

Most recently, the work of Bungman (1981, 1984) has explicated and applied a criticism of adequacy suggested in a variety of earlier works: The semantic relatedness criterion has led to a variety of research in contempora-
y semantics. The theory of lexical semantics sees a network of minimally different meanings, with
parts of a small number of lexemes, which sees a lexical item as a network of minimally different meanings, with

In succeeding years, Langacker (1987) and Tamy (1985) added a further major criticism for the adequacy of a semantic theory, namely, that generalizations involving the meanings of grammatical morphemes in the word's language(s) be describable. In applying this criticism, they demonstrated the need for incorporating into semantics the study of relationships among them.

Within the cognitive semantics tradition, the first major advance was Fillmore's account for most of the phenomena of natural language semantics. Within the same semantics, Fillmore (1975, 1978, 1982, 1985) took seriously the conditions of accuracy proposed earlier by semantic field theorists, namely, to show the systematic relationships among the words in a given field (e.g., *buy*, *sell*, *cost*, *price*, *goods*, etc.). He argued that words had to be defined relative to schematic structures called frames (alicer-schemata) and investigated many of the properties of those frames.

Classical semantics is characterized in large measure by a set of constraints on acceptability. Semantic theory is to characterize such relations as synonymy, antonymy, and polysemy for words, and entailment and contradiction for sentences. This set of initial constraints led to a view of semantics as a form of logic, and the insights that came out of this view limited notions of logical form, including predicate-argument structure, reference, binding of variables, scope of logical operations, propositional functions, and semantics of truth, which led to the application of model theory to linguistics (cf. Lakoff, 1968). Though a number of real insights have come from this approach, it has failed to assess classical semantic roles, etc. The constraints themselves assumed a view of meaning as based on truth, which led to the application of model theory to linguistics (cf. Lakoff, 1968).

Linking: A Study in Lexical Network Theory

we get important evidence for the nature of semantic theory, in addition to whatever we learn about the structure of the lexicon.

Some senses of *take*

The kind of lexical analysis we are undertaking is more than mere lexicography in another way as well. It seeks to understand *why* the same word or morpheme should be used to express different concepts.

We are currently investigating the relationships among the senses of common polysemous words. The word *take* is one of these. Consider the following sentences:

1. John took the book from Mary.
2. John took the book to Mary.
3. John took the book to Chicago.
4. John took Mary to the theater.
5. John took a whiff of the coffee.
6. John took a punch from Harry.
7. John took a punch at Harry.

Here are some of the questions that we will try to answer:

- How are the various senses of *take* related to one another, and which, if any, is central?
- Why is it that the subject can be stationary in 1 but must be moving in 2?
- Given the change of possession in 2, why need there be no change of possession in 3?
- 4 implies that John attended the play, as well as Mary. But *John took Mary to class* does not imply that John took part in class. Why?
- Given that in 6, the directionality of action goes from Harry to John, and given that the verb *take* is used in both 6 and 7, why is that directionality reversed in 7?
- Why is *take* used to express perception, as in 5?

We will argue that sense 1 is central and that, given a detailed representation of the central sense, each of the other senses can be seen as a minimal variation either of the central sense or of another sense in the network. The resulting lexical network analysis will provide answers to all of the above questions.

Since this verb has a large number of related senses, it should be clear why the homonymy approach of simply making a list will not do. But before providing an idea of what a lexical network theory approach would be like, let us consider another popular approach to lexical representation, what we will refer to as the *abstractionist* mode of analysis, according to which a word that appears to have many senses really has a single, very general and very abstract sense.

The Lexical Network Approach

From Brugman's work we know that there is at least one polysemous lexical item with a very large number of senses which is structured in terms of a network such that each sense is a *minimal variant* of some other sense. When we say that sense A is a minimal variant of sense B we mean that, even though A and B may differ in many ways, all their differences boil down to a single difference from which the others can be predicted. Although we are by no means certain that all polysemy will ultimately be represented in terms of networks whose links are *single* differences, nonetheless we would like to investigate this idea and see where it fails.

So far, we have found that the links in lexical networks fall into the following types:

- Image-schema transformation links: These are links given by natural relationships among image-schemas.
- Metaphoric links: These are links that are established by metaphoric mappings that exist independently of the given lexical item.
- Metonymic links: These are links that are established by metonymic mappings that exist independently of the given lexical items.
- Frame-addition links: Here the minimal difference is the addition of a frame.

These link types enable us to represent a network of lexical senses in such a way as to eliminate redundancies, state generalizations across senses, and show exactly how polysemous senses are related to one another.

A gets B	→	A changes to having B
C gets A B	→	some D has B, and then C causes A to have B
A has B	→	there is a relation between A and B

This paper proposes an addition to the theory of link types. We will suggest two additional types of minimal distinction links:

- E. Semantic role differentiation links: There are cases where one sense identifies two semantic roles, and a minimally related sense distinguishes those roles.
- F. Profile shift: These are cases where what is backgrounded in one sense is foregrounded in a minimally related sense.

Incidentally, lexical network theory does not dispute the claim that homonyms and abstractions may exist in certain cases, but its emphasis is on the analysis of polysemes. Within lexical network theory, homonyms and abstractions have less semantic structure than polysemes — and from our point of view, are therefore less interesting. From our point of view, a rich polyseme like *take* presents a challenging and interesting problem.

Take is interesting because it can express a basic action, because it is so common (among the 10 or 15 most frequently used verbs), because it is both a verb of motion and a verb of possession, because it has conventional metaphorical senses, and because it occurs in a great many idioms. Indeed, it is because *take* can express a basic action that it can be extended to many other uses — which *take* 14 pages to list in the OED. Dictionaries, of course, merely list senses. They do not provide representations in a form that allows one to state generalizations governing the relations among the senses, which is what we take to be our task.

Though we ultimately expect to provide a theory of the internal structure of semantic roles, for the purpose of this exposition we will follow the normal practice of considering them as primitives. Here is the list of semantic roles that we have found to occur in the various senses of *take*:

Participants:

- A agent: active actor or cause of an action
- S source: initially has the patient
- R recipient: receives the patient
- P patient: object acted upon or affected by the agent
- I instrument: used to transport the patient

Settings:

- O origin: location where patient started out
- D destination: location where patient ends up

We will begin with what we hypothesize to be the central sense of *take*, the *take* in *The baby took the toy from its mother*. As we shall see shortly, the other senses of *take* can be represented most economically in terms of minimal variation links if we do so. Moreover, speakers intuitively judge this sense to be the most basic, and dictionaries reflect this judgment.

Take-1: grab

Background Conditions: R is at D, P is at O, O ≠ D, S ≠ R, A = R.

ACT: A MOVES P ALONG A PATH FROM O TO D (WITH I)

CONDITION: DURING ACT, A PHYSICALLY CONTROLS P

DEFAULTS:

Result: A receives P

A is human

P = easily manipulated physical object

I = A's arm and hand

O = near A;

D = at A's body

Examples:

The baby took the toy from its mother

The baby took the toy from the table.

In this sense the agent is restricted to be a human who also plays the role of the recipient. In the typical case, the agent uses his hand as the instrument of movement by extending his arm, and the patient is a relatively small, light-weight physical object within grasping distance of the agent. Because the agent is the recipient, the agent need not be moving; only the patient need move. Moreover, the agent may take something and then drop it or lose it before actually having it firmly in his possession. Though this is possible, it is not the typical case. In the typical case, the agent actually receives the patient as the result of the taking. For this reason, we have listed the condition 'A receives P' as a default.

Take-2: take Patient to Recipient

LINKED TO: Take-1

DIFFERENCE: A ≠ R

Example: *the messenger took the book to Mary*

We assume as a hypothesis that the ACT condition is to be kept constant across senses whenever possible, since that is the most important part of the sense. Given this, take-2 can be seen as a minimal variant of take-1. The minimal difference is that in take-2 the agent is not the recipient. This entails that the movement from origin to destination is *locomotion* on the part of the agent, since the recipient is at the destination, the agent no longer is, and so the agent must move to the destination if the ACT condition is to be

kept constant. An additional consequence is that the agent's movement of the patient to the recipient is profiled.

This accounts for the following difference between take-1 and take-2: In *John took the book from Mary*, *took* profiles the movement of the book to the agent-recipient *John*. But in *John took the book to Mary*, *took* profiles the movement of the agent *John* to *Mary's* destination. The difference in selectional restrictions between take-1 and take-2 is also accounted for. Take-2 can select both source and recipient, while take-1 selects only source. The reason of course is that in take-1 the recipient is the agent, while take-1 selects only preferentially coded as subjects.

Take-3: take Patient to Destination

LINKED TO: Take-2

DIFFERENCE: SETTINGS ARE PROFILED

CONSEQUENCES: S AND R ARE OPTIONAL; RESULT IS OPTIONAL.

Examples:

I took the book home.

I took one suitcase to Bali.

Take a cookie with you.

Since participants rather than settings are normally profiled, the source and recipient are part of the profile of take-2, while the origin and destination are backgrounded as settings usually are. Take-3 is a minimal variant on take-2 in which the settings (origin and destination) are profiled, and consequently the source and recipient are backgrounded. This is reflected in the syntax, where the origin and destination rather than source and recipient are coded. Thus, *John took the book to Mary* is an instance of sense 2, while *John took the book from Chicago* is an instance of sense 3. When a setting is profiled, it is because the participant associated with that setting is either absent or unimportant. For this reason, it follows that the source and recipient are optional in sense 3, as is the result. Thus, in *John took the book to Chicago*, he may or may not have taken it from some source and he may or may not have taken it to some recipient.

Let us now turn to the senses of *take* in *I took a punch at John* and *I took a punch from John*.

Take-4: take action at Patient

LINKED TO: Take-2

DIFFERENCE: THE METAPHOR THAT APPLYING FORCE IS TRANSFERRING AN OBJECT

Example: *I took a punch at him*

Take-5: take action from agent

LINKED TO: Take-4

DIFFERENCE: RESULT IS PROFILED

CONSEQUENCE: R IS SUBJECT

Example: *I took a punch from him*

Take-4 is a minimal variant of take-2, which is a transfer of a patient by an agent to a recipient. The relation between take-2 and take-4 is metaphorical. In the metaphor, a quick, forceful action is understood as an object delivered by the agent to the patient.

Source domain: taking

Target domain: performing a quick forceful action

Agent → agent

Patient → quick, forceful action

Recipient → patient

Notice that the patient in the target domain (e.g., punching) is the recipient in the source domain (taking), while the action in the target domain is the source domain patient. Since there is a patient in both source and target domains, and since they are not in a one-to-one correspondence, it is important not to confuse them. With respect to the syntax, it is the source domain semantic roles (the ones associated with taking) that are relevant. Thus, *punch*, the action that corresponds to the source domain patient, is the direct object. This aspect of the syntax is a predictable consequence of having such a metaphorical link.

Another thing that is predicted is the use of *at* as opposed to *to*. In general, *at* is used instead of *to* when a goal is not necessarily reached. This is part of the meaning of sense 4, which is why *at* is used. The reason it is part of the meaning of sense-4 is as follows: In take-2, as in take-1, the result condition that *R* receives *P* is optional, since defaults by their very nature are optional. In take-1 and take-2, the preposition *to* is used since the patient reaches the destination setting, even though there may or may not be any receiving by a recipient located in that setting. When you are delivering an object, that is difference usually doesn't matter; if it reaches the neighborhood of the recipient, that is good enough, since things in his immediate neighborhood are still in his control. But with a punch it is a different matter. Getting close isn't good enough. Unless the punch is

received, the metaphorical patient, the punch, doesn't reach its destination. But it is not guaranteed that the punch reach its destination, since the reception condition is optional.

Take-5 differs from take-4 in that the result is profiled, and as a consequence is obligatory instead of optional: the punch is definitely received. The difference in profiling leads to a syntactic difference. Since the recipient is profiled while the agent is backgrounded, the recipient is subject.

The next sense of *take* we will consider is that of *Max took Sadie to the theater*. This sense of *take* is intimately related to the sense of *go* in *Sadie went to the theater*. Such a sentence involves a metonymy — when we say she went to the theater, we normally mean that she not only went there, but that she did what a member of the audience typically does at the theater. That is, the going there part of the scenario is metonymically standing for the entire scenario.

The precise characterization of this metonymy is somewhat complex. Consider first the range of possible examples:

- Harry went to prison.
- Max went to work.
- Sam went to a restaurant.
- Irv went to the store.
- Maxine went to the church.
- Sadie went to the doctor.
- Ron went to the bank.
- Mark went to class.

In each of these cases, there is a destination, D, which is a public establishment, and a conventional activity with a conventional purpose, C, which takes place there. In each Schema,

The Going-to-D Schema

C = a conventional activity with a conventional purpose.
D = public establishment where C takes place.

METONYMY: Going to D stands for doing C.

The sense of *take* in *Sam took Sadie to the theater* involves the Going-to-D schema. But it involves a restricted version of it. In the following cases,

- John took Mary to the restaurant.
- Mark took Suzie to the concert.
- Sam took his son to the ballgame.

the agents (John, Mark, and Sam) are all taking part in the activity C.

However, in cases like

- Max took Sadie to the doctor.
- Sam took Molly to the bank.
- Harry took his son to class.

there is no implication that the agent is taking part in the activity that normally takes place at the destination. In these cases, the Going-to-D Schema is not invoked for the agent. What distinguishes the first set of cases from the second is that, in the first set, C is a recreational activity, while in the second set, it is not. Thus, we can represent the sense of *take* in the first set of examples as follows:

Take-6: take to the movies

LINKED TO: take-3

DIFFERENCE: ADD Going-to-D Schema

RESTRICTIONS:

C is recreational.
P is human.

CONSEQUENCE: A doesn't have P in the sense of possession, but remains in charge of P.

The tricky part of this account is the notion "in charge of". Thus, *John took Mary to a restaurant* could be true in this sense even if he was not in charge of transporting her there. So far as we can tell, the notion "in charge of" is simply vague and varies a great deal from case to case.

Let us turn now to expressions such as *take a whiff*, *take a sniff*, *take a look*, *take a glance*, *take a glimpse*, *take a taste*, etc. We need to account for the relationship between *take* in these expressions and some other more basic sense of *take*. We also need to describe what *take* means here, and why it is *take* that is used in these cases. We also need to explain why such seemingly parallel examples as **take a stare*, **take a leer*, etc. are ill-formed.

The usual account of these cases is no account at all — it is just a list of paraphrases, with no description of the semantics of *take* in these cases. While we do not claim that the cases that occur are completely predictable, it appears that *take* in such cases is a metaphorical use of *take-1*, which is a special case of the very general metaphor PERCEIVING IS RECEIVING, according to which perception is the *reception* or *taking in* of

sense impressions. Briefly, the metaphorical mapping is of the following form:

Source Domain: receiving

Target Domain: perceiving

Patient → Percept

Agent/Recipient → Perceiver

Instrument → Sense organ

Receiving → Perceiving

Patient moves to Recipient → Percept moves to perceiver

→ Perceiver has percept available for use

This metaphor interacts with a general process in English by which a perfective action

(that is, a completed action taken as a bounded unit) is nominalized, as in the case of a *look*, a *sniff*, a *taste* etc. What is special about this sense, is that it includes the metonymy

that an act of forming a percept stands for the percept. It is the percept that is "taken in." Thus, in *take a look*, is an action of perceiving, which is metonymically mapped onto the

corresponding percept. By the general metaphor of perception-as-reception, the percept is a patient which an agent/recipient "takes" in the sense of *take-1*.

This analysis answers a number of questions:

—Why are the acts of perceiving typically short ones (peeks, whiffs, etc.)? Because this sense is linked to *take-1*, where the default patient is a small physical object. Under the metaphorical mapping, the size of the physical object is mapped onto the duration of the action, yielding short actions in the default case, though still allowing for non-default cases like taking a long look.

—Why doesn't **take a stare* occur? Because the nominalization process only applies to perfective actions, and *stare* is inherently imperfective.

—Why is the source coded with *of* instead of *from*? *Take-1* has a special case in which the source is partitive rather than locative; in this case *of* is used to code that source. For example, in *take a slice of the roastbeef on the table*, the roastbeef is the whole of which the slice is part. Similarly, in *take a whiff of this roastbeef*, the whiff is metaphorically a part of the source.

Take-7: Take a glance at

LINKED TO: Take-1

DIFFERENCE: THE METAPHOR THAT RECEIVING IS RECEIVING

These seven senses taken together form a network with the following link-types and

shape:

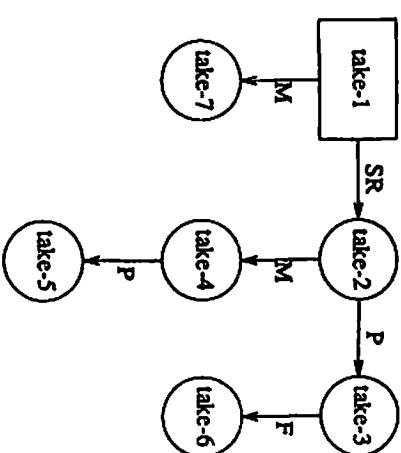
- 1 to 2: semantic role differentiation (SR)
- 2 to 3: profile shift (P)
- 2 to 4: metaphor (M)
- 4 to 5: profile shift (P)
- 3 to 6: frame addition (F)
- 1 to 7: metaphor (M)

What we have just seen is that it is not an arbitrary fact that the same word *take* is used in all these seven senses. There are generalizations governing the relationships among these senses, and lexical network representations using the theory of minimal differences can account for them. The difference between a network structure and a list is critical here. There are not just some random similarities and differences among the senses. Rather, the differences are minimal and of a restricted number of types. Only a network structure permits the statement of the minimal differences. We predict that the same types of links will occur in other lexical networks.

One of the most striking things about this lexical network representation is that all of the minimal differences are semantic in nature, despite the fact that the various senses have a great many syntactic differences. All of the syntactic differences are predictable from the minimal semantic differences.

Profile-shift occurs twice in the network, which suggests to us that as more such cases are investigated more and more instances of profile-shift should show up. We feel it is an extremely basic kind of semantic relation, as Langacker and Talmi have repeatedly suggested. But what is most remarkable about profile shift is that it can give rise to important and noticeable truth-conditional differences, as in the relationship between *take-4* (Sam took a punch at Harry) and *take-5* (Harry took a punch from Sam); in the latter case, Sam connected, though in the former case he did not necessarily connect.

Finally, and most importantly, we have shown that the lexicon is governed by explanatory principles. It is anything but a mere list of irregularities, and characterizing the relations among entries is fundamental to the study of semantic theory.



Conclusion

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EXPERIMENTAL PHONOLOGY

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This paper is an advertisement for Experimental Phonology. I will try to promote an approach to phonology that I think will do for the field what Buddhism promises to do for the soul: to permit it to escape the endless and agonizing cycle of birth and death of trendy theories, schools, frameworks, etc. and achieve oneness with the spirit and principles that guide all scientific endeavor, be it physics, chemistry, physiology, psychology, or linguistics. The structure of my paper will be as follows:

- To characterize briefly what experimental phonology is.
- To counter certain myths or misconceptions about experimental phonology.
- To provide examples of phonological experiments.

1. WHAT IS EXPERIMENTAL PHONOLOGY?

Undoubtedly the popular image of an experimental discipline includes complicated procedures or instruments. But this is a false image: first, the complexity is unessential and complex instrumentation by itself does not make an undertaking experimental. William Harvey conducted some of the first physiological experiments with little more equipment than a few tourniquets. What is essential for experimentation is an attitude: first, a keen awareness that the world is not necessarily as it may seem, i.e., that our sense-impressions and therefore the opinions and beliefs based on them may be faulty, and, second, the willingness to actively do something to compensate for or correct these potential errors by making observations under carefully controlled conditions. Pasteur (and others before him) doubted the apparent evidence of spontaneous generation of, for example, bacterial growth in food because he guessed that we might be unable to detect the minute air-borne spores that produced the bacteria. He therefore contrived a situation where foodstuff was left open to the air but where air-borne micro-organisms were prevented from reaching it. He demonstrated that under such circumstances the food remained unspoiled, thus further undermining the doctrine of spontaneous generation. What made his actions experimental was taking pains to make observations whose evidential value on the issue at hand would not be distorted by unwanted sources of error. As a field matures and accumulates more experience with experimentation it (a) learns of more potential sources of error and ways to compensate for them and (b) begins to ask questions of a more detailed sort which requires ever more careful observations. This is where the complicated instruments and procedures may enter simply as a natural outgrowth of the epistemological development of the discipline.