. This put phonemes and morphemes in line with words, phrases, and sentences, since it was also assumed that a word consists of one or more morphemes (in a specified arrangement), a phrase of one or more words, and so on.

> This assumption is either explicit, or implicit but very close to the surface, in much of the early Prague discussion and in Bloomfield's postulates. The wording . . . clearly implies that morphemes are composed of phonemes. While Bloomfield does not say quite this, he does say . . . that 'The morphemes of a language can thus be analyzed into a small number of meaningless phonemes.' (Hockett 1961: 29)

As Hockett acknowledges, Bloomfield does not directly assert that morphemes are composed of phonemes; this claim is merely an inference that Hockett and his contemporaries drew from Bloomfield's sometimes opaque discussions of morphology. Bloomfield characteristically spoke of larger units being 'described by' smaller parts, as in the claim that '[a]ny utterance can be fully described in terms of lexical and grammatical forms' (Bloomfield 1933: 167). Description in this sense involves, as noted above, a general process of classification. The shift to a more decompositional part–whole perspective is clear in Hockett's restatement of a general principle of TOTAL ACCOUNTABILITY:

> Every morph, and every bit of phonemic material, must be determined by (i.e., predictable from) the morphemes and the tagmemes (if any) of which the utterance *is composed*. (Hockett 1947: 235, emphasis added)

This shift was the decisive step in the development of what came to be known as the 'item and arrangement' (IA) model (Hockett 1954). More generally, by reinterpreting Bloomfield's taxonomy of forms in terms of a hierarchy of part–whole relations, the descriptivists had arrived at a conception that was strikingly simple and transparent. At each linguistic level, elements could be organized into sequences that formed the primes for the next higher level.[3] The lowest, phonemic level assigned classes of phones

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[3] A similar conception also underlies transformational models (Chomsky 1975a).

to phonemes. The morphemic level organized sequences of phonemes into morphemes. The syntactic level organized sequences of morphemes into larger constituents (Wells 1947). In this way, a uniform part–whole analysis could be extended from phone to utterance.

Uniformity was not regarded solely as an end in itself, but reflected the descriptivists' practical and methodological interest in general procedures of analysis. A model in which levels differ solely in the nature of the elements they contain is susceptible to analysis by means of general procedures of segmentation and classification. The resulting 'Russian doll' model is appealing in its sheer simplicity, so much so that it is still widely assumed in informal presentations of grammar and morphology, particularly in introductory textbooks.

However, in its most basic form, this model was immediately shown to be inadequate or, at the very least, incomplete. In the morphological domain, cases of 'morphologically conditioned allomorphy' presented an immediate problem. An example considered by both Harris (1942) and Hockett (1961) involves pairs such as *knife~knives* and *calf~calves*. Given that the singular form of each pair ends in a voiceless fricative, /f/, and the stem of the plural ends in the voiced counterpart, /v/, the singular and plural forms have no morphemes in common if morphemes are simply composed of phonemes. Characteristically, the descriptivists formulated a number of technical solutions to this fundamental challenge. On one alternative, explored by Harris (1942) and Hockett (1961), an analysis would introduce a morphophoneme '/F/, which represents /v/ before /-z/ "plural" and /f/ elsewhere, and say that there is but one English morpheme /najF/' (Harris 1942: 170). However, descriptivist phonemics suggested a solution which was more compatible with their general model. Hockett (1942) had earlier formulated principles of phonemic analysis that treated PHONEMES as abstract units, representing classes of PHONES with a non-contrastive distribution. Morphemic analysis could be established on exactly the same basis. A MORPHEME could be treated as an abstract unit, which represented classes of MORPHS with a non-contrastive distribution. Defining morphs as sequences of phonemes forged a more indirect link between morphemes and phonemes in a way that avoided the problems posed by morphologically conditioned allomorphy. In the earlier example, the morpheme {KNIFE} represents the two ALLOMORPHS /naif/ and /naiv/, and it is these morphs that are composed of phonemes.

The introduction of a morphophonemic level between morphological and phonological levels removed the main obstacle to the development of a general model of analysis based on classes and sequences. The descriptivists' policy of removing meaning from the grammar proper eliminated 'sememes' and 'episememes' from grammatical analyses. This led in turn to the collapse of Bloomfield's distinction between meaning-bearing tagmemes and sub-meaningful taxemes. What remained then were just two fundamental elements: morphemes, representing classes of morphs, and phonemes, representing classes of phones.

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> Most linguists agree on the existence, or at least on the inescapable utility, of
> two kinds of basic elements in a language: morphemes and phonemes. (Hockett
> 1961: 29)

18.2.4 Constituent Structure Analysis

Reducing Bloomfield's arrangements to selectional and ordering relations between
elements produced a similar simplification at higher levels of the grammar (Matthews
1993: 148). Morphs consisted, as noted directly above, of sequences of phonemes.
Words and larger syntactic constructions were likewise composed of sequences of
morphemes. The model of grammar that emerges from these revisions is a recogniz-
ably modern, constituency-based model.

> We summarize this by asserting that every language has its own GRAMMAR. The
> grammar, or grammatical system, of a language is (1) THE MORPHEMES USED IN THE
> LANGUAGE, and (2) THE ARRANGEMENTS IN WHICH THESE MORPHEMES OCCUR
> RELATIVE TO EACH OTHER IN UTTERANCES. (Hockett 1958: 129)

The 'arrangements' of morphemes were conventionally represented by Immediate
Constituent (IC) analysis. IC diagrams exhibited the structure of an expression by
dividing the expression into parts (its immediate constituents), further subdividing
these parts, and continuing until syntactically indivisible units (morphemes) were
obtained. This style of analysis was motivated in part by a belief in the locality of
syntactic relations, in particular the view that the most important relations held
between immediate constituents.

> The process of analyzing syntax is largely one of finding successive layers of ICs and
> of immediate constructions, the description of relationships which exist between
> ICs and the description of those relationships which are not efficiently described in
> terms of ICs. The last is generally of subsidiary importance; most of the relation-
> ships of any great significance are between ICs. (Gleason 1955: 151)

Although again inspired by the programmatic remarks in Bloomfield (1933), models of
IC analysis were principally developed by Bloomfield's successors, most actively in the
decade between the publication of Wells (1947) and the advent of transformational
analyses in Harris (1957) and Chomsky (1957a). Within this tradition, there was a fair
degree of consensus regarding the application of procedures of IC analyses as well as
about the analyses associated with different classes of constructions. The development
of constituent structure analysis was held back by, among other things, the lack of a
perspicuous format for representing syntactic analyses. The formats explored by the
descriptivists were all somewhat cumbersome, ranging from annotated circuit dia-
grams through charts such as Fig. 18.1 to Chinese box arrangements like Fig. 18.2.

For the most part, these structures segmented an expression successively into sub-
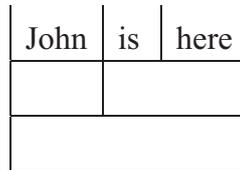expressions, each of which was annotated with a word class label and, usually, other

John	is	here

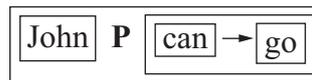FIG. 18.1 Chart-based IC analysis (Hockett 1958: §17)

John **P** can → go

FIG. 18.2 Nested box-based IC analysis

types of information. For example, Fig. 18.2 expresses functional or dependency infor-
mation that is absent from Fig. 18.1 in that 'the arrow points towards the head' in a
modifier–head construction and 'the **P** always faces the predicate in a subject-predicate
construction' (Gleason 1965: 157). But it was not until the early transformational
accounts that procedures of IC analysis were made explicit in any general way, and
the fact that these procedures were first formalized by the Bloomfieldians' successors
had the effect of simplifying the procedures, much as the Descriptivists had themselves
simplified Bloomfield's more intricate constructional perspective.

In Chomsky (1956), phrase structure grammars are proposed as 'the form of
grammar [that] corresponds to [the] conception of linguistic structure' expressed by
IC analysis (p. 111). Chomsky's insight consisted in recognizing how informal proced-
ures for segmenting and classifying expressions could be recast in terms of rules of the
form $A \rightarrow \omega$ that would 'rewrite' a single word class label A by a string ω (which could
consist of labels along with words and formatives).

However, as in the move from the Bloomfieldian to the descriptivist model, the move
from informal procedures of IC analysis to explicit phrase structure grammars
achieved clarity at the cost of simplifying the original model. In particular, initial
formulations of phrase structure grammars were incapable of representing the classes
of discontinuous constituents recognized by the Bloomfieldians, a point that was
conceded in initial models of transformational analysis.

> This [the treatment of 'long components' in the sense of Harris 1951] is an
> important question, deserving a much fuller treatment, but it will quickly lead
> into areas where the present formal apparatus may be inadequate. The difficult
> question of discontinuity is one such problem. Discontinuities are handled in the
> present treatment by construction of permutational mappings from **P** [the level
> of phrase structure, JPB] to **W** [the level of word structure, JPB], but it may turn
> out that they must ultimately be incorporated somehow into **P** itself. (Chomsky
> 1975a: 190)

The transformational tradition never did reconsider whether discontinuities could be handled better within a phrase structure analysis, and no general approach to this issue was explored within constituency-based grammars until much later.[4] Instead, this tradition sought to reinforce the case for 'permutational mappings' (i.e. transformations) by disputing the feasibility of applying procedures of IC analysis to 'derived' constructions such as polar and information questions.

> The case for indirect representation, not based on the relation of membership, becomes even stronger when we consider such sentences as 'did they see John' or 'whom did they see'. *These are sentences that no linguist would ever consider as the starting point for application of techniques of IC analysis*—i.e. no one would ask how they can be subdivided into two or three parts, each of which has several constituents, going on to use this subdivision as the basis for analysis of other sentences, and so on. Yet there is nothing in the formulation of principles of procedure for IC analysis that justifies excluding these sentences, or treating them somehow in terms of sentences already analyzed. (Chomsky 1962: 131f., emphasis added)

The emphasized passage in this quotation testifies to how thoroughly the descriptivist tradition was misunderstood and even misrepresented by its immediate successors. Virtually all leading American linguists of the time, including Hockett, Gleason, Nida, Pike, and Wells, not only considered applying but in fact *did* apply procedures of IC analysis to questions in English. In particular, the analysis of polar questions was regarded as a solved problem and presented as such in the introductory textbooks of the day. In the passage below, Gleason gives what he takes to be an uncontroversial IC analysis of polar questions to exemplify the notion of discontinuous constituents.

> In English, discontinuous constituents occur. One common instance occurs in many questions: *Did the man come?* This is clearly to be cut *did . . . come | the man*. (Gleason 1955: 142)

Hockett (1958) similarly uses polar questions as what he takes to be an uncontroversial illustration of semantically distinctive word order.

> On the other hand, two sentences may involve exactly the same constituents at all hierarchical levels, and yet differ in meaning because of different patterns . . . The difference [between *John is here* and *Is John here*] lies not in constituents, but in their arrangement: *John* respectively before or within *is here*. (Hockett 1958: 158)

The discrepancy between procedures of IC analysis and phrase structure grammars is of more than purely historical interest, given that one of the key criticisms levelled at phrase structure grammars turned on their inability to represent discontinuous dependencies, especially within auxiliary verb phrases.

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[4] Descriptivist analyses are most systematically rehabilitated in the 'wrapping' analyses within the Montague grammar tradition, notably in Bach (1979) and Dowty (1982), in the work of McCawley (1982) and his students Huck (1985), Ojeda (1987), and subsequently in Head Grammars (Pollard 1984) and in linearization-based models of HPSG (Reape 1996, Kathol 2000).

> To put the same thing differently, in the auxiliary verb phrase we really have
> discontinuous elements . . . But discontinuities cannot be handled within [Σ, F]
> grammars [i.e. phrase structure grammars, JPB]. (Chomsky 1957a: 41)

Phrase structure grammars can be regarded as an extreme case of planned obsoles-
cence in that they were designed with representational limitations that transformations
(discussed in §18.3.3) were meant to overcome. It was pointed out almost immediately
(Harman 1963) that these limitations could be overcome by a range of non-transform-
ational means. However, the basic architecture had been established, and later models
retained a simple part–whole constituent analysis, augmented by devices for relating
non-contiguous elements.

18.3 DEVELOPMENT OF THE DESCRIPTIVIST MODEL

At each step in its progression through descriptivist models to current variants of
constituency-based analysis, the Bloomfieldian model was simplified. With each sim-
plification came the need for compensating elaboration elsewhere. In some cases,
particularly in the area of morphology, the trade-off between the simplicity of the
theoretical model and the auxiliary assumptions required to apply the model was
apparent to the descriptivists. In other cases, notably in the domain of syntax, this
kind of cost–benefit analysis was still at a fairly rudimentary stage when the descripti-
vists' influence declined abruptly in the 1960s.

18.3.1 Morphemic Analysis

The development of morpheme-based analyses of word structure shows how the
descriptivists attempted to arrive at an honest accounting of the costs of theoretical
parsimony. The atomistic perspective encapsulated in what is sometimes termed the
'structuralist' morpheme did not originate with the descriptivists. This perspective is
present in an incipient form in Bloomfield's work, where it reflects the influence of the
Sanskrit grammarians (Emeneau 1988).[5]

Nevertheless, Harris (1942) is the point of origin for a recognizably modern form of
morphemic analysis. Subsequent models essentially refine his definitions of mor-
phemes as groupings of morphs that '(a) have the same meaning (b) never occur in

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[5] It was in general via Bloomfield that the insights of earlier philological traditions came to exert an
influence on theoretical developments within the descriptivist school. Bloomfield's particular regard for
the Sanskrit grammarians is reflected in his view that Pāṇini's Sanskrit description provided 'an
indispensable model for the description of languages' (Bloomfield 1929).

identical environments, and (c) have combined environments no greater than the environments of some single alternant in the language' (Harris 1942: 179f.). Within five years, Hockett (1947) had begun to express reservations about morphemic analysis, at least as it had been formulated within what he later called 'item and arrangement' models. By the end of the decade (when most of Hockett 1954 was written), those reservations had led to a repudiation of the item and arrangement model and an initial formulation of an 'item and process' alternative, which rehabilitated the process-based perspective of Sapir (1921). Within twenty years of voicing his initial reservations Hockett (1967) had come to regard morphemic descriptions as nothing more than a 'convenient shorthand' for traditional descriptions in terms of paradigms and principal parts.

> A correct principal-parts-and-paradigms statement and a correct morphopho-neme-and-rule statement subsume the same actual facts of an alternation, the former more directly, the later more succinctly. We ought therefore to be free to use the latter, provided we specify that it is to be understood only as convenient shorthand for the former. (Hockett 1967: 222)

The ascendance of transformational models in the early 1960s, and particularly the treatment of morphology in Chomsky and Halle (1968), gave morphemic analysis a new lease of life, allowing variants of morpheme-based models to survive into the present day. In much the same way, the incorporation of phrase structure analyses into transformational models (as the format of the structures related by transformations) preserved a simplified variant of IC analysis. This restricted form of constituent analysis in turn provided the basis for Generalized Phrase Structure Grammar (Gazdar et al. 1985) and Head-driven Phrase Structure Grammar (Pollard and Sag 1994) and defined the structural backbone of Lexical Functional Grammar (Kaplan and Bresnan 1982).

18.3.2 Distributional Analysis

A common charge levelled against the descriptivists is that they neglected the study of meaning. Lyons covers more or less the entire tradition when he asserts, 'Many of the most influential books on linguistics that have appeared in the past thirty years devote little or no attention to semantics' (1968: 400). However, this neglect is less a descriptivist innovation than a more transparent representation of Bloomfield's own semantic agnosticism. Although Bloomfield had introduced 'sememes' and 'episemes' to represent lexical and constructional aspects of meaning, these 'units' are just placeholders in his model.

> The statement of meanings is therefore the weak point in language study, and will remain so until human knowledge advances very far beyond its present state. In practice, we define the meaning of a linguistic form, wherever we can, in terms of

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some other science. Where this is impossible, we resort to makeshift devices.
(Bloomfield 1933: 140)

As this passage also makes clear, Bloomfield's attitude towards semantics was agnostic rather than hostile. In other discussions of meaning, Bloomfield also emphasizes that the primacy accorded to form is largely a practical matter, reflecting the availability of techniques for describing and classifying forms.

> This re-enforces the principle that linguistic study must always start from the phonetic form and not from the meaning. Phonetic forms—let us say, for instance, the entire stock of morphemes in a language—can be described in terms of phonemes and their succession, and, on this basis, can be classified or listed in some convenient order, as, for example, alphabetically; the meanings—in our example, the sememes of a language—could be analyzed or systematically listed only by a well-nigh omniscient observer. (Bloomfield 1933: 162)

The idea that structural properties of language can be studied independent of meaning or function is of course developed more vigorously by Bloomfield's successors. Trager and Smith approach the description of English with the view that 'the syntax of a language like English can be constructed objectively, without the intervention of translation meaning or any sort of meta-linguistic phenomena' (1951: 68). It is however in the work of Harris that Bloomfield's practical caveats are elevated to a general methodological principal. The outset of the descriptivist period finds Harris proclaiming that 'the structures of language can be described only in terms of the formal, not the semantic, differences of its units and their relations' (Harris 1942: 701). By the time of the classic statement of distributionalism in Harris (1951), Harris had come to regard distributional analysis as defining an entire subfield of linguistics.

> Descriptive linguistics, as the term has come to be used, is a particular field of inquiry which deals not with the whole of speech activities, but with the regularities in certain features of speech. These regularities are in the distributional relations among the features of speech in question, i.e. the occurrence of these features relatively to each other within utterances . . . The main research of descriptive linguistics, and the only relation which will be accepted as relevant in the present survey, is the distribution or arrangement within the flow of speech of some parts or features relatively to others. (Harris 1951: 5)

The resulting model was purely distributional, concerned with the arrangement of observable units, without regard to any associated meaning or function. Where reference to meaning was unavoidable, this tended to be operationalized, as in the use of what came to be known as the 'paired utterance test' (Harris 1951: 32) for distinguishing phonemic contrasts. However, operational solutions reflected the practical orientation of the descriptivists, who, as Hockett stresses, developed their theories to serve the goals of linguistic description.

> [A]t the time we were all (except Chomsky) field-workers at heart; that is, we tended to express our theoretical notions operationally. The early followers of

> Chomsky found fault with that, but without justification. To confuse theory and
> day-to-day field procedure would of course be a mistake, but to express theory in
> operational terms is not. (Hockett 1997a: 151)

The role of meaning and function in linguistic analyses remains a matter of contention, as does the status of semantic primitives and representations, participant roles, truth-conditional interpretations, and other components proposed to incorporate meaning into contemporary models. More importantly, to the extent that these components 'interpret' linguistic representations, or are segregated into separate representational levels, they fully with the Bloomfieldian and descriptivist view that at least some aspects of structure can be described independently of their meaning or function.[6]

18.3.3 Grammars and Transforms

One of the salient features of the descriptivist model is the degree to which it came to concern itself with representations, and with the procedures or devices that define those representations. The shift in focus from the study of the properties of languages to the study of the properties of the devices used to describe and analyse languages is one of the most enduring influences of the descriptivists, unleashing forces which gained even greater momentum during the transformational period. The change in the orientation and subject matter of the field is already implicit in Hockett's notion of a 'grammatical description,' which corresponds closely to a formal grammar in the modern sense.

> [a] grammatical description . . . sets forth principles by which one can generate any
> number of utterances in the language; in this sense, it is operationally comparable to
> that portion of a human being which enables him to produce utterances in a
> language; i.e., to speak. (Hockett 1954: 390)

Harris makes the same point in an even more modern form when he suggests that '[a] grammar may be viewed as a set of instructions which generates the sentences of a language' (Harris 1954b: 260). Although the descriptivists did not have a formal frame of reference in which to define applicable notions of 'description' or 'grammar,' the string rewriting systems developed in Post (1943, 1947) provided a good general model, as Scholz and Pullum note.

> The differences between Post's systems and the TGGs of Chomsky (1957a) lie
> mainly in the additional devices that Chomsky assumed, like rule ordering and
> obligatory application; but these turn out neither to restrict nor to enhance genera-
> tive power. (Scholz and Pullum 2007: 718)

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[6] Though see Matthews (2001) for a discussion of the fairly wide range of interpretations that have been associated with 'structuralism' and 'structural linguistics.'

The descriptivists initially welcomed the formalizations proposed in transformational models, seeing them as developments of their own models. Already by the early 1960s, introductory textbooks such as Gleason (1955) had been revised to incorporate discussions of rewrite interpretations of phrase structure rules (p. 180) and add chapters devoted to transformational analysis. Moreover, it is noteworthy that the notion of transformational analysis was already modelled on Chomsky (1957a) rather than on Harris (1957).

In Harris' original conception, transformations are equivalence relations between constructions in a corpus, employed to limit the role of IC analysis.

> If two or more constructions . . . which contain the same n classes . . . occur with the same n-tuples of members of these classes in the same sentence environment . . . , we say that the constructions are transforms of each other, and that each may be derived from any other of them by a particular transformation. For example the constructions N v V N (a sentence) and N's V*ing* N (a noun phrase) are satisfied by the same triples of N, V, and N (*he, meet, we; foreman, put up, list*, etc.); so that any choice of members which we find in the sentence we also find in the noun phrase and vice versa: *He met us, his meeting us* . . . ; *The foreman put the list up, the foreman's putting the list up* . . . Where the class members are identical in the two or more constructions we have a reversible transformation, and may write e.g. N_1 v V $N_2 \leftrightarrow N_1$'s V*ing* N_2 (and the set of triples for the first. the set for the second). (Harris 1957: 147)

Applying procedures of IC analysis to basic constructions first defined the 'kernel' of a language. The complex constructions of the language could then be obtained as transforms of basic constructions, avoiding the putative redundancy and inelegance entailed by extending IC analysis to cover passives and other constructions with a transparent relation to those in the kernel.

> The kernel is the set of elementary sentences . . . such that all sentences of the language are obtained from one or more kernel sentences . . . by means of one or more transformations. (Harris 1957: 335 [197])

The use of transformations to describe complex constructions, along with the kernel-transform split—and agnosticism about the constituent structure of transforms (Stockwell 1962)—survives into early models of transformational grammar (Chomsky 1957a, 1975a). However, Chomskyan models define transformations in terms of derivational relations between inputs and outputs.

> A grammatical transformation T operates on a given string (or, in the case of [generalized transformations], on a set of strings) with a given constituent structure and converts it to a new string with a new derived constituent structure. (Chomsky 1957a: 44)

This is the 'dynamic' conception that Gleason adopts when he explains: 'A transformation is a statement of the structural relation of a pair of constructions which treats that relation as though it were a process' (Gleason 1955: 172).

18.3.4 Discovery and Evaluation

Harris', work shows the greatest concern with methodological precision and explicit theory development (Matthews 1999), so it is unsurprising that the transformational lineage grew out of this branch of descriptivism. However, it is only in the transformational period that the primary focus of general linguistics shifts decisively from language description to theory construction. Whereas descriptivists tended to develop theories that were at least intended to be of use in improving the accuracy and uniformity of language descriptions, transformationalists approached language description almost purely as a means of obtaining evidence bearing on theoretic claims. This shift in perspective led the transformationalists to misinterpret and even misrepresent the descriptivists, nowhere more than in criticisms of the search for mechanical 'discovery procedures.'

As in the case of the designation 'structuralist,' the term 'discovery procedure' was never used by the descriptivists themselves, but was instead coined and applied by Chomsky, who regarded it as 'very questionable that this goal is attainable in any interesting way' (1957a: 53) and suggested that

> by lowering our sights to the more modest goal of developing an evaluation procedure for grammars we can focus attention more clearly on really crucial problems of linguistic structure and we can arrive at more satisfying answers to them. (Chomsky 1957a: 53)

The shift in methodological focus proposed by Chomsky reveals the extent of the change in perspective from the descriptivist to transformational paradigms. The descriptivists' interest in practical procedures for language analysis were not purely theoretical but grew naturally out of their descriptive concerns.

> It should be possible to establish a method of finding the best possible organization of any given utterance and of insuring comparable results with comparable material. This is the basic problem of syntax . . . Unfortunately, the methodology has not as yet been completely worked out in a generally applicable form. (Gleason 1955: 132)

In contrast, the transformational tradition tended to regard the task of obtaining 'observationally adequate' descriptions as trivial, since they could be generated by Turing-equivalent devices, which incorporated the weakest assumptions about human languages: that they can be idealized as recursively enumerable sets of strings. Of course the assumption that any human language can be described by an unrestricted rewrite system or equivalent formalism is of no practical descriptive use. Moreover, there is an irony in the proposal that linguists should 'lower their sights' from discovery to evaluation. In the transformational literature, the search for evaluation metrics never progressed past the kinds of primitive symbol-counting metrics set out in Chomsky and Halle (1968). Meanwhile, Harris's work on what his detractors dismissed as

'discovery procedures' inspired a subfield of 'grammar induction' in which machine learning techniques are used to induce a grammatical description from a corpus.

The descriptivists' more general belief in the practical usefulness and theoretical relevance of corpora has also been confirmed by the range and fruitfulness of contemporary corpus-based research. Corpus-based grammars such as Biber et al. (1999) provide the first accurate synchronic snapshots, freezing languages in the course of their constant evolution. Despite the obvious limitations of current corpora as idealizations of a speaker's linguistic environment, the frequency information obtainable from corpora such as those in CELEX (Baayen et al. 1995) has proved useful for predicting response latencies and other behavioural responses. The descriptivists' early interest in information theory has turned out to be even more prescient. Information-theoretic measures provided the first general means of reconciling the type-sensitivity of derivation and the token-sensitivity of inflection (Moscoso del Prado Martín et al. 2004). Subsequent studies have confirmed the predictive value of other information-theoretic measures in models of psychological processing (Milin, Đurđjević, and Moscoso del Prado Martín 2009, Milin, Kuperman, et al. 2009). The fundamental grammatical importance of notions of uncertainty and uncertainty reduction has also become increasingly clear in synchronic analyses of complex morphological systems (Ackerman et al. 2009, Malouf and Ackerman 2010a, 2010b).

18.4 THE DESCRIPTIVIST LEGACY

In assessing the contribution of the descriptivists and their role in the history of linguistics, it is important to bear in mind the fact that ideas tend to outlive the traditions that initially hosted them and mutate during their own lifespans.

> It is . . . worth stressing that ideas often persist, evolve and may be abandoned on a time scale that does not correspond to the transitory intellectual hegemony of one group of scholars or another. (Matthews 1993: 5)

Over time, the descriptivists repudiated or abandoned many of the innovations that they had formulated or come to be associated with. But they had unleashed forces, institutional as well as intellectual, that they were ultimately unable to control. The Chomskyan era saw the retrenchment and expansion of many of the most academically disruptive aspects of the descriptivist school. The descriptivists' general neglect of European scholarship and their casual disregard for traditional approaches had sown the seeds of an insular intellectual culture in which in which they in turn could be ignored by their Chomskyan successors. *Language*, which had functioned almost as a house journal for the descriptivists in the aftermath of the Second World War, came to reflect this shift in institutional power. By the mid-1960s, the descriptivists found themselves in the role of occasional contributors or, as in the case of Zellig Harris, seemingly ostracized.

[Harris 1965] was also, sadly, his last contribution to *Language*. I have not thought it my business to inquire into the circumstances; but from then on, for whatever reason, a journal for which he had written so much for a quarter of a century, and so much of such influence and importance, published him no more. (Matthews 1999: 114)

As the Chomskyan paradigm consolidated its hold over the emerging 'science' of linguistics, the metalinguistic focus on formal devices triumphed over descriptive concerns, and the study of languages was relegated to the role of providing evidence bearing on the choice between competing theories or toolkits. More than any other single innovation, this shift ushered in the modern era, by cutting off contemporary schools of linguistics from the older philological tradition. The distance that the field had moved is reflected in the sense of anachronism evoked in the modern reader by Bloch's eulogy for Bloomfield.

Trained as an Indo-Europeanist in the great tradition of the neogrammarians, he had also a specialist's knowledge of at least four groups within the general field: Germanic, Indic, Slavic, and Greek....Nor did he confine himself within the bounds of Indo-European; he had a wide acquaintance with languages in other families also. His first-hand investigation of several Malayo-Polynesian languages was one of the pioneer works in a little-known field. And as everyone knows, his descriptive and comparative studies of the Algonquian languages are among the classics of American Indian research. (Bloch 1949: 9of.)

The breadth of Bloomfield's expertise was remarkable even in someone of his generation. But what is perhaps most sobering is that this breadth of interests is not only less common but far less valued in the traditions that he spawned.