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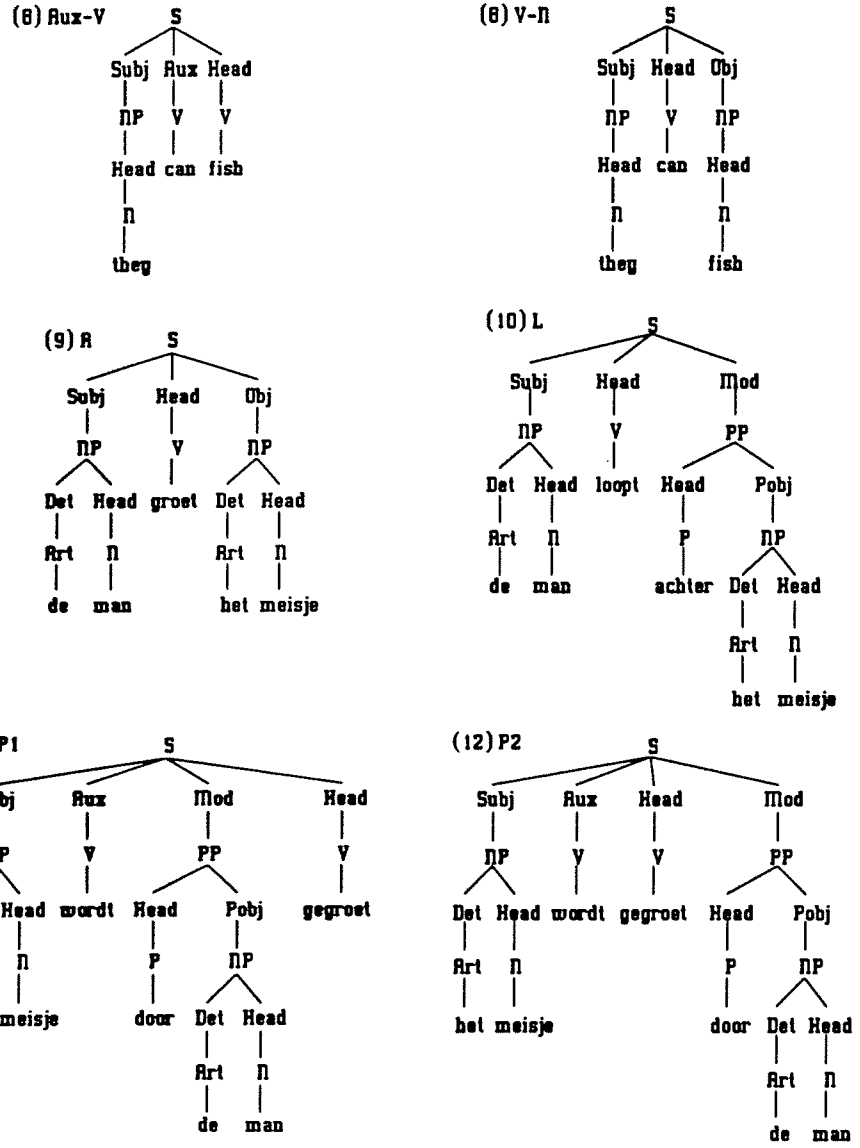

As a consequence of our tree drawing program, the labels of segment arcs (e.g. Subj, Head, Mod) are represented as separate nodes. Words rather than word class labels figure as terminal nodes. Apart from that, the tree diagrams are equivalent to that of Figure 5.1. The parse trees of sentences (1) and (2) — not shown here — are expansions of (3) and (4) respectively.

6 Competition in language and thought

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There are two major approaches to the study of language acquisition. One approach attempts to account for the facts of language development in terms of formalist-modularist theories of language structure. Typically, this approach emphasizes the uniqueness of language learning and minimizes the contribution of general cognitive principles to language structure or use. This approach is represented by work such as Wexler and Culicover (1980) and Morgan (1986) which attempts to use the issue of learnability to elaborate grammatical theory. The second approach attempts to understand language development in terms of general cognitive principles. Research by Bowerman (1988), Schlesinger (1988), Slobin (1986), and Bates and MacWhinney (1982, 1987) typifies this second line of thought. Cognitivists often subscribe to the view that language use, structure, and acquisition are determined by cognitive principles. In this paper, I will articulate a particular form of the cognitive view that emphasizes the role of mental competition as a determiner of language use, structure, and acquisition.

Workers in the formalist-modularist tradition often find it easiest to take as their starting point some well established view of language structure. Examples of this "off the shelf" use of linguistic theory in acquisitional research include Wexler and Culicover (1980) and Pinker (1987). However, if one wishes to gain a real understanding of the dynamics of the relations between language and cognition, it is best to avoid making a complete commitment to a model based almost exclusively on data about language structure. In our work on the Competition Model, Elizabeth Bates and I (Bates and MacWhinney, 1982, 1987; MacWhinney and Bates, in press) have examined ways in which the competition between linguistic forms comes to determine the shape of language structure. Our understanding of language processing is illuminated not by the work of the formalists in linguistics, but by the work of functionalists such as Givón (1979), Bybee (1985), and Kuno

(1986). Our empirical work, which is collected in MacWhinney and Bates (in press) is based on experimental studies of sentence processing in 12 languages. Our subjects have included normal adults, language-learning children of all ages, second language learners, bilinguals, and aphasics. This paper will not review that empirical work, but will focus instead on examining ways in which the basic notion of competition provides us with new understandings of the relations between language and thought. We will focus on a particular area of language — the learning and processing of the meanings underlying words.

The Competition Model views language processing not as rule application, but as cue utilization. Psychologists as different as Piaget (1952), Gibson (1966), and Anderson (1989) have argued that the human mind appears to be constructed in such a way that it continually strives to improve the fit between the structure of the environment and the structure of the organism's actions upon the environment. Anderson (1989) notes that many different approaches to psychology tend to converge on this fundamental fact about development, each conforming to what Anderson calls a "rational analysis." As Simon (1969) has often argued, this rational striving seldom approaches optimality. Instead, we can think of normal development as "monotonic" in the sense that it continually leads to a tighter adaptation of the organism to the environment. However, that adaptation inevitably remains imperfect.

Within the Competition Model, the process of organism-environment attunement is treated in terms of the concepts of *cue validity* and *cue strength*. The language-learning child begins by detecting a rich set of possible cues. The child then tracks the ways in which these cues predict particular outcomes of interest. The more frequent a particular type of outcome, the higher its *task frequency*. For a particular task or outcome, cues vary in their *availability* and *reliability*. For example, the task of choosing the name for a type of bird is higher in task frequency than the task of choosing a name for a constellation of stars. Following a rational analysis, the Competition Model claims that cues to high frequency tasks will be acquired before cues to low frequency tasks. Within a particular task, cues that are high in availability and reliability will be acquired before those that are low in availability and reliability. The work presented in MacWhinney and Bates (in press) shows that these claims hold up remarkably well across languages and subject groups.

Although the concepts of cue validity and cue strength help us to understand the relation between the organism and the environment, they do not explicate the actual origins of ideas during mental processing. For that, we need to look at the ways in which ideas *compete* and *cooperate*. To illustrate the importance of the concept of competition, let us take a look at some issues in the study of word meaning.

WORD MEANING

We are taught in school that two words that "mean the same thing" are synonyms. We are given pairs such as "umbrella" and "brolly" or "boy" and "lad" and told that these are good examples of synonyms. It is certainly true that there is a strong overlap in meaning between such "synonyms" and we are willing to think of this overlap as synonymy. As cooperative students, we seldom call into question the general idea that two words can in fact mean the same thing. However, as we look more closely at such examples, we find that the supposed identity of meaning is really not all that clear. In terms of actual usage, there are often register, dialect, or referential differences between even the closest of referents. Looking at such facts, Bolinger (1965) reached the conclusion that "when I say two different things I mean two different things by them" and his conclusion has been echoed by other researchers such as Chomsky and Lasnik (1977), Clark (1987), Markman (1984), and Pinker (1987).

Competition provides us with a way of understanding why language avoids synonymy. Consider a pair of words like "cup" and "mug." In the Competition Model account these two forms are seen as occupying neighboring, but separate, parts of a multidimensional semantic topography. The semantic range of each item in this multidimensional space is determined by its range of values on a large number of dimensions or "planes." Each of the values on a given dimension is a "cue" to the selection of the word. If an object has a set of cues that place it within the "cup" part of the topography, we call it a "cup." If it has a series of cues that place it within the "mug" part of the topography, we will call it a "mug." Cues such as "object," "holds liquid," or "ceramic" are shared by both "cup" and "mug." These shared cues help distinguish "cup" and "mug" from "dog" and "Brooklyn Bridge." Other cues are crucial in governing the competition between "cup" and "mug." For example, the cues "ceramic," "heat-resistant," "handled," "cylindrical," and "taller-than-wide" all activate the item "mug" in the adult language. Such cues may vary in their availability and reliability (MacWhinney and Bates, in press). For example, the "heat-resistance" cue is not always "available," since we may not be able to judge whether a given drinking utensil is capable of holding hot liquids until we actually use it. Even if this cue is available, it still may not be entirely reliable, since many porcelain cups are as capable of holding hot liquids as are mugs. Similarly, the "handled" cue which is shared by both "cup" and "mug" is not always required since some cups may not have handles. On the other hand, the combination of the "cylindrical" cue with the "handled" cue seems to be quite reliable as a predictor of "mug." Although a cylindrical, heat-resistant, ceramic container without handles might be a "cup," one with handles is a pretty good case of a "mug," as long as it is not too short or too tall (Labov, 1973). In general the semantic range of "cup" is wider than that of "mug." This is because "mug" is delimited by the intersect of quite a few semantic features and the more features used to delimit a semantic space, the smaller it becomes.

It is important to realize that competition is not a private affair between only two words. In some cases, the principle competitors may be simply "cup" and "mug." In other cases, words like "glass," "dish," "tumbler," and "beaker" may play a larger role in the competition. The semantic topography controlled by each word is a result of these many-sided competitions. Each

competing form comes to adapt itself to the particular constellation of cues in the semantic landscape actually used by other speakers of the language. This adaptation requires repeated exposure to many exemplars, particularly to cases where cues conflict (McDonald, in press).

The situation is much like that in population genetics. If two species of birds are competing for exactly the same ecological niche, one of the two species will win out and the other species will move into another niche or die out altogether. The niche of the losing species may overlap partly with that of the winning species, but this overlap cannot be exact. Why must this be true? Because the two species are genetically different, they must also differ in one or more phenotypic characteristics. Each difference has some level of impact on the survivability of the species in each microenvironment of its niche. In some cases the impact will be small, in others it will be large. Each impact will be felt in terms of the ability of the species to compete in a given microenvironment. To the degree the species loses out in many microenvironments, its overall survival can be threatened. If a species loses out in some competitions while winning in others, it may shift over to new areas of competition and its entire niche will change significantly. If one species has a thicker beak, it will be able to eat seeds with a tougher shell or husk, perhaps coming to dominate in areas around certain species of trees. However, this thickness of the beak may be a disadvantage in catching small insects and the other species will dominate in areas around ponds and meadows where insects abound.

Competition and cooperation

No single idea can win out in mental processing unless it cooperates properly with other ideas. The fact that an object is cylindrical is not enough by itself to allow something to be called a "mug." Rather cylindricality must cooperate with features such as "handled" and "taller than wide" to emerge as the winner in the competition with "cup." Cooperation allows a percept or an action to gain strength from the other actions with which it interlocks. The better the fit with other active ideas, the more an idea can win out over its competitors. To illustrate this, Warren and Warren (1970) examined the perception of the first sound of the word "wheel." If this sound is degraded or replaced with a beep, the stimulus "*eel" could be perceived as "peel," "wheel," "deal," or a variety of other words. In a sentence such as "Bill oiled the squeaky *eel," subjects hear the word "wheel." In such cases, the sound "eel" is cooperating with expectations from "oil" and "squeaky" to support the candidacy of "wheel." In a sentence such as "Bill threw away the orange *eel," subjects hear the word as "peel." In that sentence, the sound "eel" is cooperating with expectations from "throw" and "orange" to support the candidacy of "peel." Without this cooperative support, neither of these two alternatives could predominate in the competition.

The general principle is that competition is based on cooperation. In language processing, the most common type of competition is not between species or individuals, but between lexical items. The domain of each lexical item or word is shaped both by the meanings and sounds to which it responds and by the response range of the lexical items with which it competes. When we process sentences, each lexical item sets up expectations for other lexical items. When processing is successful, these expectations interlock in tight cooperation.

THE DEVELOPMENT OF WORD MEANING

Having sketched out the basics of the Competition Model approach to lexical semantics, we can now take a look at how the model can help us understand the acquisition of word meaning by the child. As a first step, the child acquires the conceptual structure underlying language. After carving out the topography of an internal semantic world, the child then acquires words to reign over particular domains in that semantic topography. The process of word acquisition involves four basic processes: concept formation, episodic encoding, segmentation, and cue extraction. These processes are not steps that follow each other in lock-step sequence, but rather changing aspects of the unfolding of a general process by which the child sharpens his mapping of the semantic topography. Let us look at these developments from the viewpoint of the Competition Model.

Concept formation

Before the child acquires language, he develops a set of things he wants to talk about. These are the functions that underly the forms of language — the semantic topography upon which words build their habitats. Lexical acquisition is initially driven by the child's interest in expressing some meaning. As Brown (1973) and MacWhinney (1975, 1978, 1985, 1986) have argued, the child usually develops an interest in the concept expressed by a word before actually acquiring that word. This is function-driven learning. However, the opposite course of development — form-driven learning — can also be observed, particularly in older children. In form-driven learning, the child picks up a word which maps onto parts of the semantic topography that he has not yet constructed or explored. The word then induces exploration of those distinctions that can control its competitions with its neighbors.

Episodic encoding

After some months, the child has probably solidified the semantic topography in the area of "dog" and "cat." He has also learned enough language to be able to use terms such as "want" and "gimme." Let us then imagine that he sees a small stuffed dog among a collection of other stuffed animals, including a stuffed alligator, a stuffed elephant, and a stuffed seal. The child says "gimme." The mother is not sure which animal he wants and says

"doggie?" while handing him the stuffed dog. The child is elated. At the same time, he begins to associate the sound "doggie" with the conceptual clustering that has been developing in the general area of "dog." At first, the strongest linkage is between a particular pronunciation of "doggie" and the actual toy dog figure -- the particular episodic encoding that is fully supported by the input. This first episodic encoding becomes the basis of the "confirmed core" of meanings actually encountered by the child for the new word. The child may also use the new word to cover areas of semantic topography outside the confirmed core. Some children may "hypothesize" that new words refer to the whole territory of the conceptual cluster within which they are located (MacWhinney, 1984; Mervis, 1984). However, this more adventurous and extensional use of new words does not override the continual development of the confirmed core.

If the child is cautious, he will not only limit the range of the new form, he will also only attempt to acquire a new form when he is sure that the adult is focusing on a function for which he does not yet have a name. In the case of the "doggie" example, the child recognized that the stuffed dog was present and that the parent was looking at the dog. If the child is uncautious by disposition or if the parent is unclear, the child will end up associating the sound "dog" to the meaning of "alligator." But, even if such overgeneralizations occur, no "learnability problem" arises for the child, since he can learn to map the sound of "alligator" onto parts of the semantic territory occupied by the erroneous mapping and this form will drive out the form "dog" from this part of its habitat. The ability of the form "alligator" to drive out "dog" from part of its habitat is based upon the fact that the main support for each form comes from particular episodic encodings which can be thought of as simple points in the semantic topography. The generalization from the episodic base to new parts of the topography is slow and this allows the two forms to stay in competition for some time during a time of free variation. If the child were to adhere too strictly to Mutual Exclusivity, this period of free variation would be missing and initial mismapping could indeed lead to serious learning problems.

If, instead of handing the child a dog, the parent had given the child a stuffed alligator and named it, the child could still have attempted acquisition of a new form. In this case, however, the function would not have been ready before the form was encountered. The child would then be placed in a position where, having heard a new form, he must search about for a function it might express (MacWhinney, 1978). In both cases, the child makes a first "stab" at a meaning on the basis of his best guess about what the new form might mean. MacWhinney (1988) speaks of this fast mapping of some current referent to the new phonological string as *jumping-in*. If this initial mapping is incorrect, it will be weeded out by the competition. If child thinks the sound "alligator" means "dog," competition will simply weed out this bad guess. It is not important that this initial fast mapping be completely accurate. Rather, what the child needs to do is to establish a beachhead to link a form to a function. Eventually, competition will fix up errors in the initial mapping.

What the child does during "jumping in" is simply to establish a first episodic encoding. This encoding is a pairing of a particular actual sound sequence with a particular event or state in the real world. Each time the child hears that same word, he can store a new episodic encoding. We need not assume that each episode is always encoded without fail. Rather, we only need to believe that enough episodes are encoded to provide a rich empirical database for further learning.

Cue extraction

Repeated exposure to a word provides the learner with masses of episodic data that can be used to sharpen the borders of lexical items and to sculpt the semantic topography of the lexical habitat. We can think of this sculpting as a process of *cue extraction* whereby highly available and highly reliable cues come to work as the the strongest predictors of word assignment. For many words, the extraction and strengthening of cues is based upon the child's increasing his attention to perceptual and experiential cues that he can already detect, but which are somewhat low in salience. In other cases, the cues must be constructed by recombination from more basic cues (MacWhinney, 1987). In yet other cases, the child must actually construct new cues before he can begin to use them (Carey, 1985; Keil and Batterman, 1984). The Competition Model claims that, once detected and acquired, the strengths assigned to various cues will be a function of their "cue validity" which is defined as the product of cue availability (how often is the cue there when you need it) and cue reliability (how often does use of the cue lead you to the correct decision). For details on the Competition Model's use of cue validity as a way of understanding category formation, see MacWhinney and Bates (in press).

Acquiring superordinates

The child's acquisition of semantic hierarchies presents a major challenge to all models of semantic development that rely heavily on the principle of contrast. The problem is that, at first blush, superordinate terms such as "animal" and basic level terms such as "dog" seem to show an extreme form of semantic overlap in that a "dog" is always a "animal," although the reverse is not true. If this opposition is looked at without considering the whole of the lexical system, it might appear that acquisition of the word "animal" should be blocked by the Mutual Exclusivity principle. However, the principles of Competition and Contrast fare somewhat better in this area, since they provide the child with more tolerance for free variation, without which the child would have a very difficult time controlling such contrasts. When the child first hears the word "animal" used to refer to a dog, it works in effect as another name for "dog." At the same time, the child is receptive to any data that can distinguish the two forms. In this particular case, the child will also hear "animal" being used to refer to cats, mice, and horses. During this

period, the word "animal" is in variation with a variety of forms. However, it is also gaining strength from those features which are shared by cats, mice, dogs, and horses. This then leads to the formation of a concept which expresses the shared features, but which loses out when the child wishes to express more detailed features. In this way, the child uses competition to acquire superordinates (Callanan, 1982; Rosch, 1977).

Conflict can also arise between a subordinate term such as "dachshund" and a basic-level term such as "dog." Again, the child allows the forms to coexist for some time as variants. During this period of probation, the form "dachshund" gains support from features such as "short" and "long-eared." This allows the form to carve out a niche *vis à vis* "dog," so that when the child sees a dog that is clearly a dachshund and wishes to emphasize its exact identity, he uses "dachshund" rather than "dog." However, if the child is talking to a friend, and the friend has only one dog, he asks, "What's your doggie's name?" rather than "What's your dachshund's name?"

The Competition Model views the acquisition of both superordinates and subordinates in terms of the strengthening of particular competitions between lexical items in particular habitats, rather than as the sudden acquisition of a new form of cognition (Inhelder & Piaget, 1964). The literature on this topic (Markman, 1984) indicates that these developments are indeed quite gradual and that they follow different patterns for different words.

PUSHY POLYSEMY

The notion of a fixed semantic topography is too static to yield a correct view of all that goes on in sentence processing. In general, we need to think of words not just as finding places in a pre-formed landscape, but also as shaping that landscape and as pushing other words around on that landscape. In this section, we will discuss various ways in which this initial simple non-dynamic account of polysemy needs to be replaced by a more general concept of "pushy polysemy." As an example of pushy polysemy, let us look at some relations involving prepositions. Prepositions often force their arguments to assume particular figure-ground relations. For example, the preposition "near" forces its object to play the role of a fixed reference ground and allows the head of the prepositional phrase to act as the object located. A sentence like "the bicycle is near the house" involves a minimum of polysemic pushing, since "house" is a good stable reference location in its default reading. However, a sentence like "the house is near the bicycle" requires that the word "bicycle" be placed into a reading that sees "bicycle" as a reference location. One way this can be done is by treating both "house" and "bicycle" as toys. In this way, the word "near" pushes both of its arguments into particular polysemic pathways.

So far our examples have treated the choice between competing polysemes as a unidirectional process. In fact, polysemy works in a far more dynamic and reciprocal way. Consider first an example of pushy polysemy involving major entries as in the sentence "the trash can hit the fence". If we

decide to select the nominal reading of "can," we lock in an adjective reading for "trash." If we decide to select a verbal reading for "can," we lock in a nominal reading for "trash." Here the reciprocal nature of the constraint satisfaction system is fairly obvious, but when we look at minor polysemy, the effects become more subtle. Consider a sentence such as "John drives over the hill." Here the unmarked translative and punctative meaning of "drive" as "takes a one-time trip to a place" would usually force the word "over" to assume its reading of "path across a gap." It that case we can say that "drive" is pushing "over" into a marked place in its semantic topography. However, it is also possible to have "over" take on the sense of "position on the other side of a gap." In that case, the preposition "over" forces the verb "drive" to take on the meaning of a generic activity. In that reading, the whole event occurs in some habitual or generic way on the other side of the hill. In one case "drive" pushes "over" into a marked polysemic slot. In the other case "over" pushes "drive" into a marked polysemic slot. The least marked case is the one where the total amount of pushing is the least. In that sense, "over" appears to more easily assume either of these two meanings than does "drive."

SEMANTIC EXTENSION

One of the most remarkable aspects of human language is the way in which words can assume new meanings right in the middle of a discourse (Clark & Clark, 1979; Lakoff 1987). Sometimes these new meanings are created through processes which operate in fairly well-worn pathways. In other cases, not only the meanings but also the processes deriving the new meanings are more innovative and mark off new territory in the semantic topography. A particularly well-worn extensional path produces "metonymy" or the use of the part to refer to the whole. For example, we can use "hands" to refer to sailors, "guns" to refer to soldiers, or "wheels" to refer to an automobile. In these three cases, the pathways have been precut into the semantic topography. However, if we refer to men as "ties" or students as "pencils," we would be using this standard extensional pathway in a very innovative way.

A still more productive extensional pathway allows us to refer to tokens of things by the names of the things they are tokens of. For example, we refer to a toy airplane as an "airplane" or a miniature butter churn as a "butter churn." This pattern is totally productive and there is virtually no miniature or toy that cannot be referred to by using the name of the real object. Along somewhat different lines, we can also refer to any token or written expression of a work of art by the name of the original. So I can say "I lost my Hamlet" and mean that I lost my copy of the book that contains the play Hamlet. There is also a standard extensional path which allows us to use place names like "London" or "Buenos Aires" to stand for governments, radio stations, or soccer teams. For example, we can say "Buenos Aires informed Washington that it would soon withdraw from the Malvinas conflict." Or, to take yet another example, salespeople can refer to customers by the names of the

things that they have ordered. So one customer may be "the ham sandwich" and another may be "the banana split" and we can say "The ham sandwich is sitting across from the banana split."

The actual process by which the listener pushes words down these extensional pathways involves the kind of reciprocal interaction we discussed above. For example, when we hear that "Buenos Aires informed Washington that it would soon withdraw from the Malvinas conflict," we know that place names cannot play the roles of first and second argument of a verb like "inform." Indeed this verb has a strong expectation for animate agents in both role slots. However, we can use this extensional pathway to convert both of the place names into names for collections of human beings. In this way pushy polysemy leads directly to attempts to extend the semantic topography.

Pushy polysemy is strong enough to overcome most of the standard categorizations of words into parts of speech and subclasses of the parts of speech. It can easily force a mass noun to assume a reading as a common noun. Often we are told that "sugar" is a mass noun and that phrases such as "another sugar" are ungrammatical (Gordon, 1985). From this we are to assume that the sentence "I'd like another sugar, please" is also ungrammatical. However, if we are asking for a small packet of sugar and using the contents of the packet to refer to the whole (metonynmy), the extension is quite reasonable and even conventional. Or we may be working in a chemistry lab analysing the reactions of various sugars such as fructose, sucrose, and glucose. Here we are using an extensional pathway that uses a word to refer to a member of a taxonomic class. One can say that only words like "sugar" can do this because of the special circumstances mentioned. However, even so unlikely a sentence as "I'd like another sand, please" can be interpreted in similar ways. Much like the interpretation of "another sugar" as referring to a packet of sugar, we might interpret "another sand" as referring to a bag of sand used either for construction or for sand-bagging a swollen river. Just as we could imagine a chemist working with various sugars, we could imagine a situation where sedimentary geologists are describing the sand content of a new formation. They have used sieves to sort out the various types of sand in the formation and then placed these sands into jars. One of them asks the other for "another sand" for testing, meaning either another bottle of sand or another type of sand.

Proper nouns can also be converted into common nouns. Usually, we are told that a determiner such as "a" cannot precede a proper noun such as "Reagan." However, there is nothing wrong with a sentence such as "A wiser Reagan returned from Rejkjavik," if we are thinking of "Reagan" not just as single man, but also as a man who can assume various states or values. Virtually any proper noun can be extended in this way. Another extensional path allows us to convert adjectives into nouns, as in the sentence "the green is nicer than the red." This type of conversion works best if we are able to conceive of the new deadjectival nouns as members of a collection or ensemble.

Semantic extension presents us with a great puzzle. How can we predict which word will extend to any given new piece of semantic territory? If there is a well-worn pathway along which many analogous extensions have occurred, a particular extension may be quite predictable. Because we routinely refer to governments as "Buenos Aires" and "Washington," there is nothing too very puzzling about referring to the government of Hungary as "Budapest." When we are dealing with well-worn pathways, we can talk about semantic extension in terms of "inheritance rules." We can formulate specific rules about the conversion of mass nouns into count nouns, the use of the part to refer to the whole under well-defined situations such as the customer who has ordered a particular disH, the use of a capital city name to refer to the government of that city, the use of a common noun to refer to a toy, and so on. These inheritance rules will allow us to characterize the most common types of semantic extension. However, they cannot be used to account for all types of semantic extension.

Extensions that involve more imaginative across-domain analogies require us to think more deeply about the roots of semantic extension. For example, the use of "dog" to refer to an unattractive person is something that is easy to predict only in hindsight. We can say that this extension is based on analogy with the earlier use of "pig" to refer to an unattractive person which in turn was based on a more general use of "pig" to refer to an unkempt person. Or we can talk more generally about pathways for referring to people as animals and ways in which isomorphism is established between the world of animal characteristics and the world of human characteristics. The basic problem with accounting for such extensions is that they involve projections from relations on one semantic plane to relations on another. In order to make such projections, we need to be able to describe the geometry of both planes (Indurkhya, 1987). For example, we can project the temporal meanings of prepositions from their locative meanings for words like "at," "before," and "between." We can do this because we have a well-developed system for analogizing the structure of time to the structure of space. However, not all projections are so easy. If they were, riddles would not be so difficult to solve. Whereas most mechanisms controlling the basic competitions between polysemes are extremely well-oiled, the mechanisms computing extensions and projections are fragile and often need to be constructed by inference right on the spot. Despite the rather peripheral nature of some of these projections, they make a major contribution to language development and change. If we can develop a better understanding of the processes of semantic extension we will also be gaining a deeper understanding of the shape of semantic space itself, since it is the shape of that space and the nature of the various planes comprising that space which characterize and predict the various possibilities for semantic extension.

CONCLUSIONS

This paper has illustrated only one small area in which mental competition shapes language acquisition and structure. Within this area, thinking of

processing in terms of competition gives us a much more dynamic view of the nature of language and the relation between language and thought. The resolution of pushy polysemy, the role of predication and valence in determining meaning, and the Darwinian nature of early lexical growth are all seen as vivid examples of the role of competition in lexical semantics. Other areas we have explored in the Competition Model include morphological processing (Taraban, McDonald & MacWhinney, 1989; MacWhinney, Leinbach, Taraban & McDonald, 1989), sentence interpretation (MacWhinney & Bates, in press), on-line sentence processing (Kilborn, 1987) and concept acquisition (McDonald & MacWhinney, 1989). In each of these areas, we find that competition plays a central role as a principle relating cognition to language.

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