Semantics and the Syntactic Classification of Words[*]

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In presenting some aspects of our somewhat unusual
grammar to a gathering of computational linguists, I feel
justified in taking two things for granted: first, that
most people who have taken an active interest both in com-
puters and in natural language have come to realise that
computers, although impressively fast and reliable in many
tasks, are not very brilliant when it comes to making in-
ductive decisions on the basis of insufficient or not tho-
roughly defined data; and, second, that what we linguists
know about the workings of natural language is by no means
enough to supply computers, as they are, with a solid bas-
is for the fully automatic handling of natural-language.
data.

This is not meant to be a disparaging comment on pre-
vious efforts in linguistics, for, after all, the contin-
gency that has opened our eyes to these shortcomings did
not exist until a few years ago. Traditional linguists,
and especially grammarians, could carry on their business
quite happily on the more or less explicit assumption that
language - like so many things in the still wide-spread
Platonic view of the world - could be separated into two
levels: the ideal, uncontaminated one of pure structure

or form that was inherently generalisable, and the slight-
ly messy, unsystemic, and therefore far less interesting
one of individual content. This dichotomy was possible and
workable as long as the use of language was restricted to
organisms who, by the time they embarked on linguistic act-
ivities, had necessarily absorbed a vast body of experien-
tial and conceptual knowledge, on which, more or less con-
sciously, they could draw whenever the formulation or com-
prehension of a linguistic expression required something
beyond the rules of the ideal grammar.

With the advent of computers the situation was radical-
ly changed. Suddenly linguists could and would find them-
selves committed, for one reason or another, to transmit
their know-how to a potential language user who did not
possess any a priori experiential or conceptual knowledge
whatsoever. Thus there arose innumerable questions which,
hitherto, no one had ever been compelled to answer, and it
became painfully obvious that the application of much of
the linguists' cherished theoretical knowledge to actual
language material presupposed a considerable amount of as
yet unexplored preprocessing of that very material.

I shall not try to catalogue the types of question and
the kinds of problem which have been thrust upon the lin-
guist by the appearance of computers - every one of you
is familiar with some if not all of them; instead I should
like to present a few examples and show the direction in
which, we believe, some solutions can be found.

By 'linguistic activities' or 'handling language data'
we mean, for instance, formulating a given message in a
specific natural language; or recognising, in a given
piece of language, the message intentionally formulated

in that way by an author; or translating a formulation giv-
en in one natural language into a 'corresponding'[*] form-
ulation in another natural language, etc. Since the 'pre-
processing' in all these cases involves what, summarily,
is called <u>semantics</u>, it is necessary to stress that in our
view of language there is no unbridgeable abyss or opposi-
tion between semantics and syntax. In fact, we speak of
'relational' semantics (a term already used by Ullmann[1])
when we try to define that part of an expression's meaning
that is determined by specific syntactic functions (or <u>Cor-
relators</u>); and we call 'lexical' semantics the attempt -
for instance the lexicographer's - to define the meaning
of words as separate individual items.

In traditional grammars the lexical items of a natural
language are classified as 'parts of speech' according to
their generic syntactic functions and/or their morphologic-
al characteristics; in correlational grammar[**] they are
classified exclusively according to the actual roles they
can play in correlational structures; moreover, while tra-
ditional grammars operate with about a dozen different ge-

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* Note that since we are interested, not in developing a ri-
gid logically formalised theory of grammar, but in develop-
ing a flexible operational system for the automatic inter-
pretation and handling of natural-language sentences and
text, we do not require formal instruments for the determ-
ination of 'meaning', 'interlinguistic correspondence',
'synonymy', etc.; for our empirical purposes the consensus
of proficient language speakers is the relevant and suf-
ficient criterion.

** Although both theory and practice of Correlational Gram-
mar have been drastically modified in our empirical appli-
cations, much of the terminology and the basic concepts
derive from the pioneering work of Silvio Ceccato, whom I
was fortunate enough to have as friend and teacher.

neric syntactic functions, our correlational English gram-
mar distinguishes several hundred correlators (in the pre-
sent version of our automatic parser[3] there are 350).

The list of these correlators is the result of intuit-
ive analysis of English texts, continual refinement by
means of insights gained in the translation of English sen-
tence structures into other languages[*], and by experi-
ments with an automatic parsing procedure whose output, or
lack of output, inevitably demonstrates the shortcomings
or, as we prefer to put it, the degree of completeness
reached by the system's grammar. In our terminology a 'cor-
relator' is a connective function which links two pieces -
either words or word combinations - and thus forms a unit
we call 'correlation'. Correlators are divided into sever-
al types, the main distinction being made between _implicit_
correlators, which are indicated in the sentence merely by
the juxtaposition of the items they link, and _explicit_ cor-
relators, which are indicated by specific words (mostly
prepositions and conjunctions).

To serve as a valid tool in the parsing or interpreta-
tion of sentences, a correlator must not only have an in-
dividual code number ('Ic', or correlation index), but the
particular relation it establishes, between the two items
it correlates, must be characterised or explicated. This
explication may be an _ad hoc_ description, an illustrative
paraphrase, a suitable transform _à la_ Chomsky[4] or Fill-
more[5], or a symbolic expression devised along the lines
of function symbols in logical calculus[6].

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* Translation frequently helps to pinpoint relational ambi-
guities which, although relevant in the disambiguation of
other structures, are not immediately perceived by the
monolingual speaker or reader.

As samples of correlator explication, here are two (one concerning an implicit correlator, the other an explicit one) taken from the correlator list which has been implemented in our operational system:

Corr.No.   Description

3670 N   generic type: verb phrase complemented by in-
                     finitive;

     Explication: the gram.subject is the actor of the
          infinitive activity; the infinitive specifies
          the purpose of the subject's primary activity.

     e.g. "He works to live",
          "I braked to avoid the child";

     but not: "He began to live" (3430 N),
          "I had to avoid the child" (3410 N);

     nor: "He was eager to live" (3350 N),
          "I was clever to avoid the child" (7012 N).

0243 E   generic type: BY, temporal limitation;

     Explication: the item on the right of "by" speci-
          fies the point in time after which what is as-
          serted by the item on the left of "by" is to be
          considered an accomplished fact.

     e.g. "You will be paid by Christmas",
          "He had left by 1865";

     but not: "You will be paid by cheque" (0257 E),
          "He had left by the back door" (0251 E);

     nor: "You will be paid by the treasurer" (0247 E),
          "He had left by sheer determination" (0255 E).

It should be clear that the 'Explication' is intended to describe as univocally as possible the relation qua re-lation without regard for the particular items[*] that are

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* In practice it is, of course, not always easy to formu-
late the explication without reference to particular items;
but as long as the analyst remains scrupulously aware of
the intention, this is not a serious impediment and, in
our experience, a sufficiently general formulation can al-
ways be found sooner or later.

eligible to be linked by that relation. Correlator analysis
and the explications this analytical investigations aims at
are consequently what we may call 'the semantics of rela-
tions'.

The term 'correlation' refers to the word-combination a
correlator produces, i.e. the ternary unit consisting of
one specific correlator and the two items (words or them-
selves word-combinations) that are linked by it; and we re-
present correlations - for instance the ones operative in
the first phrase sample) in this manner:

```
He          works        to          live
 └2230 N ──┘             └──2310 N ─┘
       └──────── 367L N ──────────┘
```
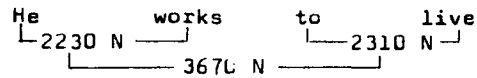
which corresponds to a conventional tree-structure with
labelled nodes:

```
              ─(3670N)─
      (2230N)           (2310N)
      /     \           /     \
    He     works      to     live
```
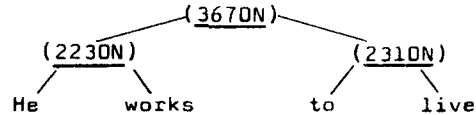
In order to recognise this structure in the linear in-
put string of the sentence, first each of the four word
items must be characterised as a possible candidate for
linkage by correlators 2230 N and 2310 N respectively[*];
and both these correlations have then to be characterised
as possible candidates for linkage by correlator 3670 N.
This characterisation is achieved by correlation indices
(or Ic's) assigned to the individual items and specifying
(a) the code numbers of the correlators by means of which

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* The correlator numbers we use were originally significant
as to the kinds of relation; continual corrections and ad-
ditions, however, have thoroughly obliterated this signi-
ficance and the numbers are now neither consecutive nor
characteristic.

the item can be linked to other items; and (b) whether the
item can occupy the right-hand (RH) or the left-hand (LH)
place in the specified correlation.

(The process of assigning Ic's, obviously, is of one
type when the item to which the Ic's are to be assigned is
a pre-established vocabulary word, and of quite another
when the item is a correlation formed in the course of the
analysis procedure; in the first case the word's string of
Ic's is the result of a priori assignation; in the second
case it is the result of a dynamic process called 'reclas-
sification', implemented by means of an intricate system of
rules which take into account the correlator responsible
for the made correlation as well as the individual charac-
ter of the pieces correlated in the particular instance;
for a full discussion of the operational reclassification
procedure see ref. No. 7).

From the sample phrases given under correlator 3670 N
it is evident that the two partial phrases constituting the
right-hand piece of the listed correlations, i.e. "to live"
and "to avoid the child", must bear RH-Ic's not only of
correlator 3670 N but also of correlators 3430 N, 3410 N,
3350 N, and 7012 N, while the partial phrases constituting
the left-hand piece of the two correlations 3670 N will
bear only the LH-Ic of correlator 3670 N and not those re-
ferring to the correlators operative in the remaining four
samples. (In the sample phrases given under correlator
0243 E, the situation is symmetrically inverted, i.e. the
two partial phrases on the left will bear only the LH-Ic of
correlator 0243 E, while the partial phrases on the right
must bear RH-Ic's of the other four listed correlators
as well.)

This assignation of Ic's automatically precludes the

formation of _unacceptable_ phrase interpretations, such as:

```
He          began        to          live
 L—2230 N —J             L—2310 N —J
       L——————— *3670 N ————————J


or    I     was   clever   to   avoid   the    child
 |          L—4230 N—J     L—2310 N—J   L—5010 N—J
 L—2050 N—J                     L——— 4010 N——J
       L——————— *3670 N ——————————J
```

which would be roughly equivalent to "He began _in order_
to live" or, respectively, "I was clever _in order_ to avoid
the child" (Note that if we change the form of the LH-phrase
in the second example and say "I was _being_ clever to avoid
the child", the 3670 N interpretation becomes acceptable
while the 7012 N interpretation - equivalent to "to avoid
the child was clever _of me_" - is no longer possible!).

Traditional grammars tend to consider such interpreta-
tional distinctions (if, indeed, they make them) as 'se-
mantic'; for correlational grammar they are clearly rela-
tional, because they are handled exclusively by the mechan-
ism of Ic-matching - and this mechanism is the operational-
ly implemented syntax of the system. And there is another
criterion as well. In all the above cases, the assignation
of Ic's to vocabulary words or correlational products emerg-
ing in the course of the parsing procedure can be determin-
ed by an examination of the individual item with regard to
the explication of the correlator whose Ic is being con-
sidered (i.e. without considering complementary items);
this examination, in principle, is similar to the examina-
tion - in traditional grammar - of a morphologically de-
ficient or indefinite word with regard to the possibility
of its being for instance a verb or a noun; or, to put it
in another way, this examination is essentially different

from the one required to decide whether two given items are
compatible as RH and LH pieces in one particular syntactic
structure[8].

The question of predicability - especially if elaborated
in the way suggested in an essay by Fred Sommers[9] - is a
case in point. Whether phrases such as:

"blue grass" or "cerise ideas",

"the indigestion of angels" or "the wings of the morn-
  ing",

are acceptable, acceptable only metaphorically, or not ac-
ceptable at all, is apparently not a relational question;
the relation - a kind of 'appurtenance' - does not seem to
change, nor could we say that any of the four phrases is
unacceptable because one of its items is such that it can
never be related in that way; since we have no objection
when the same relation is asserted in "cerise paper" or
"clear ideas", we can only conclude that there are certain
items to which certain properties or things cannot be said
to appertain and that, therefore, it is a question of lex-
ical semantics.

If the semantic analyses initiated by Ceccato in the
1950's[*] were pushed further, it seems likely that a re-
lation such as 'appurtenance' could be demonstrated to in-
corporate (i.e. to have confused) a number of specifiable
subrelations; and, once we had isolated these subrelations,
much if not all of what we now, for the lack of demonstrab-
le distinctions, have to call 'lexical ambiguity' could
perhaps be resolved relationally in a satisfactory way.

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* called 'operational' semantics, by which was meant the
analysis of the mental operations that lead to the forma-
tion of the items (or concepts) designated by words (cf.
ref. No. 10).

Thus it may indeed be so, that our need to resort to a
static, non-relational semantic classification of items,
in order to interpret phrases and sentences, is only the
measure of our ignorance concerning the basic character
and composition of relations; and that, eventually, it will
become possible to derive a comprehensive and foolproof
general semantics from the investigation of relational con-
ditions as they manifest themselves in our actual use of
language.

Let me try to make these conjectures a little less ob-
scure. One area of English grammar that has given consider-
able trouble to analysts is that of a string of constituents
which, in traditional terms, would have the specification:

<u>nominal + to be + adjective + infinitive</u>

A survey of contemporary text shows that this string,
with different lexical items and in different contexts,
gives rise to ten different relational interpretations[*].
Explicating the relevant relations, we get the following
listing:

A   "John is easy to please"

    <u>Paraphrase</u>: to please John is easy

    <u>Explication</u>: the gram.subject is the object of the in-
        finitive activity; the adj. specifies an aspect (ad-
        verbial) of the infinitive activity as enacted by
        the given subject.

B   "John is eager to please"

    <u>Paraphrase</u>: to please is what John <u>wants to do</u>

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* I do not wish to claim that ten is all and that no others
are possible; but these ten are the interpretations we came
across in one year's conscious scanning of everything con-
temporary we happened to read.

Explication: the gram.subject is the actor of the in-
    finitive activity; the adj. specifies the subject's
    disposition towards the infinitive activity, and
    this activity is merely envisaged.

C   "John was slow to understand"

Paraphrase: John was slow about understanding

Explication: the gram.subject is the actor of the in-
    finitive activity; the adj. specifies an aspect of
    the subject's performance.

D   "John is likely to leave"

Paraphrase: that John leaves is likely

Explication: the gram.subject is the actor of the in-
    finitive activity; the adj. specifies an assess-
    ment of the activity's incidence (i.e. whether or
    not it will take place).

E   "John is clever to leave"

Paraphrase: to leave is clever of John

Explication: the gram.subject is the actor of the in-
    finitive activity; the adj. specifies an assess-
    ment (regarding the subject) based on the subject's
    enacting the given activity.

F   "John is young to go to school"

Paraphrase: John is young for going to school

Explication: the gram.subject is the actor of the in-
    finitive activity; the adj. specifies an assess-
    ment of the subject's adequacy (or inadequacy) as
    actor of the given activity.

G   "John is heavy to lift"

Paraphrase: John is heavy with regard to being lifted

Explication: the gram.subject is the object of the in-
    finitive activity; the adj. specifies an aspect
    (adjectival) of the subject as object of the given
    activity. (Note: the paraphrase given for type A
    is impossible here; and if an ambiguous adjective
    occurs in G, the construction determines its mean-
    ing; e.g. "mushrooms are good to eat" requires the
    interpretation "good"='pleasing', since it does not
    mean "to eat mushrooms is good for you", where

"good"='beneficial').

H   "John is sad to go away"

Paraphrase: to go away causes John to be sad

Explication: the gram.subject is the actor of the in-
    finitive activity; the adj. specifies the subject's
    state which is a reaction to the given activity.

I   "John was critical to upset the speaker"

Paraphrase: John was critical in order to upset the
            speaker

Explication: the gram.subject is the actor of the in-
    finitive activity; the adj. specifies a deliberate
    attitude of the subject's, and the infinitive spe-
    cifies the purpose of the subject's attitude.
    (Note: there often is an irresolvable ambiguity be-
    tween type I and type E; e.g."the dog was clever to
    get the biscuit" may be interpreted as I, 'the dog
    was being clever in order to get the biscuit', or
    as E, 'it was clever of the dog to get the biscuit')

J   "It is sad to go away"

Paraphrase: to go away is sad

Explication: the nominalised infinitive is the sub-
    ject of the sentence; the "it" functions as sub-
    ject marker; the adj. specifies an evaluation of
    the given activity as event.

    As far as relational analysis goes, this discrimination
of types is fairly satisfactory (although, to be really
solid, it would require the detailed definition and coher-
ent application of the terms used in the explications ,
many of which, e.g. 'aspect', 'assessment', 'attitude',etc.,
are still rather vague). when we come to a sentence-inter-
pretive procedure, however, such a listing of relational
possibilities does not get us anywhere, unless we are able
to provide each type with some criterion by means of which
we can recognise it in the input text.
    In an attempt to discover some such criterion, we as-

sembled a corpus of about 100 relatively frequent adject-
ives from a recent compendium of English word frequency[11]
and examined their individual possibilities to function as
acceptable constituents in the ten types of construction
(for a complete report on our findings, see ref.No.12).
The results of this investigation were compiled in the form
of a matrix, showing for each adjective the types of con-
struction in which it can occur.

Summarising some of the observations that could be made
regarding that matrix, we can say:

a) the adjectives that fit construction type D (viz. cer-
tain, expected, known, likely, said, sure, unknown, unlike-
ly) do not occur in any of the other constructions.

b) the adjectives that fit construction type H (viz. con-
tent, glad, happy, proud, sad, satisfied, sorry) do not oc-
cur in any of the other constructions - with the exception
of sad, which can occur also in type J.

c) the adjectives that fit construction type B (viz. able,
afraid, anxious, careful 2, desirous, eager, fit, mad 2,
prepared, ready, reluctant, wild 2, willing, unable) do not
occur in any of the other constructions - with the except-
ion of fit and ready, which can occur also in type G.

(Of the other adjectives of the corpus, approximately one
quarter fits only one construction, one half fits two con-
structions, and one quarter fits three; but since many of
these adjectives have more than one meaning - e.g. good 1 =
'pleasing', good 2 = 'beneficial', good 3 = 'moral' - the
relational listing of the individual meanings is not an im-
mediate help in the disambiguation of a given string. Never-
theless, it is a step forward from the position where every
adjective has to be considered a potential candidate for all

ten constructions.)

The groups of adjectives given under (a), (b), and (c),
on page 13, constitute extensional definitions, within the
selected corpus, of adjective classes, and we can now exam-
ine each of these groups to see whether an intensional de-
finition can be derived from it.

Group (a) obviously has a common semantic element which
could be described as 'assessment of probability and/or
actuality' (of the item to which the adjective is applied);

Group (b) has a common semantic element which could be
described as 'a temporary state of mind usually associated
with a specific cause';

Group (c) has a common semantic element which could be
described as 'attitude or disposition towards an event'.

I should like to stress that we are at the beginning of
this kind of investigation and are presumably still rather
clumsy in formulating valid definitions of semantic ele-
ments; what is relevant in this context, however, is not
the efficiency or reliability of the definitions we tenta-
tively formulate, but the fact that semantic definitions
can be derived at all from word groups compiled on the
strength of relational considerations. What we are, in fact,
trying to show, is that the analysis of the relations found
to obtain between the items of phrases or sentences leads,
first, to an extensional, and eventually, to an intension-
al semantic classification of the lexical items constitut-
ing these phrases or sentences.

This particular sector of adjective construction is, of
course, not the only area of English grammar which makes it
seem plausible that semantic classifications of lexemes can
be derived from empirical grouping according to their rela-

tional behaviour. The range of relations expressed in Eng-
lish by prepositions is extremely fertile in this regard,
but since it is also extremely wide, we have not yet brought
our survey of it to a definitive conclusion. Partial re-
sults[13], however, indicate that, here too, relational se-
mantics successfully absorbs a great deal of what, hitherto,
was considered lexical or unsystemic.

A comprehensive study of the verb-object relations (a
still poorly defined area in our operational system) pro-
mises to yield the perhaps most convincing confirmation of
our thesis.

Even a very superficial examination of a transitive verb
and the grammatical objects that occur with it, shows that
the way in which the two are related may vary widely. If,
for instance, we take the verb "to pay", we find that:

1) in "He paid the driver" the subject gives up some-
   thing of economic value (e.g. a sum of money); and
   the object specifies the receiver;

2) in "He paid his bill" the subject gives up something
   of econ. value; the object implies a specific amount
   and that this amount is due to some not further spe-
   cified (but specifiable) remote entity as the right-
   ful receiver;

3) in "He paid fifty dollars" the subject gives up some-
   thing of econ. value; the object specifies the amount.

Leaving aside the rarer and the more metaphorical uses
of the verb (such as: to pay attention, homage, a visit,
etc.) we can now take a corpus of nouns, try each one of
them as object of "to pay", and determine which of the
three described relations it fits. This will extensionally
define three noun classes (not necessarily mutually exclus-
ive, because some of our nouns may fit into more than one
of the relations) for which we can then tentatively formu-
late intensive semantic definitions:

1') items that can act as receiver of items having an economic value; e.g. boy, butcher, college, court, driver, girl, tax collector, tailor, etc.;

2') items implying a definite econ. value and the fact that the implied amount is due to someone; e.g. dues, fare, fee, fine, postage, tax, etc.;

3') items indicating a specific econ. value; e.g. any numeral followed by an indication of currency, and pronominal expressions such as "a lot", "little", "much", etc.

The verb "to pay" is also doubly transitive, i.e. it can be constructed with a dative and an accusative object in one phrase, e.g.:

4) "He paid the butcher ten dollars" (in which "the butcher" is the receiver).

If we now test our corpus of nouns in this construction, we find, first, that only the items listed in group 1' can be used as dative object and that they cannot be used as accusative object; second, that if items of group 2' or 3' are used as direct object, the dative object always plays the part of 'receiver'; third, we find that we have to consider some new items (occurring only in conjunction with a dative object) which are not members of the three listed classes and which, moreover, change the role of the dative object, as for instance in:

5) "He paid his driver a holiday" (where "his driver" is the beneficiary of the subject's act).

We thus get a fourth group of possible objects; their intensional definition is less obvious, but we can tentatively put down:

5') items intended for personal consumption; e.g. a drink, a term at college, a meal, a trip round the world, a vacation, etc.

One point that is of special interest in these still very crude and incomplete results of relational analysis and semantic classification, is the fact that, although the classes of 'receiver' and 'beneficiary' are co-extensive in the corpus, they do not seem to create ambiguities, since the particular role of an item that is ambivalent in this respect, is, in any given example, determined by the classification of the direct object; in other words, if the direct object belongs to either group 2' or 3', the dative object plays the part of 'receiver'; if the direct object belongs to group 5', the dative object plays the part of 'beneficiary'.

This rule, incidentally, seems rigid enough to deal with at least some phrases which, on a purely experiential basis (i.e. 'knowledge of the world'), would have to be rated rather odd or unlikely. If, for instance, we came across the sentence "She paid her lover a week of clams", we might be uncertain how to interpret precisely "a week of clams", but we would have no doubt that it had to be something her lover could personally consume. - And there is considerable reassurance to be got from the implication that (at least in some cases) the logic of relational semantics is more powerful than the statistics of factual experience.

We could adduce many more examples of transitive verbs and relevant object classification, but at the present stage of the analysis this would add little: the results are invariably suggestive, even indicative, but they cannot be considered conclusive. Therefore, I shall merely summarise what we expect from these investigations.

On the basis of work accomplished during the last 18 months, it appears that the semantic classes derived from relational analysis are recursive and that their num-

ber will remain usefully smaller than the number of classi-
fied items. There will, of course, be many more semantic
classes than grammars have hitherto contemplated - but giv-
en the versatility of natural language, this should not
really surprise us; nor is there any need to be particular-
ly pessimistic about the possibility of implementing such
a voluminous and intricate data base in a computer system.
We all have seen how the early computational linguists'
worries concerning storage capacity and processing speeds
have been been made to appear anachronistic by technologic-
al progress, and this progress does not yet seem to be any-
where near its ceiling.

As to the theoretical implications of our kind of lan-
guage analysis, I should like to put forward one suggest-
ion. Assuming that we can derive (and the material present-
ed here does imply precisely this) a satisfactory semantic
classification of lexical items from their relational pro-
perties defined in terms of an adequately differentiated
syntax, it may be more profitable (and, perhaps, also more
correct) to view syntax and semantics, not as a pair of
mutually exclusive opposites, but rather as the axes of a
continuum of meaning; every semantic element, particle,
feature (or however we want to call it) would, in such a
frame of reference, have both a relational and a lexical
coordinate - which would not only make it possible for us
to discuss one and the same item from two points of view
without contradiction, but, I believe, it would also be a
useful advance towards an economical representation of lin-
guistic data in computational procedures.

References

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Semantics and the Syntactic Classification of Words

A B S T R A C T

   Traditional grammars classify words according to gener-
ic syntactic functions or morphological characteristics.
For teaching humans and for descriptive linguistics this
seemed sufficient. The advent of computers has changed the
situation. Since machines are devoid of experiential know-
ledge, they need a more explicit grammar to handle natural
language. Correlational Grammar is an attempt in that di-
rection. The paper describes parts of correlational syntax
and shows how a highly differentiated syntax can be used
to establish word classes for which an intensional semant-
ic definition can then be found. It exemplifies this ap-
proach in two ares of grammar: predicative adjectives and
transitive verbs. The classification serves to eliminate
ambiguity and spurious computer interpretations of natural
language sentences.

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