

[Published as Place, U. T. (1983). Skinner's Verbal Behavior IV - how to improve Part IV, Skinner's account of syntax. *Behaviorism*, 11, 163-186.]

## SKINNER'S *VERBAL BEHAVIOR* IV - HOW TO IMPROVE PART IV - SKINNER'S ACCOUNT OF SYNTAX

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Having argued in the first paper in the present series (Place, 1981a) that to explain verbal behaviour in intensional or mentalistic<sup>1</sup> terms involves the circularity of explaining the acquisition of linguistic skills on the assumption that both speaker and listener already possess those skills, attention was drawn in the second paper (Place, 1981b) to four major defects in the alternative non-mentalistic account of language presented by Skinner in his book *Verbal Behavior* (1957). In the third paper in the series (Place, 1982) an attempt was made to put right the two most fundamental defects distinguished in the preceding paper (a) Skinner's failure to draw a clear distinction between sentences and the words of which those sentences are composed and (b) the inadequacy of his account of the control exercised by the verbal operant over the behaviour of the listener.

In relation to the first of these defects it was argued that the ability to construct new sentences by putting familiar words into new combinations in accordance with grammatical convention helps us to account both for Goldiamond's 'instruction stimulus' which enables a speaker to by-pass the long process of shaping otherwise required in order to instate a new pattern of behaviour and for the concept of the 'informative stimulus'<sup>2</sup> introduced by Harzem and Miles (1978) which provides the listener with information about aspects of the environment which are otherwise inaccessible. Having introduced these modifications in Skinner's basic theory, I then tried to put right the first of the two consequential defects in the account of language proposed in *Verbal Behavior* to which attention was drawn in the second paper in the series (Place 1981b), namely the confusion within the concept of the *tact* between tacts as sentences which contrast with mands and tacts as words which contrast with autoclitics.<sup>3</sup> It was suggested in this connection that the distinction between mand and tact sentences could be drawn in three different and only partially overlapping ways, *synmands* and *syntacts* distinguished according to syntactic criteria, *semmands* and *semtacts* distinguished according to semantic criteria and *pragmands* and *pragtacts* distinguished according to pragmatic criteria.

Two further points remain to be discussed. On the one hand there is the distinction, already mentioned, between two types of sentence constituent, tact words and tact phrases contrasting with autoclitic words and autoclitic phrases, which leads into the topic of the present paper, Skinner's account of syntax and how to improve it. On the other hand there is the problem of how to provide an adequate account of truth and falsity within Skinner's conceptual framework. This is an issue which arises in the context of the use of self-directed verbal behaviour or thinking as a means of controlling other verbal and non-verbal behaviour of the thinker. Thinking is the principal topic discussed by Skinner in Part V of *Verbal Behavior* the way to improve which will be discussed in the fifth and final paper in the present series.

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<sup>1</sup> When writing this first paper, I took the notions of 'mentalistic' and 'intensional-with-an-s' as applied to explanations to be co-extensive, if not equivalent, and endorsed the view to which Skinner implicitly subscribes which holds that all forms of intensional-with-an-s locution need to be eliminated from a scientific account of verbal behaviour. In the light of discussions with Dr. Richard Garrett of the Department of Philosophy, Bentley College, I now accept that no purely extensional account of the relation between a sign and what it signifies can be given, and that 'mentalism', in so far as that term comprehends what must be avoided on pain of circularity in accounting for verbal behaviour, covers only those locutions in which the behaviour of the agent is explained either in terms of some rule which is followed or in terms of some statement or proposition which is taken to be true.

<sup>2</sup> Incorrectly given as 'information stimulus' in the text of the previous paper (Place, 1982, pp. 121-123).

<sup>3</sup> I now recognise three distinct senses of the word 'tact' (Place, 1985) quite apart from the 'syntacts', 'semtacts' and 'pragtacts' distinguished in the preceding paper (Place, 1982, pp. 130-135).

## AUTOCLITIC BEHAVIOUR AND THE AUTOCLITIC

All the three chapters, chapters 12, 13 and 14, which comprise Part IV of *Verbal Behavior* are concerned with autoclitic behaviour and with the unit of autoclitic behaviour, the autoclitic. Unlike the other principal neologisms which he introduces in *Verbal Behavior*, the *mand* (from the Latin *mandere* 'to order') and the *tact* (from the past participle of the Latin *tangere* 'to touch'), Skinner does not explain the etymology of the term *autoclitic*. It appears to be derived from two Greek words, the reflexive αὐτός 'self', and κλιτικός, an adjective derived from the verb κλίνειν 'to bend', and to be constructed on the analogy of the term *proclitic* (προκλιτικός), literally, 'bending in front of'), and *enclitic* (ἐγκλιτικός), literally 'leaning on'. Both words are technical terms used in Greek Grammar. A proclitic is a monosyllabic word which precedes and qualifies a subsequent word by and into which it is to all intents and purposes absorbed, with the result that when the two words are spoken, no breathing pause is ever made between the two and the accent never falls on the preceding proclitic word. Examples of proclitics in English given by the *Oxford English Dictionary* include "an ounce," "as soon" and "at home." Similarly an enclitic is a monosyllabic word which is itself unaccented, but which transfers an accent to the final syllable of the word which precedes it and to which it is attached as a suffix. There do not appear to be any plausible examples of enclitics in English; however a familiar example in Latin is the conjunction *que* which when attached as a suffix to a preceding word transfers an accent to the final syllable of that word, as in *populusque*.

Another neologism derived from the same root is the psycho-analytic term *anaclitic*. This word is a new formation derived from the Greek verb ἀνακλίνειν, "to lean back," "recline." It was introduced by the original English translator of Freud's *Introductory Lectures on Psycho-Analysis* (Freud 1922), Joan Riviere, when she used the phrase 'anaclitic type' as a translation of the German *Anlehnungstypus*. It would seem that by an 'anaclitic type' is meant someone who is emotionally dependent on a parent or parental figure.

On these analogies, *autoclitic behaviour*, as conceived by Skinner, is verbal behaviour which *bends or leans towards itself* or, as Skinner himself puts it, "the term 'autoclitic' is intended to suggest behavior which is based upon or depends upon other verbal behavior" (1957, p. 315).

However, because of a failure to draw the traditional grammatical distinctions between words, phrases and sentences, Skinner fails to make clear what are the units of verbal behaviour that are "based upon or depend upon other verbal behavior" and on what units of verbal behaviour they depend. It is also unclear in what way autoclitic behaviour depends on other verbal behaviour, such that the other (otherwise unspecified) verbal behaviour does not in the same way depend upon the autoclitic behaviour. However an examination of the examples which Skinner gives of the different types of autoclitic which he distinguishes in the course of Chapters 12 and 13, the "Descriptive," the "Qualifying," the "Quantifying," the "Relational" and the "Manipulative," together with his identification of Grammar and Syntax as Autoclitic Processes in the title Chapter 13 and his use of Emerson's phrase "shuffling, sorting ligature and cartilage" of words to characterise what he means by autoclitic behaviour at the beginning of Chapter 14 *Composition and Its Effect*, make it abundantly clear both that autoclitic behaviour is the behaviour emitted by the speaker when he or she puts words together so as to form an intelligible sentence and that the autoclitic, *qua* unit of autoclitic behaviour is a word or, in the case of what Skinner calls "Descriptive Autoclitics," a phrase consisting of two or three words, whose function consists entirely in its contribution to the structure of the sentence in which it occurs.

## TACTS AND AUTOCLITICS AS WORDS AND PHRASES

As I have already mentioned, I made the suggestion in the second paper in this series (Place, 1981b) that Skinner's term "tact" is ambiguous as between "tacts" as sentences or sentence utterances which contrast with "mands," and "tacts" as words or phrases which contrast with "autoclitics." According to this view the function of the autoclitic is to contribute to the structure of the sentence in which it occurs. By contrast *tact words* and *tact phrases* (corresponding approximately to the names, predicates and descriptions of traditional grammar) differ from autoclitic words and phrases in that they name or "tact" specific recurrent features of

the common environment of speaker and listener. This means that whereas one can point to instances to which tact words, like the noun *rabbit* or the verb *runs*, or to which tact phrases, like the noun phrase *a bald headed gentleman* or the verb phrase *trying to tie a knot* apply, you cannot point to anything to which autoclitic words, like *if*, *not*, or *and* apply. It is true that you might conceivably point to instances of what Skinner calls "descriptive autoclitics." Descriptive autoclitics are phrases like *I regret to inform you* or *I don't suppose* which, taken literally, make reference to an alleged mental state of the speaker. One might, for example, point to clear cut cases where someone is obviously distressed by what they are having to tell another person or where someone quite genuinely does not expect a favourable reaction to the proposal they are about to make. But to take these locutions in the literal way that is implied by this way of explaining their meaning is to entirely miss their point which, in the first case, is to prepare the listener to receive bad news, and, in the second, to introduce a request in a suitably apologetic tone. Another way of bringing out the contrast between tact words and phrases and autoclitics is to say that tact words and tact phrases are the nouns, verbs, adjectives and adverbs, together with the corresponding noun, verb, adjectival and adverbial phrases which give a sentence its content; whereas autoclitic verbs and phrases are the prepositions, inflections, verbal auxiliaries, pronouns, quantifiers, conjunctions, etc., which give a sentence its form or structure. Unfortunately, having failed to draw a coherent distinction between sentences and the words, phrases and clauses of which they are composed, Skinner's account lacks the conceptual resources which are required in order to make sense of the very notion that a sentence has a structure; and without the notion of the syntactic structure of a sentence, he is in no position to explain the contribution made by the different types of autoclitic he distinguishes both to the process whereby the speaker constructs the sentence in the first place and to the listener's subsequent interpretation of that sentence structure. Since it is precisely in giving an account of sentence structure that rival accounts of language provided by logicians, grammarians and linguists are most at home, it is clear that the first objective of any attempt to improve on the account of syntax given by Skinner in terms of the notions of autoclitic behaviour and the autoclitic must be to develop a coherent account of the way words, phrases and clauses are put together so as to form an intelligible sentence.

#### SENTENCES, SENTENCE STRUCTURE AND THE PARTS OF SPEECH

In the second paper in this series (Place, 1981b) I also criticised Skinner for failing to draw an adequate distinction between words and sentences, in particular, one which recognises that it is only words and sentence patterns that are regularly repeated and that sentences are typically constructed *de novo* by combining a sentence pattern (constituted by a particular arrangement of autoclitics) and a particular set of (tact) words filling the gaps between the autoclitics. Skinner can be criticised, however, not only for failing to draw an adequate distinction between words and sentences, but also for the cavalier attitude he adopts to the traditional classification of words into the different parts of speech, nouns, verbs, adjectives, adverbs, pronouns, prepositions etc. Despite making use of these traditional concepts whenever it suits him to do so, Skinner declares on p. 331 of *Verbal Behavior* that

purely formal analyses of grammar and syntax (in which, for example, parts of speech are defined in terms of formal properties, including frequency or order of association with other parts so defined) are of little interest here, where no *form* of verbal behavior is significant apart from its controlling variables.

The same attitude resurfaces on page 340 where, referring back apparently to the example *Cigarette me!* on page 338, where what is otherwise a noun, as in *Give me a cigarette!* (p. 337), is used as a verb, he remarks

The grammatical distinction between noun and verb is, as we have seen, arbitrary and unnecessary so far as reference is concerned.

If these quotations can be taken to mean that Skinner attaches small importance to the classification of words into different parts of speech, he is clearly mistaken. For unless a sentence has a structure, unless importance attaches to the order in which the different words that compose the sentence occur within it, there can be nothing to distinguish a sentence from an arbitrary string of words and no way of deciding where one sentence ends and another begins. But equally a sentence cannot have a structure, nor can there be any recognisable conventions governing the order in which the words composing the sentence occur, unless words are classified into different grammatical types, such that only words and expressions belonging to the same type or category can be substituted for a particular word on pain of converting what was previously a well formed sentence into an incoherent and unintelligible word salad, as when *Shut the door* becomes *Shut the go*, *Shut could door*, or *False the door*.

### A BROTH OF PHONEMES

In the same paper (Place, 1981b, p. 132) I expressed surprise that

along with what he regards as the mediaeval lumber of traditional grammar and logic with its prescientific mentalistic concepts like knowledge, beliefs, purposes, intentions, rules and above all meanings, Skinner has unaccountably thrown out what would seem to be the perfectly objective and indispensable distinction between sentences and the individual words of which a sentence is composed.

That I was right to regard the distinction between words and sentences as indispensable, I have no doubt; but was I right to claim that the distinction is a perfectly objective one?

It has often been suggested that the only thing that gives unity and coherence to a sentence is the thought, idea or meaning it expresses, that in the absence of the cues provided by the punctuation and gaps between one word and another which are provided in written text, we have only our intuitive understanding of the meaning of what is said to go on in deciding where in a long monologue the boundaries between different words, phrases, clauses and sentences are located. For a behaviourist like Skinner who rejects the concept of meaning, what to others is a colleague's brilliant inaugural lecture can be nothing more than "a broth of phonemes."<sup>4</sup>

Indeed it is probably true that in the absence of the cues to meaning provided by the context of utterance and the gestures that accompany it, a trained phoneticist would be able to give an accurate transcription of the sequence of phonemes uttered by the speaker of a previously unknown language, and yet be unable to identify with any degree of confidence the boundaries between words, phrases and sentences. No doubt breathing pauses occur almost invariably at boundaries between sentences, usually at the boundaries between clauses and phrases and more often at the boundaries between words than in the middle of a word. But the correlation here is at best statistical and can do no more than provide a check on hypotheses about the location of word, phrase and sentence boundaries based on other considerations, and those other considerations arguably, can only be hypotheses about the meaning of what is being said.

What this shows, I suggest, is that Skinner is entirely right and not just right from his own standpoint in rejecting

purely formal analyses of grammar and syntax ... in which ... parts of speech are defined in terms of formal properties, including frequency or order of association with other parts so defined. (Skinner, 1957, p. 331)

The point I am making can be illustrated by the example already given where a word belonging to another part of speech is substituted for each of the three words making up the sentence *Shut the door*. Consider

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<sup>4</sup> I am indebted for this phrase to my former colleague Dr. Hugo Meynell, now of the Department of Religious Studies at the University of Calgary. Dr. Meynell does not claim to have invented the phrase, but cannot now remember where he got it from (personal communication).

what it is that tells us we can substitute the word *Close* for the word *Shut* without altering the sense of what is said, substitute the word *Open* for *Shut* and still have a well formed sentence, though with a different and opposite sense; whereas substituting *False* for *Shut* generates a meaningless string of words that is no longer a sentence. The only thing that tells us which strings of words are sentences and which are not and hence which words belong to the same part of speech and can be substituted for one another while others belonging to different parts of speech cannot, is our linguistic intuition. In other words without the linguistic intuitions that by and large only the native speaker of a natural language possesses, there is and can be no formal criterion by which to distinguish the different parts of speech.

It is conceivable, no doubt, that there might be a natural language in which each different part of speech, each noun, verb, adjective, preposition, conjunction etc. would have its distinctive prefix or suffix. In this case once you knew what part of speech was signalled by a particular prefix or suffix it would then be possible to identify the part of speech to which every new word belonged by using this set of purely formal criteria; but in the absence of a lexicon or grammar of the language in question, you would still have to rely on the linguistic intuitions of native speakers to identify which particular function is performed by each category of word. No doubt a statistical study of the incidence of the different parts of speech in different natural languages would reveal certain recurrent patterns of distribution from which a linguist could make an informed guess as to which formally identified category of word corresponded to which of the traditionally recognised parts of speech, but without the linguistic intuition of native speakers there would be no way of confirming or disconfirming such hypotheses.

#### LINGUISTIC INTUITION AND ITS ROLE IN SYNTACTIC ANALYSIS

What is it then that our linguistic intuitions tell us in such cases? What is meant by describing the knowledge which we acquire in this way as "intuitive." Why is it that we are compelled to rely on the linguistic intuitions of native speakers for our information on matters such as these? In considering what it is that the linguistic intuitions of native speakers can tell us, it is helpful, I suggest, to compare the native speaker to an anthropologist's informant on whom the anthropologist depends for his or her information about the social norms of a pre-literate society. The important difference is that in this case the grammarian or linguist who is a native speaker of the natural language in question combines the roles of investigator and informant in the same person. Conceived in this way, what the linguistic intuitions of the native speaker give us are samples of the kind of utterance whose emission by the investigator/informant in his or her capacity as speaker has been reinforced by its success. In the case of what I called in the preceding paper (Place, 1982) a "pragmand" or mand in the pragmatic sense, success is a matter of determinately controlling the behaviour of the listener. In the case of what I am proposing to call a "pragtact" or tact sentence utterance in the pragmatic sense, success is a matter of securing from the listener an expression either of assent or of gratitude for information received. The native speaker can also react in the capacity of a listener and sample member of the verbal community to any string of words that may be presented to him or her for evaluation of its intelligibility. In so doing, the native speaker relies on his or her ability to determinately react to such a string as a guide to its conformity or otherwise to conventions accepted within and reinforced by the verbal community on which the intelligibility of what is said depends. In Skinner's terms, what the linguistic intuitions of the native speaker are telling us in such cases is which sentences and sentence types are capable of acting as effective discriminative stimuli with respect to particular contingencies or contingency types for all reasonably competent members of the verbal community constituted by the native speakers of the natural language in question.

In trying to understand what is meant by describing such knowledge as "intuitive," we can usefully refer to what Skinner himself has to say about such knowledge in Chapter 6 of *Contingencies of Reinforcement* (Skinner, 1969, pp. 133-171) where he draws a contrast between behaviour that is directly shaped by repeated exposure to a particular contingency and rule-governed behaviour. Skinner uses the term "rule-governed behavior" to mean behaviour under the control of a self-directed and usually self-formulated verbal formula which is reinforced as part of the individual's behavioural repertoire in so far as it specifies and thus provides an accurate guide to contingencies operating in the individual's

environment. Rule-governed behaviour in this sense is behaviour governed by explicit verbally formulated knowledge and beliefs. By contrast the knowledge that is embodied in contingency-shaped behaviour is implicit rather than explicit, intuitive rather than rationally inferred. As Skinner himself puts it,

the behavior shaped by the contingencies which arise as one solves the problem may yield a solution intuitively. The solution appears, the problem is disposed of, and no one knows why. (Skinner, 1969, p. 169)<sup>5</sup>

The reason why we are compelled to rely on the linguistic intuitions of native speakers for our information about such questions becomes apparent in the light of an observation made in the first paper in this series (Place 1981a). In that paper I pointed out that the initial acquisition of verbal skills by a native speaker of a language cannot, on pain of circularity, be conceived as being itself controlled by rules in the sense of verbal formulae specifying the relevant contingency. Our basic verbal skills must, therefore, be contingency shaped. Moreover, any subsequent verbal formulation of these controlling contingencies must be based on the rehearsal by a native speaker of deeply engrained contingency shaped habits of sentence construction. These are then subjected to critical self-examination on the basis of equally deeply engrained contingency shaped habits of selectively reinforcing one's own and other people's verbal behaviour as a member of the verbal community. In this way the native speaker is able to ensure that his or her own verbal behaviour conforms to the conventions endorsed and maintained by the verbal community which thereby ensures the mutual intelligibility of what its members say to one another.

If no formal criteria can be given for distinguishing the principal syntactic categories, if we are ultimately dependent on the intuitions of native speakers in order to analyse speech into sentences, clauses, phrases and words and for classifying words into the different parts of speech, we must conclude, so it seems to me, that we can never hope to provide an account of these distinctions in purely formal syntactic terms, in other words, without adverting to their semantic and pragmatic functions in the typical case. What this means, I take it, is that any interpretation that is given of the syntactic structure of the sentence depends, at least in part, on a preliminary identification of the kinds of objects, situations and events referred to by the tact words and tact phrases composing the sentence and, hence, on an implicit comparison between the sentence in question and a range of alternative sentences in which the same tact words or similarly constructed tact phrases occur in different combinations of word, phrase structure and sentence pattern. In other words, although the "meaning" of a sentence only becomes clear once its syntactic structure has been fully deciphered, the process of decoding the syntactics of a sentence proceeds hand in hand with that of decoding the semantics, rather than sequentially with the syntactic decoding preceding the semantic, as is sometimes supposed.

## THE CONCEPT OF A SENTENCE

Any account of the structure of sentences must begin with an examination of the concept of "sentence" itself. The traditional answer to the question "what is a sentence?" is that a sentence is a string of words which expresses a complete thought. This account of what a sentence is has the merit of giving expression to the notion of a sentence as a string of words which has a non-arbitrary beginning, middle and end such that once the sentence has been started in a particular way there is a limitation on the number of different ways in which it can be intelligibly completed. It also has the merit of implying that it is the meaning of the sentence rather than its formal structure which determines when it is complete. Unfortunately, this traditional account has a nasty habit of degenerating into empty circularity when, having been told that a sentence is complete when the thought it expresses is complete, we raise the awkward question "In what does the completeness of a thought consist?" In response to this question, the only answer that comes

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<sup>5</sup> I am indebted to Professor C. Fergus Lowe of the Department of Psychology, University College of North Wales, Bangor, for drawing my attention to this important discussion by Skinner of a central issue in the verbal or "cognitive" control of human behaviour.

readily to mind is one which is blatantly circular, namely, that a complete thought is one that is expressed by a complete sentence.

In order to escape this circularity logicians and linguists have sought to characterise the completeness of a sentence in syntactic terms and have claimed that a sentence is complete only in so far as it consists of a subject term to which a predicate is attached, of a functional expression whose argument places are filled by appropriate "proper names" (in Frege's extended sense of that term) or, as conceived in contemporary linguistics, of an appropriate combination of noun phrase and verb phrase. This syntactic approach to the definition of the sentence also runs into a number of difficulties. The first and most important of these we have already encountered in the shape of our dependence on the linguistic intuitions of native speakers in order to identify the boundaries between subject and predicate, function and argument, or verb phrase and noun phrase. This syntactical approach to the definition of the sentence has also misled many linguists and grammarians into the strange delusion that sentences are a kind of grammarian's ideal to which the actual utterances of speakers in ordinary discourse are no more than an approximation. Zellig Harris, for example, in his *Structural Linguistics* (Harris, 1951, p. 14) maintains that

the utterance is, in general, not identical with the 'sentence' (as that word is commonly used), since a great many utterances, in English for example, consist of single words, phrases 'incomplete sentences,' etc.

The view that is expressed in this quotation from Harris according to which very few of the utterances that speakers actually emit constitute sentences by these syntactic criteria is a view which Skinner himself endorses. Indeed it provides him with his most powerful argument for rejecting the sentence as a unit of verbal behaviour for the purposes of his own analysis. This attitude, however, ceases to be tenable, once we appreciate the need for an effective word/sentence distinction in order to explain how it is that, by constructing new sentences in accordance with the syntactic and semantic conventions reinforced by the verbal community, a speaker is able both to elicit from the listener behaviour that the listener has never previously performed and to communicate to the listener information about contingencies that he or she has never previously encountered. Moreover once the function of putting words together to form new sentences is construed in this way, it becomes evident that we now have an account of what it is for a single word or a string of words to constitute a sentence which does not rely either on the circularity of defining the completeness of a sentence in terms of the thought which it expresses or on intuitions as to its syntactic composition.

#### EFFECTIVE AND CONVENTIONAL SENTENCES

This account of what a sentence consists in is an account in terms of the effect of a word or string of words in its capacity as a discriminative stimulus on the behaviour of the listener. But in order to explain how it comes about that many utterances which produce a determinate effect on the behaviour of the listener are not well-formed sentences in accordance with the recognised conventions of grammar and syntax, it is necessary to distinguish two senses of the word "sentence." In the case of what I propose to call an "effective sentence," the sentence is a word or string of words which has a determinate effect on the behaviour of a particular listener, when uttered in a particular context on a particular occasion. An effective sentence, so defined, contrasts with what I propose to call a "conventional sentence," namely, a string of words which, when uttered in an appropriate context, has the same determinate effect on the behaviour of any member of the verbal community who has learned the relevant syntactic and semantic conventions.

Clearly since the conventions for the use of words which are adopted and reinforced by the verbal community are entirely arbitrary, there is no reason why any sound or sequences of sounds or indeed any combination of stimuli in any sense modality should not have a particular determinate effect on the behaviour of a listener and thereby constitute what I am proposing to call an "effective sentence." However, since any natural language with a reasonable well-developed vocabulary enables a speaker to construct a sentence which will direct the behaviour of any listener who has learned the relevant syntactic

and semantic conventions in whatever way his or her behaviour is capable of being coherently directed, it is invariably possible to construct what I am calling a "conventional sentence" which will have the same effect on any competent member of the relevant verbal community as does any effective sentence on the behaviour of a particular listener on a particular occasion. Thus to revert to the two examples that Skinner uses in his discussion of the listener's response to a tact in Chapter 5 of *Verbal Behavior* (Skinner, 1957, pp. 86-89), we can say that the single word utterance *Fox!* is an effective sentence which is equivalent to the pair of conventional sentences *Look!* and *There's a fox!* Likewise the single word utterance *Dinner!* is an effective sentence which is equivalent to the pair of conventional sentences *Dinner is ready!* and *Come and get it!*

## PROGRESSIVE DISAMBIGUATION

Given the distinction between effective and conventional sentences, we can, I suggest, begin to appreciate the significance of what I called in the second paper in this series (Place, 1981b, pp. 132-133) Skinner's "progressive disambiguation" theory of the sentence construction. In my slightly modified version of the example used by Skinner to illustrate this principle, a speaker with a limited grasp of English begins by uttering the single tact word *hungry*. This, as it stands, would not normally function as an effective sentence because there is no way of telling either who it is that is hungry or whether it is a past, present or future hunger that is referred to. Nevertheless, given an appropriate context and supplemented by the appropriate gestures, it is not difficult to envisage circumstances under which this single word utterance could effectively control the listener's behaviour and thus qualify as an effective sentence in my sense of the term. Alternatively, by adding in a second tact word in the form of the noun *man* so as to generate the two word sentence *man hungry* or *hungry man*, ambiguity is somewhat reduced in so far as it now becomes clear that the hunger in question is that of a single person and of man rather than of a woman or a child. Adding in a relational autoclitic in the form of the auxiliary verb or copula *is* to generate *Man is hungry* makes it clear that it is a present hunger rather than a past or future hunger that is at stake; while the definite article or quantifying autoclitic *the* or the indexical *this* generate the conventional sentences *The man is hungry* and *This man is hungry* respectively which, when combined with an appropriate gesture, effectively completes the disambiguation process.

Despite the weakness to which I drew attention in the previous paper (Place, 1981b, p. 133) whereby it fails to explain why it is that at a certain stage, but not before, the sentence is judged conventionally (i.e., syntactically) complete, this theory of sentence construction has the important virtue of drawing our attention to the function of autoclitic words that are added into the sentence in the process of sentence construction as effectively excluding alternative readings of the sentence which are possible in its incompletely articulated forms. The importance of this is that we are led to the view that autoclitics, the sentence structure to which they contribute, together with the conventions governing the use of autoclitics to assemble of words into phrases and phrases into well formed conventional sentences, form a system whose function is to ensure that the utterances emitted by speakers are, as far as possible, unambiguously intelligible to every listener who is a member of the relevant verbal community. This function of autoclitic behaviour whereby it generates sentences which are intelligible to other members of the relevant verbal community explains two phenomena whose connection might not otherwise have been suggested. On the one hand it explains the social phenomenon whereby special emphasis is placed on the inculcation of speech and writing which is grammatically "correct," especially in those schools which in England and Wales used to be known as "grammar schools" whose traditional social function was to train an elite class of clergy, merchants and government officials who needed to communicate both in speech and in writing to other members of their own class on a nationwide basis and not be restricted, as were the "uneducated" peasants, to communicating with those living in the immediate vicinity of their birth by means of the local dialect or *patois*.

On the other hand, the role of autoclitic behaviour in rendering speech intelligible to others also explains a curious feature of the phenomenology of thinking. As I put it in a recent paper:



Where, as in thinking, verbal behaviour is self-directed there is no danger that the thinker will misunderstand what he is saying to himself because the sentences he uses are incomplete or ambiguous or because he uses words in ways which do not conform to ordinary usage as accepted within the verbal community. Consequently, where verbal behaviour is self-directed, control by the verbal community is relaxed, autoclitics and the niceties of syntax go by the board, words are abbreviated or used in idiosyncratic ways and the thought may ultimately take on that apparently wordless and imageless character which puzzled the introspective psychologists at the beginning of this century (Titchener, 1909; Humphrey, 1951), and more recently philosophers like Ryle (1958), as well as giving some initial plausibility to Fodor's (1975) concept of an innately programmed language of thought. (Place, 1983, p.26)

## BEHAVIOURAL CONTINGENCY SEMANTICS

We have seen that the function of autoclitics and the structure that they give to the sentence of which they form part is to ensure that those sentences have a determinate and unequivocal effect on the behaviour of any listener who is a member of the verbal community in question and has learned the conventions governing the use of the words contained in the sentence. We have also seen that it is only in so far as it is required to perform that function and thereby preserve the intelligibility of what is said within the verbal community, that autoclitic behaviour is maintained by mutual reinforcement on the part of community members. What we now have to consider is how the autoclitic behaviour involved in its construction gives to a sentence its power to produce a determinate and unequivocal effect on the behaviour of the standard listener.

In my immediately preceding paper in this series (Place, 1982, pp. 120-123) I tried to account for the fact that the speaker is able to put words together so as to form novel sentences, whether in the form of Goldiamond's "instruction stimuli" which can elicit from the listener behaviour which he or she has never previously emitted, or in the form of what Harzem and Miles (1978) call "informative stimuli" which can convey to the listener information about contingencies that he or she has never previously encountered. I based that account on a modification of the theory of "discriminative stimuli" and "discrimination learning" presented by Skinner in Chapter 5 of *Behavior of Organisms* (Skinner, 1938 pp. 167-231). This modified version of Skinner's account of discrimination and discriminative stimuli is designed to accommodate the special properties of the sentence as it affects the behaviour of the listener. It is summarised in the following six points which cover the same ground, though in a different order, as do the five points laid out on page 122 of the immediately preceding paper (Place, 1982).

1. Sentences produce their effect on the behaviour of the listener by acting as discriminative stimuli ( $S^D$  or  $S^A$ ).

2. A discriminative stimulus may be defined for the present purpose as a stimulus which has the property of organising the behaviour of an organism in manner appropriate to the existence in its environment of a particular contingency or contingency type.

3. The term contingency as used here may be defined as a causal relationship which either holds or is alleged to hold given certain antecedent conditions between behaviour which the organism in question may or may not emit and the consequences of emitting that behaviour under those conditions. As was recently pointed out to me by Dr. Richard Garrett,<sup>6</sup> this use of "contingency" to characterise what it is that a discriminative stimulus prepares the organism to encounter is "intensional" in the sense that the description of the contingency is being used to specify the range of circumstances which the organism is thereby prepared to encounter, rather than as means of identifying an actually existing causal relationship within the organism's environment.

4. Speakers constantly emit and listeners can and do regularly respond determinately and effectively to sentences. These novel sentences consist of familiar words put together in accordance with familiar conventions maintained by selective reinforcement on the part of the verbal community; although

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<sup>6</sup> Of the Department of Philosophy and Business Ethics, Bentley College (personal communication).

that particular combination of words and sentence structure may never have been previously encountered in precisely that form. Such novel sentences, moreover, act as discriminative stimuli for contingencies which, though consisting of familiar elements standing in familiar relationships to one another, have often never previously occurred in that precise combination in the previous experience of the listener.

5. Since in such cases neither the sentences nor the contingencies for which they act as discriminative stimuli have been previously encountered by the listener, it follows that they cannot have acquired their ability to act as discriminative stimuli with respect to the behaviour of the listener in the manner described by Skinner in Chapter 5 of *The Behavior of Organisms* (1938). According to that account, discriminative stimuli acquire their properties by virtue of a contrast between a discriminative stimulus ( $S^D$ ) which is consistently associated with an operant when it is followed by reinforcement and another discriminative stimulus ( $S^\Delta$ ) which is consistently associated with the same operant when it is not reinforced. It is evident that a novel sentence which a listener has never encountered before cannot have acquired its discriminative stimulus properties in this way. Nevertheless, it is also clear that such sentences only acquire their ability to act as discriminative stimuli in so far as their constituent tact words have been consistently associated with types of objects, situations or events which have formed part of a variety of actual contingencies in the past experience of the listener, and in so far as the autoclitic words and other autoclitic features, such as the order of words within the sentence, have been consistently associated with particular contingency types.

6. Suppose that in the past learning experience of the listener the tact words of which a sentence is composed have been consistently associated with stimulus elements which have recurred as parts of a variety of different contingencies. Suppose further that there has been a similar past association between the autoclitic words and other features which give the sentence its structure and contingencies which, though containing different stimulus elements, have the same formal structure. We may now suppose that a sentence so composed acquires the properties of a discriminative stimulus for the listener with respect to given contingency by virtue of an isomorphic mapping relationship between the elements and structure of the sentence on the one hand and the elements and structure of a part or the whole of the contingency in question on the other. This is the principle which I propose to call "Behavioural Contingency Semantics."

## THE STRUCTURE OF CONTINGENCIES

In order to substantiate this account of how a sentence acquires the property of acting for the listener as a discriminative stimulus with respect to a particular contingency, two analyses are needed. On the one hand we need a syntactic analysis of the structure of the sentence of the kind familiar to the linguist, grammarian and logician which breaks down the sentence into its constituent parts. On the other hand we need a corresponding analysis of the contingency so as to be able to identify the elements and relationship within contingency which correspond to the words, phrases and clauses of which the conventional sentence is composed.

In developing an analysis of contingencies which we can then relate to the sentences which map on to them, we can usefully begin by analysing a contingency into the three terms or "legs," as I prefer to call them, represented by the mnemonic A-B-C standing for Antecedents, Behaviour and Consequences. I prefer to speak of the three "legs" rather than the more usual three "terms" of a contingency, partly because the three terms of contingency do not, as we shall see, correspond to the subject and predicate terms into which the sentences and propositions of traditional grammar and logic are divided, and partly because, if we think of a three legged stool, it reminds us that a contingency that lacks any one of its three legs won't stand up. A contingency, I have suggested, is a causal relationship. It is therefore not surprising to find that the three legs of a contingency correspond to three essential features of any causal relationship involving the occurrence or non-occurrence of an event such as that constituted by the behaviour of a living organism. Thus the Antecedents correspond to the standing pre-conditions, like the dryness of the match without which the effect (the ignition of the match) cannot come about. The Behaviour corresponds to the triggering event, the striking of the match head against the sandpaper, which precipitates the effect,

the igniting of the match, which in turn corresponds to the third term of the contingency, the Consequences of the Behaviour, given the relevant Antecedent conditions.

When we analyse a contingency into these three legs, it becomes apparent that, although it is possible to construct a complex sentence like *Provided the match is dry, it will ignite, if the head is struck against the sandpaper* or *If the baby cries, give it a bottle and it will go back to sleep*, which specifies all three legs of the contingency concerned, these complex sentences can be broken down into three separate simple sentences each of which maps onto a different contingency leg. Thus in the two examples I have given the sentences *The match is dry* and *The baby is crying* specify an Antecedent condition under which the Behaviour specified by the sentences, *Strike the head of the match against the sandpaper* and *Give the baby a bottle* will have the Consequence expressed in the one case by the sentence *The match will ignite* and in the other case by the sentence *The baby will go back to sleep*. But although these simple sentences specify only one of the three legs of the contingency, nevertheless, when uttered in the appropriate context, each simple sentence is capable of standing by itself and thus of acting as a discriminative stimulus for the listener with respect to the complete contingency of which only one leg is actually specified by the sentence. Thus, under appropriate circumstances, any of the sentences *This match is dry* (Antecedent), *Strike the match head against the sandpaper* (Behaviour) and *We need the match alight* (Consequence) can be used to induce the behaviour of striking a match. Likewise any of the sentences *The baby is crying*, *Give the baby a bottle* and *I wish that baby would go back to sleep* can be used to induce bottle-giving behaviour on the part of the listener.

Generalising from these examples we see that for a sentence to be complete and thereby function as a discriminative stimulus with respect to the contingency in question, it is not necessary that it should map onto all three contingency legs. On the other hand, it would appear that no sentence can determinately control the behaviour of a standard listener and thus qualify as a complete conventional sentence, unless it specifies at least one of three legs of the contingency for which it thereby acts as a discriminative stimulus.

#### EVENTS, STATES OF AFFAIRS AND THE PROPERTIES OF A SUBSTANCE

By induction from the example of the three simple sentences *The baby is crying*, *Give it a bottle* and *It will go back to sleep*, we can derive the hypothesis that a simple or "atomic" sentence, as that term will be used within the framework of Behavioural Contingency Semantics, is one which maps on to an event or state of affairs which constitutes one or other of the three legs, Antecedent condition, Behaviour or Consequence, of which every contingency is composed. From these three simple or "atomic" sentences, we can construct two compound conditional sentences of the form "If *p* then *q* ." The first of these, the sentence *If the baby cries, give it a bottle* specifies the Antecedent and the Behaviour to be emitted. The second, the sentence *If you give it a bottle, it will go back to sleep* specifies the Behaviour and its Consequences. Finally the three clause sentence, *If the baby cries, give it a bottle and it will go back to sleep* specifies all three legs of the contingency.

From this observation, we then derive the further hypothesis that using the manipulative autoclitic pair *If ..., then ...* we link two or more of these simple sentences together in such a way as to provide a map of the contingent relationship between Antecedent and Behaviour, Behaviour and Consequence, or between Antecedent, Behaviour and Consequence.

What we now need to do is to go inside the various events and states of affairs which constitute the three legs of a contingency in order to discover the various elements and relationships between them which are needed in accordance with the principle of Behavioural Contingency Semantics to match the words, phrases and relations between them which are revealed by a syntactic analysis of the corresponding sentence.

When we do this, we discover, I suggest, that every contingency leg is either a *state of affairs*, something like the baby's being asleep, which persists without change over a period of time, or an *event*, a change which occurs at or over time. Events are of two kinds, either *processes*, like the baby crying, which involve continuous change extended over time or *instantaneous events*, changes which occur at

moments of time, but are not extended over time (Place, 1972). Instantaneous events occur at the interface either between two processes or between a process and a state of affairs. They occur when one process ends and another one begins, as when the baby stops crying and begins to feed, when a pre-existing state of affairs comes to an end and is replaced by a process, as when the baby starts to cry, or when a process, such as the crying, in its turn comes to an end and is replaced by an existing state of affairs such as a state of sleep (Place, 1973).

Not only does it appear that every contingency leg is either an event or a state of affairs, it also turns out that every event that impinges on the behaviour of a living organism can be construed as the leg of some contingency or other. In general states of affairs tend to occur as Antecedent conditions, and events either as Behaviour or as Consequences of behaviour, depending on whether the change involved is one that is or could be brought about by the organism for whom it is a contingency. However, there are many events and many states of affairs that can occur indifferently as Antecedents, Behaviour and Consequences in relation to different contingencies for the same or different individuals. Thus the baby's crying is an event which constitutes an Antecedent condition with respect to the Behaviour of the parent or baby sitter in giving it a bottle. But it is also Behaviour emitted by the child itself; and it may well be a Consequence in relation to some behaviour which has disturbed it while asleep. Similarly someone's having an empty glass is a state of affairs which constitutes an Antecedent condition for the Behaviour of buying the individual in question another drink, Behaviour reinforced by avoiding prosecution for drunken driving or the Consequence of having consumed the contents.

Every change that occurs and hence every event is either (a) a matter of something which did not previously exist coming into existence, (b) a matter of something that already exists ceasing to do so, or (c) a change in the properties of or relations between things that already exist. Similarly, every persisting state of affairs is either (a) a matter of the continued existence of something that already exists, or (b) the persistence of some property or relation between things that already exist. Moreover, as Aristotle first pointed out more than two thousand years ago, properties and relations can only exist, and thus be susceptible to change or to remaining unchanged, in so far as there exists a spatially extended object or substance (οὐσία) of which it is the property or two or more such objects or substances between which the relation holds. Consequently one or more such objects or substances must be involved in every event and state of affairs and hence in every contingency leg whether Antecedent, Behaviour or Consequence. There can't be crying without someone who is crying; there can't be emptiness without some vessel that is empty; there can't be giving without a giver, something given and someone to whom it is given.

The relationship of an object or substance to its properties or the relations which hold between it and other objects or instances is as follows. With the exception of the property of excluding other objects which are not incorporated within it from the volume of space which it currently occupies, any of the properties of an object and any of the relations in which it stands to other objects can change without the object in question ceasing to exist. Moreover, the object will continue to be identifiable as the same object that was encountered on a previous occasion by virtue of its occupying a continuous sequence of spatial volumes as it moves or is moved from place to place during its unique career through time. Its properties and relations to other things, by contrast, are much more ephemeral, and it is for this reason that they can normally only be identified by reference to the objects or substances of which they are the properties or, in the case of relations, by reference to the objects or substances between which they hold.

#### SUBJECT AND PREDICATE - FUNCTION AND ARGUMENT

To Aristotle goes the credit not only for drawing our attention to this relationship between properties and the substances that bear those properties, but also for pointing out how the relation between a substance and its properties is reflected in the grammar of the sentence in the relation between the subject term, corresponding to the object or substance, and the predicate that is attached to it, corresponding to a property of that object or substance. This subject-predicate analysis of sentences was the only account of the structure of the sentence available to grammarians and logicians for more than two millenia. Its weakness was first pointed out by Frege (1879, 1891). On the subject-predicate analysis the two sentences,

*John loves Mary* and *Mary is loved by John*, which are simply the active and passive versions respectively of what is in all other respects the same sentence, require to be analysed quite differently, *John loves Mary* as a sentence with subject term *John* and predicate term *loves Mary* and its passive equivalent *Mary is loved by John* as a sentence with subject term *Mary* and predicate term *is loved by John*.

In the light of this criticism Frege proposed an alternative analysis which overcomes the difficulty presented by the active/passive transformation, which confronts the traditional subject-predicate analysis in dealing with sentences describing relations between two or more objects. On Frege's analysis relational sentences are construed as consisting of a function or multi-place predicate whose argument places are filled by what Frege calls "proper names." The *function* or multi-place predicate in this analysis specifies relation which holds between the objects denoted or referred to by the proper names which fill the argument places.

Consider the following sentence which occurs in Volume II of Whellan's *York and the North Riding* (Whellan, 1859) in the section on Marton-in-the-Forest: *Ascitel de Bulmer purchased Marton of King Henry I*. The first point to be made about this sentence is that it can hardly be said to specify a contingency affecting the behaviour of a reader more than 800 years after the event it records. Nevertheless one of the implications of Behavioural Contingency Semantics is that a listener, reader or audience can only relate to narrative statements or narrative presentations in the form of a play or film whether fictional or historical, by identifying with one or more of the characters in the story and thus treating the contingency presented as if it were a contingency impinging on his or her own behaviour in the here and now.

Whether or not this is a satisfactory resolution of the difficulty which is presented to the theory by a statement about a remote historical event, we can at least observe the feature of the sentence which is important for our present purpose, namely, that it is a sentence which consists of a functional expression or multi-place predicate, the verb *purchased* with three argument places filled respectively by the proper names *Ascitel de Bulmer*, *Marton* and *King Henry I* which denote respectively the purchaser, the object purchased, in this case a village and the land surrounding it, and the vendor, and which respectively occupy the subject, object and indirect object positions within the sentence.

However, Frege's point about sentences like this is that the fact that, in this form of the sentence, the subject position is occupied by the proper name *Ascitel de Bulmer* is simply a matter of what you want to emphasise. There are in fact four different versions of the same sentence in which by modifying the form of the functional or predicate expression we can move each of the proper names into any of the three argument places. Thus from the original sentence *Ascitel de Bulmer purchased Marton of King Henry I*, which homes in on the behaviour of Ascitel de Bulmer, we can move by active/passive transformation to the sentence *Marton was purchased of King Henry I by Ascitel de Bulmer*, which homes in on the consequence for Marton of the behaviour of Ascitel de Bulmer. Then by substituting the verb *sold* for the verb *purchased* we can express the same relationship with *King Henry I* in the subject position yielding the sentence *King Henry I sold Marton to Ascitel de Bulmer* which homes in on the behaviour of the King; and by active/passive transformation we can move to *Marton was sold by King Henry I to Ascitel de Bulmer* which homes in on what happened to Marton as a consequence of the behaviour of the King.

This example illustrates very clearly the contrast between the Aristotelian subject/predicate analysis of the sentence and the Fregean function/argument analysis. On the one hand it emphasises Frege's point about the arbitrary nature of the assignment of one proper name to the subject term position in the sentence in that, by substituting the verb *sold* for *purchased* in the function position and by making the active/passive transformation, we can move any of the three proper names into any of the three argument places without altering the sense of what is asserted in any way. At the same time it brings out the fact that the main point of making these transformations is precisely to bring a particular proper name into the subject position. The effect of this is not to say anything different about the event or state of affairs in question. It simply has the effect of viewing the event or state of affairs, as it were, from the standpoint of the individual whose name occurs in the subject position and thus as a part of a contingency relating to that individual's behaviour.

It also brings out, I suggest, how it is that Frege's function and argument analysis resolves a simple sentence into elements which correspond exactly to the analysis of events and states of affairs outlined above. Conceived in this way a sentence is rather like a wheel of which the function or multi-place predicate is the hub and the argument places are the spokes. It is the function or predicate around which the sentence as a whole revolves. It is also the function/predicate expression which corresponds to the property or relation the change in or persistence of which constitutes the event or state of affairs which is specified by the sentence as a whole. The proper names which occupy the argument places in our example correspond to the objects/substances, in this case two human beings and a village, without whose participation the event in question could not have occurred, and without mentioning which the event could not have been identified.

The fact that it is the function/predicate expression which maps directly onto the event or state of affairs which is specified by the sentence as a whole, helps to explain why it is that in most cases when sentences are reduced to a single word like *Stop, Go, Fire!, Fox!*, etc. it is the principal tact word of a function/predicate expression which does duty for a complete sentence. At the same time, the evanescent character of most states of affairs and events makes them unsuitable candidates to be the bearers of proper names. Hence the importance of being able to pin down an event or state of affairs to the much more permanent objects/substances on which their existence depends as part of the process whereby the speaker makes clear to the listener which event or state of affairs or which range of events or states of affairs is at issue.

Although objects/substances are by and large sufficiently permanent features of the environment to be the bearers of proper names and many, including all three objects involved in the event specified by our example, are so identified, we can and often do refer to the same individuals in ways other than by their proper names. For example, at the time when the purchase was made it might have been possible for someone present to point to the two people involved and say *He* [i.e. Ascitel de Bulmer] *is purchasing it* [i.e. Marton] *from him* [i.e. King Henry] where an indexical pronoun has been substituted for each of the proper names. Alternatively, we can substitute the definite description *the man who was Sheriff of Yorkshire between 1114-1130* for the proper name *Ascitel de Bulmer*, the definite description *the manor* for the proper name *Marton* and the definite description *The third King of England to reign after the Conquest* for the proper name *King Henry I* so as to generate the sentence *The man who was Sheriff of Yorkshire between 1114-1130 purchased the manor from the third King of England to reign after the Conquest.*

Both alternative versions of the original sentence in which we substitute in the first case pronouns and in the second case definite descriptions are analysed by Frege in precisely the same way as is the original sentence from which they are derived. In all three cases the sentence consists of a function *purchased* and three argument places filled by what Frege would call "proper names" each of which refers to the same object as the proper name, in the ordinary sense of the term, which occurs in the corresponding place in the original sentence.

The introduction of noun phrases or descriptions as substitutes for proper names is important, not just as an alternative to proper names or pronouns and other indexical expressions like *This man* as device for establishing an identifying reference to a particular object or substance, but also because it permits the use of quantifiers (Skinner's "quantifying autoclitics"), particularly the universal quantifier ("all," "every," "each," "any," etc.), which enable sentences to specify contingencies of much greater generality than is possible if objects/substances can only be identified by name or by pointing individually at them. Descriptive elaboration and quantification are not, however, features which are confined to noun phrases occupying the argument places relative to some function or main predicate. The central verb phrase which expresses the function may include an adverbial quantifier like "sometimes," "any time," "always", etc. which quantifies over the times or occasions at or over which an event or state of affairs occurs. It may also include an adverb or a descriptive adverbial expression like *in the manner that is characteristic of him* which helps to pin down the character of the event or state of affairs in question.

## THE HIERARCHICAL CONSTRUCTION OF SENTENCES

Having given an account of the sentence successively in pragmatic, semantic and finally syntactic terms, we are now in a position to provide the rudiments at least, of what in many respects is a fairly conventional account of the construction of sentences as a sequence of hierarchically ordered steps. At first glance this approach would seem to have little in common with the account of autoclitics and autoclitic behaviour presented by Skinner in Part IV of *Verbal Behavior*. However, it turns out, somewhat surprisingly perhaps, that there is an interesting relationship between the different steps in this hierarchically ordered process of sentence construction and the different categories of autoclitic distinguished by Skinner in Chapters 12 and 13 of the book.

Conceived in this way we can envisage the construction of sentences as a process which proceeds in three distinct stages. The first stage is the stage in which words are put together to form phrases, either verb phrases or predicate expressions occupying the main predicate or function position in the sentence or noun phrases, proper names, pronouns or descriptions, which occupy the argument places. The second stage is the stage in which a verb phrase is combined with one or more noun phrases to form a minimal or atomic sentence which maps onto one of the legs of a contingency. The third stage is the stage in which simple or atomic sentences are embedded as clauses in a compound sentence.

However, in practice the distinction between the first two of these stages, the assembly of words into verb phrases and noun phrases and the assembly of verb phrase and noun phrase(s) into a sentence are not always easy to separate from one another. There are two reasons for this. One is that basic structure of the sentence is already determined by the relation of the verb phrase which constitutes the main predicate or functional expression. Thus, selection of the verb *to buy* or *purchase* in case of the sentence *Ascitel de Bulmer purchased Marton of King Henry I* immediately creates the three argument places to be filled by noun phrases specifying the purchaser, what was purchased and the vendor. Moreover given that the purchaser and what was purchased occupy the subject and object positions immediately before and immediately after a verb in the Active Voice, the selection of this verb requires the preposition *of* or *from* to mark the indirect object argument place occupied by a noun phrase specifying the vendor.

Another reason for the difficulty in separating the construction of the main verb phrase from that of the sentence as a whole is that the form of the verb or verbal auxiliary which occurs in the main verb phrase varies according to whether the subject term is singular or plural and whether it is in the first, second or third person. But although the construction of the main verb phrase is not readily disentangled from the construction of the sentence as a whole, the construction of a noun phrase where this consists of something more than a pronoun or proper name can be readily distinguished as an element distinct from that of the main verb phrase and of the sentence as a whole. This has already been illustrated in the case of the sentence *Ascitel de Bulmer purchased Marton from King Henry I* by the noun phrases or definite descriptions that can be substituted for each of the three proper names occupying the argument places. Similar substitutions of definite descriptions like *the author of this article*, *the reader* or *the aforementioned person* can be made in the case of the pronouns *I*, *you* and *he* or *she*.

If we now try to relate this initial stage in the construction of the noun and verb phrases that compose a simple sentence to Skinner's classification of types of autoclitic, we find that all the autoclitics which enter into the construction of the basic function or verb phrase, both the verbal auxiliaries and verb inflexions which indicate tense and the propositions like *to*, *from* and *by* which link the verb to the argument places are classified by Skinner as "relational autoclitics." Moreover, with the exception of the genitive preposition *of* and case ending *'s* which belong to the construction of noun phrases all relational autoclitics, in Skinner's sense, are implicated in the construction of verb phrases or functions. The remaining components of the verb phrase proper are tact words or tact phrases such as a verb (e.g. *purchased*) or an adjective (e.g. *valuable*) combined with an appropriate part of the auxiliary verb *to be*, either of which may or may not be qualified by an adverb such as *cheaply*, *extremely*, or an adverbial phrase such as the phrase *with several other properties* (in the case of *purchased* or *more/less ..... than other properties in the estate* (in the case of *was valuable*).

As we have seen, argument places are occupied either by proper names, by pronouns - a type of autoclitic or semi-autoclitic which cannot be readily assigned to any of Skinner's types - or by noun

phrases, i.e. definite or indefinite descriptions. These noun phrases consist partly of tact words, common nouns such as *man*, *king* or *village* which may or may not be qualified by an adjective (e.g. *former* or *next*) or by an adjectival phrase, introduced either by the genitive relational autoclitic *of* or 's or, where it consists of a subordinate sentence or clause, by a relative pronoun such as *who* or *which*, another type of autoclitic not included in Skinner's classification.

The other important component of the noun phrase or description is, of course, the quantifier or "quantifying autoclitic", such as the definite article *the*, the indefinite article *a*, and words like *some*, *all*, *each*, *every*, *any*, etc. Although quantification theory in modern logic is almost exclusively concerned with the quantification over individuals that is characteristic of the quantifiers that occur in noun phrases or descriptions, there is in fact another very important locus for quantification within a sentence, namely the quantification over times or occasions represented by adverbs like *sometimes*, *whenever*, *always*, *occasionally*, etc. We could construe these merely as adverbs qualifying the verbs which constitutes the nucleus of the function or verb phrase. Another suggestion which is more in keeping with their importance in determining the logical entailments of the sentences in which they occur is to assimilate them to what Skinner calls "qualifying autoclitics", such as the negation signs *no* and *not* and the corresponding assertion signs *yes*, *certainly*, *of course*, etc. (Skinner, 1957, p. 326). These qualifying autoclitics, together with the indications of voice, mood and tense given by the form of the verbal auxiliaries and verb inflections, give the sentence the structural characteristics which enable us to tell, in the case of the relational autoclitics of voice, mood and tense, whether it is the Antecedents of behaviour, the Behaviour itself or its Consequences that a simple sentence maps on to. From the qualifying autoclitics of negation and assertion the listener can tell whether it is the presence or absence of something that constitutes the Antecedents, or Consequences of behaviour and whether the required behaviour consists in the emission or omission of the act specified by the verb. Similarly from the quantifying autoclitics that range over times and occasions the listener is informed about the degree of uniformity or regularity that characterises either the Antecedent Behaviour or the Behaviour Consequence relationship.

Skinner's two remaining categories of autoclitic, the "descriptive" and the "manipulative", appear to belong to the third and final stage of sentence construction in which simple atomic sentences in the sense defined above are put together to form either the main or subordinate clauses of a compound sentence. However, because he devotes the whole of his section on the manipulative autoclitic (Skinner, 1957, pp. 340-343) to dismissing the etymological speculations of J. H. Tooke, leaving us to guess what he has in mind from the examples he discusses, it is difficult to be sure how he intends the term to be understood. Assuming, however, that by manipulative autoclitics he means paired conjunctions like *both ... and*, *either ... or* and *if ... then*, *not only ... but also*, the role of such autoclitics in the construction of compound sentences is at once apparent.

Compound sentences in which two or more simple sentences are combined are of three basic kinds. One which we have already encountered is the relative clause, an embedded sentence introduced by a relative pronoun which occurs either as an adjectival expression qualifying a common noun within a noun phrase or description occupying one of the argument places, as in the noun phrase *The man you met yesterday afternoon*, or as an adverbial expression qualifying the main verb phrase or function, as in the verb phrase *did what was asked of him*. The role of these relative clauses is the same as that of the adjectives and adverbs whose position in the sentence they occupy, namely to help the listener to identify the object, and hence event or state of affairs, referred to. Relative clauses, however, cannot be combined with the verb *to be* so as to form a predicative expression in the way that an adjective can. We can say *He is talkative*, but not *He is who talked so much at the meeting*. We have to say *He is the person who ...*

Compound sentences formed by means of what Skinner seems to want to call "manipulative autoclitics" or "truth functional connectives", as they are called by logicians, are much more interesting. As we have seen, these are the compound sentences which are used to link together the legs of a contingency and express the contingent relationship between them. Thus the standard form of a threat is a compound disjunction between a simple sentence specifying Behaviour and a simple sentence specifying the aversive Consequences of failing so to behave: *Either you do what I say, or I shoot*. Likewise the compound conditional with an antecedent specifying the required Behaviour and a consequent specifying



the reinforcing Consequences is the standard form of the promise or bribe: *If you scratch my back, I'll scratch yours*. Other compound conditional sentences specify, in the antecedent, the Antecedent conditions under which the Behaviour specified in the consequent will be reinforced. *If or When the baby cries, give it a bottle*. There appears to be no obvious counterpart for this in the case of disjunction.

The conjunction *and* has many uses. In some cases it can express what is more normally expressed by a disjunction as in the threat *Do what I say and you'll come to no harm* or by a conditional as in the promise *You scratch my back and I'll scratch yours*. In other cases it links multiple Antecedents, as in *If Joe gets in before I'm back and you want something to eat, look in the refrigerator*, the elements of Behaviour chain, as in *Break the glass, take the key and unlock the door* or a chain of Consequences, as in *If you don't hurry, you will miss the bus, miss your train and miss your appointment*.

Another interesting group of clauses are the embedded sentences in the *oratio obliqua* or indirect reported speech form which are used to report both what someone has publicly said and, as we saw in discussing intensionality-with-an-s in the first paper in this series (Place, 1981a) what they may be supposed to have said privately to themselves.

Embedded sentences of the *oratio obliqua* type can be classified in two different ways. On the one hand they can be classified according to the mood of the embedded sentence. Thus we can distinguish embedded indicative sentences introduced by the pronoun *that*, embedded interrogative sentences introduced by an interrogative pronoun *who, what, whether, why, how*, etc. and embedded imperative sentences introduced by the preposition *to*. On the other hand they can be classified according to the type of verb which introduces the embedded sentence, whether it is a verb of utterance like *say*, a verb of cognition like *think*, or a verb of volition like *intend*. Combining these two classifications we can distinguish verbs of utterance like *tell, ask* and *agree* which take embedded sentences in all three moods, verbs of cognition like *think, know* and *remember* that take sentences in all three moods, and the verb *decide* which is arguably a verb of volition and similarly introduces sentences in all three moods. Likewise verbs of utterance, like *say, suggest* and *confess*, take embedded sentences in the indicative and interrogative, but not in the imperative mood, as do a long list of verbs of cognition like *see, hear, observe, guess, wonder*, etc. Verbs of utterance, like *admit, swear* and *promise*, introduce embedded sentences in the indicative and imperative, but not in the interrogative mood, as do verbs of cognition, like *be reminded* and *expect*, and verbs of volition, like *wish* and *intend*. There is again a long list of verbs of utterance such as *assert, deny, declare, submit*, etc. which introduce only sentences in the indicative mood, and similarly in the case of verbs of cognition, such as *believe, recognise, imagine, infer*, etc. Examples of verbs which take only embedded sentences in the imperative mood are verbs of utterance, like *order, command* and *undertake*, and verbs of volition, like *want* and *try*.

It will not have escaped readers of *Verbal Behavior* that when an embedded sentence is introduced by one of these verbs in the first person and the present tense, the initial verb phrase *I'm telling you, I ask you, I agree*, etc. functions as what Skinner in Chapter 12 of the book (Skinner, 1957, pp. 313-320) calls a "descriptive autoclitic" (Skinner, 1957, pp. 313-320). The point which I take Skinner to be making here is this: in other cases where an embedded sentence is introduced by a verb in the second or third person or in the first person, if the verb is in the past tense, it has the function of reporting what someone has said or may be supposed to have thought or habitually thinks, but where the initial verb phrase is in the first person present tense, the embedded sentence functions as an ordinary assertion, question or imperative, as the case may be, just as it would if it were not embedded. The verb phrase that introduces it, though it may also have a tact or descriptive function in so far as it characterises the speaker's state of mind in emitting the sentence in question, is primarily used to indicate such things as the confidence with which an assertion is made, (*I am convinced, I suspect*, etc.), what its source or authority is (*I am reminded*), in order to soften the blow (*I regret to inform you*) or the effect of a mand, as in Skinner's example (1957, p. 317) *I don't suppose you have a match*.

## CONCLUSION

The account of syntax presented by Skinner in Part IV of *Verbal Behavior* (Skinner, 1957, pp. 311-343) is manifestly defective in so far as it fails to incorporate such notions as the sentence, the structure of a sentence, its construction *de novo* from words, phrases and clauses, and the parts of speech which are presupposed by any analysis of sentence structure. I have tried to show, however, that a fairly conventional analysis of sentence structure based on Frege's distinction between function and argument can be used to give substance to the principle which I have called "Behavioural Contingency Semantics" whereby a sentence acquires the properties of a discriminative stimulus with respect to a given contingency or contingency-type by virtue of an isomorphic mapping between the structure of the sentence, and the structure of one or more of the 'legs' of a contingency and the contingent relationship between them. I have also tried to show two principles derived from Skinner's discussion of autoclitic behaviour and the autoclitic, namely, the principle which I have called "progressive disambiguation" and his classification of autoclitics into their different types can be given a home within the more conventional account of syntax and its semantic function which I have tried to present.

Clearly much needs to be said on this topic before we can be satisfied that a fully satisfactory account of syntax along these lines has been achieved. Nevertheless I hope that enough has been said to suggest the falsity of the common view which holds that nothing significant can be said about syntax from the standpoint of the operant analysis of verbal behaviour.

Having in this paper developed something by way of an account of how words are put together to form phrases and sentences, it only remains in the next and final paper in the series to examine two consequences of this ability to construct novel contingency specifying stimuli or sentences. On the one hand we have the ability of a thinker to combine information derived from the tact sentences of others with information derived from personal observation of the environment, so as to achieve more effective behavioural control over it. On the other hand, there is the ability of the speaker to construct what Skinner calls "impure tacts", false or inaccurate statements which are liable to mislead the listener, if he or she relies on them. This raises in an acute form the problem of how to incorporate within the theory of verbal behaviour an account both of the distinction between truth and falsity and of the way in which the listener can learn to discriminate between them.

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