A Geography of Case Semantics

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The Czech Dative and the Russian Instrumental

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Preface

It is sometimes appalling to note how many basic linguistic terms that we use frequently and with ease lack an operational definition. The ambiguity of concepts such as "subject" and "noun" has motivated the invention of further metalinguistic terminology, such as "subjecthood", "agentivity" and even "nouniness" in the search for adequate circumscription of these supposedly simple terms. What indeed, for example, is an "indirect object"? Most people's first reaction to this question would be to state that an indirect object is the argument of the verb instantiated by *John* in a sentence like *Sally gave John a book*. But what does the word "like" mean in this definition, and given such a definition could we sort clausal arguments gathered from natural language data into indirect objects and non-indirect objects? And is there a definition of indirect object that applies to all languages, or is this term to some extent language-specific?

Let us suppose that we are dealing with a hypothetical case-marking language (and that this language has none of the exotic peculiarities associated with the English dative-shift). Here is a sampling of three-argument clauses in that language:

Sally-NOM	gave	John-DAT	book-ACC
Sally-NOM	took	John-DAT	book-ACC
('Sally took the book from John.')			
Sally-NOM	bought	John-DAT	book-ACC
Sally-NOM	brought	John-DAT	book-ACC
Sally-NOM	baked	John-DAT	cake-ACC
Sally-NOM	introduced	John-DAT	her friend-ACC
Sally-NOM	explained	John-DAT	problem-ACC
Sally-NOM	wrote	John-DAT	letter-ACC
Sally-NOM	told	John-DAT	her name-ACC
Sally-NOM	paid	John-DAT	bill-ACC
Sally-NOM	broke	John-DAT	arm-ACC
('Sally broke John's arm')			
Sally-NOM	envied	John-DAT	his success-ACC

One soon finds the definition given above to be empirically inadequate. In which of the sentences above does *John* function as an indirect object? Certainly not in all of them. But just which of these sentences are enough "like" the sentence in the definition above to contain an indirect object and which are not; where do we draw the line?

A closer look at these sentences makes us wonder whether we should restrict our view to three-argument clauses. Indeed there are likely to be many two-argument clauses that contain arguments that are very similar to those in the three-argument clauses. Some examples:

Sally-NOM	wrote	John-DAT
Sally-NOM	introduced-REFL	John-DAT
('Sally introduced herself to John.')		
Sally-NOM	ran-away	John-DAT
('Sally ran away from John.')		
Sally-NOM	paid	John-DAT
Sally-NOM	told-off	John-DAT
Sally-NOM	nodded	John-DAT
Sally-NOM	hurt	John-DAT
Sally-NOM	helped	John-DAT
Sally-NOM	believed	John-DAT
Sally-NOM	ruled	John-DAT

Although our intuition tells us that the common-sense definition captures something essential about the notion indirect object, it lacks necessary specification. The prototypical case has been correctly identified, but we need to know where we can go from there and how far. A theory of the structure of grammatical categories is required, and it is just such a theory that is in the making in this book.

Although all of these constructions yield grammatical sentences in Czech, I would argue that most but not all of them instantiate the indirect object, and that the observed variety among those that do results from systematic extensions of the prototypical case instantiated with the verb meaning "give". The question of what is and is not an indirect object becomes all the more pressing when we expand our view to all case usage, for indirect objects must be successfully distinguished from other constructions, including those containing dative-governing verbs. As I will show in Part two, all members of the category of indirect object are related to the central prototype by relationships of synonymy, antonymy (allowing the verb meaning "take" to participate in indirect object constructions), and metonymy (allowing the direct object to be named in the verb and thus absent from surface structure). This gives the category a clear, operational definition, making data analysis straightforward and unproblematic.

A quick glance at dative constructions in the languages of central and eastern Europe demonstrates the need for a certain amount of elasticity in the definition. Languages in the northeastern part of this territory (Russian and Ukrainian) do not admit extensions of the indirect object category via antonymy, and thus lack dative constructions for verbs meaning "take" and further extensions based on this one, whereas languages to the south (German, Czech, Lithuanian, Romanian, Serbo-Croatian, and Greek) have a more fully extended category. Clearly there must be room in the theory for the growing and pruning of peripheral branches in the development of individual languages.

This book will outline the specifics of a theory of grammatical categories, as applied to the use of case in two Slavic languages. In so doing it will take up issues of:

- what determines the shape of grammatical categories
- to what extent diachronic development is reflected in synchronic structure
- syntactic and semantic uses of case and their roles in case categories
- the role of concepts such as passivization, subject and indirect object in the structure of case categories.

Part I — Theory

0. Introduction

In 1980, Anna Wierzbicka wrote in *The case for surface case* that "cases have fallen on hard times". Indeed, in the decades that have passed since Roman Jakobson's landmark essay "Beitrag zur allgemeinen Kasuslehre" (1936 [1971]), there has been no great leap forward, although new angles have been sought by Fillmore (1968), Anderson (1971) and others. Cases have largely remained as inscrutable as they were to Bloomfield and Jespersen.[1] In part, they are themselves the cause of this stagnation, for cases are inherently difficult to investigate, as observed by Brecht and Levine:

> "there is a general consensus that the category of case is more resistant to analysis than other grammaticized semantic domains like gender, number, person, and tense. The reason for this, it would seem, is that while these latter grammatical categories can be more or less readily identified with certain pragmatic categories of the real world, it is much more difficult to find real world correlates for the putative referents of case."[2]

There is, however, growing evidence that the root of the problem runs much deeper, that it in fact lies at the foundation of our theoretical framework. Investigators researching parallel themes in the fields of linguistics, psychology, philosophy, neurobiology and artificial intelligence have suggested that there is a fundamental flaw in our twentieth-century empiricist world-view of symbolic logic and set theory that renders it inadequate to account for phenomena of human cognition. A new framework, known in these various disciplines as cognitive grammar, prototype theory, tensor network theory and connectionism, is being put forth. It requires essential changes in the way we conceive of semantics. The aim of the present volume is to test the possibilities of cognitive grammar using data on the dative and instrumental in Czech and Russian. If this framework is indeed better suited to the task of describing cognitive categories, it should not only shed new light on case semantics, but also incorporate the best hypotheses of traditional research in linguistics.

1. What cognitive semantics is

In *Neurophilosophy* Patricia Churchland discusses the profound influence of one's theoretical framework on the way that data is interpreted, using specific examples from the study of the human brain and cognition. She notes that the invention of symbolic logic by Frege, Russell and Whitehead "changed how people thought about mathematics, about logic, and about language. And it gave new life to empiricism by holding out the vision that the whole of science – even the whole of one's cognitive system – might be systematized by logic in the way that the whole of mathematics was systematized" (Churchland 1986: 252). This theoretical framework has since become doctrine and pervades virtually all work done in the sciences in this century. The implications this framework has for semantics are fundamental and have until recently been accepted without question. For one thing, logical empiricism entails the perfect separation of knowledge of meaning from knowledge of facts (Churchland 1986: 267), implying that the study of semantics must be entirely divorced from the study of other linguistic phenomena. In addition to being perceived as autonomous, meaning has been presumed to be composed of indivisible building blocks, symbols to be manipulated, symbols with no shape or structure more complicated than that provided by set theory. These assumptions form a common thread that runs through much of linguistic theory of the past fifty years.[3]

Research on cognition carried out by psychologists in the 1970s[4] indicated that the presumed model could not account for the way in which human beings store and access meaning. Based on these findings and on further work carried out on natural language, a group of linguists began to develop a new theory of semantics which has come to be known as cognitive semantics.[5] The fundamental concepts involved are presented in Lakoff 1982 and 1986. Briefly, Lakoff states that meaning is organized in cognitive categories which have a network structure. At the center of a given category is a prototype member of the category. Other members are placed in the category according to their relationship to the prototype, which may be very close or peripheral, thus giving the category a radial structure. As a result, rather than an unanalyzable bounded set of presumably homogeneous members, cognitive semantics provides for a hierarchically structured network of interrelated members, joined by their relationships to the prototype. Langacker (1987: 49) summed up the goals of cognitive semantics quite concisely: "the only appropriate basis for natural language semantics is a subjectivist theory of meaning that successfully accommodates conceptualization, cognitive domains and the various dimensions of conventional imagery."

Crucial to an understanding of radial categories is the fact that "the central case does not productively generate all [the] subcategories [i.e., peripheral members]. Instead, the subcategories are defined by convention as variations on the central case ... and have to be learned" (Lakoff 1987: 84). Cognitive semantics therefore, unlike approaches that invoke a core plus rules, does not aim for absolute predictive power; its goal is instead to seek the principles which motivate the structures of extant categories in natural languages. It follows, therefore, that one of the important claims of cognitive semantics is that languages contain entire structured categories, rather than cores plus rules for generating such categories. This means that a given category is an integral part of a language, and not constantly and predictably generated. Without this claim it would be impossible to explain why the "same" category (i.e., one based on the same prototype ["core"] and having the same principles linking members ["rules"]) would vary from language to language, a fact that will be demonstrated in the analysis. A second essential characteristic of cognitive categories is that they are generally not built from primitives, but are defined via the prototype, which is itself a gestalt.[6] This does not mean that there are no "parts" to a prototype, but rather that the perception of the parts is secondary and must be consciously guided, whereas the perception of the whole is direct.

An example of a radially-structured category is the English word *mother* (as explicated in Lakoff 1987: 83). At the center of the category stands the prototype, which defines *mother* as a woman "who gave birth to the child, suplied her half of the child's genes, nurtured the child, is married to the father, is one generation older than the child, and is the child's legal guardian". The category *mother*, however, also contains many non-prototypical members that stand one or more steps removed from the prototype because they lack one or more of the characteristics of the prototype listed above. Thus there are mothers who did not give birth – step-mothers, adoptive mothers, and foster mothers; mothers who did not nurture – birth mothers and surrogate mothers; and mothers who are not married to the father – unwed mothers. Modern science has produced an extreme example of *mother*, the "genetic mother" (who has only contributed an egg, but never bore or nurtured the child) that is a relatively peripheral member of this category. The very fact, however, that a genetic mother is referred to as a *mother*, demonstrates the way in which relationships to the prototype bind the network in a radial structure. The presence of category members that share no overlapping characteristics (such as birth mother vis-à-vis foster mother) rules out a feature analysis. All of these groups of women can be called "mothers" only by virtue of their relationship to the prototypical mother.

The implications of the cognitive model for semantics are far-reaching, for this theoretical framework makes it possible to perform coherent and penetrating semantic analyses without losing sight of the integrity of a given category, and also to discuss why a category has the members it does. Under a set-theory approach one could only list subsets, and since there is no formal device for showing their interrelationships, this has produced fragmentary accounts of categories,[7] in which one literally cannot see the forest for the trees. The only alternative was to view the undifferentiated sets as wholes, which could only be characterized in vague terms that denied the actual variety of members they contained.[8] By positing an internal structure for categories, cognitive semantics avoids the dilemma of choosing between unity and diversity presented by set theory. It enables the linguist to seek as much detail in his description as desired without endangering the integrity of the category. The network may become increasingly intricate, but by virtue of the fact that its structure is based on interrelationships, constant reference is made to the prototype and those members closest to it. Also, the use of conventional imagery to caption the kinesthetic image-schemas[9] associated with a category produces descriptions which are intuitively satisfying as well as formally elegant.

Cognitive semantics is, of course, new and has to date a limited number of subscribers, yet a number of linguists who do (or did) not work within this framework have made statements indicating that they reject a symbolic logic/set theory approach and some have even advocated a network structure for meaning.[10] Sgall et al. (1986: 10) affirms that "linguistics cannot be reduced to a part of mathematics, since there is a major difference between natural language and the formal languages of logic." Potebnja ([1958]: 70, 431) agrees that symbolic logic is not adequate to describe grammatical and semantic relations and argues that it is the linguist's task to "posit formal meanings which are more concrete, to make them as distinct as possible and to show their genetic relationships", a statement which suggests that (sub)meanings are interrelated. The authors of *Russkaja grammatika* [Russian grammar] (Švedova 1982: 479) are even more specific in describing the structure of case meaning. They claim that cases are polysemantic, that each case has its own system of meanings and that some meanings are basic and central, whereas others are semantically peripheral. Likewise Nunberg (1979: 179) comments that "we could ... assume that all of the several uses of a form are connected by a network of referring functions". Plewes (1977: ix) set out from a Jakobsonian framework, and at a more concrete level found structure not accounted for by distinctive features: "the contextual variants of a single invariant combination, while related at an abstract level, may separate into distinct semantic groupings at intermediate levels of abstraction". Schlesinger investigated the semantics of the instrumental in a number of languages and concluded that the meanings *comitative*, *instrument* and *manner* form a continuum. He then pondered the remaining meanings of the instrumental and asked "are cognitive structures constituted of isolated continua, or perhaps these continua are components of a more complicated system?" (Schlesinger 1979: 321).

These linguists were obviously groping for a model that would provide the kind of structure that cognitive semantics offers. When the discussion turns more specifically to case and the various theories that have been applied to it, there will be more mention of statements which support the cognitive framework made by linguists who did not work with this model.

1.1. Support for cognitive semantics from other disciplines

1.1.1. Psychology

As mentioned above, it was work in psychology that stimulated the development of cognitive semantics in the field of linguistics. In a series of experiments probing human categorization of natural objects, Rosch (1973b: 111) found no support for the way that "psychological and linguistic research has tended to treat categories, as though they were internally unstructured – that is, as though they were composed of undifferentiated, equivalent instances – and as though category boundaries were always "well defined"." Contrary to the tenet of empiricist logic that category membership must be all or none, Rosch's work with human categorization demonstrated that category boundaries are not necessarily definite and that categories are internally structured (Mervis and Rosch 1981: 109). Their structure is based on a gradient of relationships to a prototype, which is encoded as a mental image that represents the category as a whole.[11] It should be noted that the term *mental image* may refer to something considerably more abstract than a picture, as noted by Shepard (1978: 130), who has also suggested that the neural representation of an image probably reflects the structure of the image, a hypothesis which has been confirmed by research in neurobiology.[12]

Cognitive semantics, then, has clearly adapted Rosch's prototype theory without major alteration. The central member of the cognitive category is the prototype and is captioned by conventional imagery, represented in a profile (a representation parallel to a mental image). The structure of the semantic category is determined by the nature of relationships between the profiles of various members and the prototype. As will be seen below, it is also significant that

Rosch's work (Mervis and Rosch 1981: 104) suggests that categories are processed holistically, i. e., that when reference is made to any member, reference is also made to the whole category, for this notion is supported by research in neurobiology and artificial intelligence.

1.1.2. Neurobiology

Patricia Churchland, herself a philosopher, spent several years examining recent developments in the study of the brain in order to discover what implications they might have for theories of meaning and cognition and to construct a "unified science of the mind-brain", termed "neurophilosophy" (Churchland 1986: ix). She found that the results of research in neurobiology contradict the "familiar and virtually doctrinal computer metaphor for the mind's representations and computation" (Churchland 1986: 252) on several counts. It can no longer be claimed that the brain stores and processes finite bits of information in vast sequences of discrete steps. For one thing, problems of access would become astronomically difficult (Churchland 1986: 395). Also, given what is known about the speed at which neurons fire and the number of steps it takes to work through an ordinary problem (such as reaching for an object) in the linear fashion of a digital computer, it is necessary to predict a processing time several orders of magnitude greater than the time which the brain actually takes to perform such tasks (Churchland 1986: 35 and Cottrell 1985: 7). Instead of storing information in "centers", it appears that the brain accomplishes this by using networks of neurons which map the information in the brain. Whenever any part of a network is accessed, activation spreads throughout its pattern. Problem-solving is not carried out by serial computation, but rather by matrix multiplication, i. e., the pattern of activity of one neural net is mapped onto another. This is known as Tensor Network Theory, and provides a relatively straightforward solution for the conversion of vector information, such as that necessary for catching a ball (which involves coordinating the movement of the ball with that of the hand). Scientific evidence for the validity of this theory is provided by studies of brain anatomy and by neuronal experimentation and, in addition, it gives an intuitively appealing account of the operation of the brain. After all, we certainly do not compute vectors when catching a ball, we simply match our perception of the ball's movement with the muscular movements necessary to make our hand intercept its path, or, in other words, we appear to map perceived movement onto muscular movement. The discovery that "neurons are plastic ... their informationally relevant parts grow and shrink ... [and] this appears to be essential to their functioning as information-processing units" (Churchland 1986: 35) has further ramifications for learning. A theoretical framework based on sets and symbolic logic would predict that the brain would simply add more and more bits of information. Tensor Network Theory, however, indicates that learning involves the expansion of neural nets and this entails the automatic integration of new information in established patterns, a process not readily accounted for by logical empiricism.

Rosch's work makes plausible a claim of psychological reality for the structure of meaning invoked by cognitive semantics, and neurobiological research further suggests that it may have physical reality (based on the anatomy and function of the brain) as well. It would be premature at this point to make either such claim, but it is clear that the fundamental precepts of cognitive semantics are at least compatible with the findings of neurobiologists and psychologists, and in fact they are more compatible than those of recent theories of semantics.

1.1.3. Artificial intelligence

Computer scientists have also traditionally worked within the framework of symbolic logic and, as mentioned above, it was their model for information storage and processing that came to be accepted as the metaphor for brain function. The field of artificial intelligence, which grew out of a desire to mimic the brain's abilities with machines, had by the 1970s reached such an impasse that Dreyfus wrote an extensive exposé of its failures. In his conclusion he asks, "Is an exhaustive analysis of human reason into rule-governed operations on discrete, determinate, context-free elements possible? Is an approximation to this goal of artificial reason even probable? The answer to both of these questions appears to be, No" (Dreyfus 1979: 303). Dreyfus, however, did not lay the blame with the computers, but rather with the theoretical framework assumed by their programmers. Although many computer scientists chose to reject Dreyfus' conclusions, there were some who shared his contention that fundamental theoretical changes would have to be made before the field could progress. They began to experiment with alternative means of storing and processing information, by using systems characterized by massive parallelism and high connectedness. It is this feature of the resultant movement in computer science which gives it its name: Connectionism. Experiments have been conducted in the application of connectionism to simulation of phenomena as diverse as visual perception and motor control,[13] but only one piece of work will be cited here because it deals specifically with case. Cottrell (1985) employed a connectionist model in writing a program which would disambiguate both word sense and case function in

English. He cites a desire to imitate real brain function and to avoid the pitfalls of existing theories as his motivation for choosing the connectionist model.[14] Rather than using symbol-passing (the computational equivalent of linguistic features or of discrete bits of semantic information), Cottrell's program is designed to store and access imformation in networks. When a word is referenced, the entire network of its meanings and functions is activated and then allowed to "relax" to a consistent [with other input] interpretation" (Cottrell 1985: 207). Cottrell had his program analyze a series of English sentences and found it to be efficient at this task. In addition, it was found to be comparable to the functioning of the brain in some ways: "One test of the validity of the model presented ... is to evaluate its adequacy at accounting for neurological data ... . The model is shown to be adequate for explaining some of the overall effects" (Cottrell 1985: 161).

1.1.4. Summary

Both psychology and neurobiology fail to provide evidence that human categorization is organized in a manner consistent with set theory and symbolic logic. In both cases we infer that information is not stored in discrete and unrelated bits, but rather in hierarchized structures which interact as wholes. The application of these principles to computer science has produced a fruitful new movement after years of stagnation, and it seems plausible that this approach would likewise be a powerful tool in advancing our linguistic understanding of semantics.

1.2. Case as a semantic entity

There are three obstacles to the semantic description of case. The first is formal and relatively minor; the second two have to do with the nature of case semantics and will be treated in more detail.

1.2.1. Case lacks formal autonomy

No single case has a unique surface representation by means of which it is signaled, a fact that prevents case from fitting neatly into the structuralist schema of "one form, one meaning". Burston (1977: 51) put it succinctly: "a certain oddness remains in calling a "sign" a linguistic element which, whenever it occurs,