CENTER FOR RESEARCH IN LANGUAGE

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EDITOR'S NOTE

This newsletter is produced and distributed by the **CENTER FOR RESEARCH IN LANGUAGE**, a research center at the University of California, San Diego, which unites the efforts of researchers in such disciplines as Linguistics, Psychology, Computer Science, Communication, Sociology, and Philosophy, all of whom share an interest in language. We regularly feature papers related to language and cognition (1 - 10 pages, sent via email) and welcome response from friends and colleagues at UCSD as well as other institutions. Please forward correspondence to

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BACK ISSUES

Back issues of this newsletter are available from **CRL** in hard copy as well as soft copy form. Papers featured in previous issues include the following:

The Cognitive Perspective
Ronald W. Langacker
Department of Linguistics, UCSD
vol. 1, no. 3, February 1987

Toward Connectionist Semantics
Garrison W. Cottrell
Institute for Cognitive Science, UCSD
vol. 1, no. 4, May 1987

Dimensions of Ambiguity
Peter Norvig
Computer Science, UC Berkeley
vol. 1, no. 6, July 1987

Where is Chomsky's Bottleneck?
S.-Y. Kuroda
Department of Linguistics, UCSD
vol. 1, no. 7, September 1987
(2nd printing of paper in no. 5, vol. 1)

Transitivity and the Lexicon
Sally Rice
Department of Linguistics, UCSD
vol. 2, no. 2, December 1987

Formal Semantics, Pragmatics, and Situated Meaning
Aaron Cicourel
Department of Sociology
vol. 2, no. 3, January 1988

Center for Research in Language Technical Report 8801/April

Finding Structure in Time

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Time underlies many interesting human behaviors. Thus, the question of how to represent time in connectionist models is very important.

One approach is to represent time implicitly by its effects on processing rather than explicitly (as in a spatial representation). The current report develops a proposal along these lines first described by Michael Jordan (1986) which involves the use of recurrent links in order to provide networks with a dynamic memory. In this approach, hidden unit patterns are fed back to themselves; the internal representations which develop thus reflect task demands in the context of prior internal states.

A set of simulations is described which range from relatively simple problems (temporal version of XOR) to discovering syntactic/semantic features for words, to the problem of resolving pronominal reference for sentences which conform to Reinhart's (1983) C-command formulation. In the latter case, it is shown that a solution is possible which does not require the symbol-processing invoked by C-command. It is suggested that some aspects of language behavior can be profitably viewed as a complex sequential behavior; the problem of discovering linguistic structure in these cases is then the problem of discovering complex temporal structure.

Rules and regularities in the acquisition

of the English past tense *

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Introduction

Fueled by the fact that children (and sometimes adults) are notorious for providing researchers with creative deviations from the norms of their end-state language, language acquisition has long been thought to entail the development of systems of productive rules (e.g., Berko, 1958). Especially within the domain of English inflectional morphology, it is easy to find examples such as *I standed him up* from a child or *Leonard stealed second in the bottom of the third* from a sportscaster which can be described in terms of the overapplication of a general *rule*, such as "add *-ed*", to a stem to which the rule does not typically apply. Because of the robustness of this phenomenon in elicited production studies (e.g., Bybee and Slobin, 1982; Kuczaj, 1977) and spontaneous speech (e.g., Ervin, 1964), the overgeneralization of the past tense in English has become a prototype example of "the view that children do respond according to general rules of language" (Rumelhart and McClelland, 1986; pg. 267-8). Recently, amid debate between proponents of Connectionist (or PDP) and traditional rule-based accounts of human cognition, the acquisition of the English past tense is back in the limelight. It is both the subject of an influential and controversial alternative to the standard conceptualization of rule learning (Rumelhart & McClelland, 1986; 1987) and a comprehensive review of that work by Pinker & Prince (1987) entitled "On Language and Connectionism: Analysis of a Parallel Distributed Processing Model of Language Acquisition." [1]

The purpose of this paper is not to debate the overall success of the Rumelhart & McClelland (henceforth R&M) simulation or the Pinker & Prince response (henceforth P&P). Rather, I will work through P&P's model of the acquisition of the English past tense, in order to clarify how developmental phenomena are typically framed within this "standard" approach and to outline unresolved issues that are particularly relevant within the context of the current debate. In the second section, I will present some elicited production data from my own study of the English past tense. In that study, a procedure was used which was essentially identical to that described in Bybee and Slobin (1982). Children were presented with pictures depicting everyday activities and were asked to finish a story about "what happened yesterday." 38 children (ages 3;9 to 9;8) participated and a total of 52 verbs were tested (12 regular and 40 irregular). These data alone cannot decide whether a symbolic or a connectionist perspective best accounts for all relevant acquisition phenomena. However, through them I hope to illustrate an approach to analyses that may clarify some issues as well as inspire developmental psycholinguists to reconsider what their data are really saying about the details behind the problem of how children come to learn language.

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[1] Rather than summarizing the major tenets and criticisms of PDP here, I refer readers directly to these papers.

Developmental Data and the U-shaped Curve

As Pinker & Prince point out, the fact that children overgeneralize English morphological patterns to novel forms (Berko, 1958), as well as regularize irregular verbs, is taken as evidence that learning language consists of more than the rote imitation of what is heard in the input. The postulation of explicit rules to guide these behaviors, based on which regularities are abstracted from the input and to what forms those regularities are generalized, informs the understanding of which conceptual and linguistic constructs guide children's organization of their linguistic systems (e.g., Bowerman's 1982b analyses of causative verbs). Indeed, rules take on an explanatory status when "invoked...in order to understand how children factor a complex phenomenon into simpler components that feed representations into one another" (P&P, pg. 15). However, apart from the phenomena of overgeneralization and rule usage per se, crucial questions for developmental psycholinguistics are *how and why* children's rule usage changes *over time*. For better or worse, accounts of rule learning have had to deal with the finding that the tendency to overgeneralize appears to follow a three-phased, U-shaped pattern across development (see Strauss, 1982, for discussions of this phenomenon in other domains). In other words, children tend to regularize irregular verbs (e.g., *breaked*) after they have been using the appropriate irregular past tense forms, and only later return to a phase when they produce irregular forms correctly (e.g., *broke*). Explaining how children come to abstract linguistic regularities from the input (and perhaps more interesting, how they identify the exceptions which do not fit the general pattern), as well as why children appear to get worse before they can eliminate their errors, has been fundamental in language acquisition research (e.g., see Wanner & Gleitman, 1982; Fletcher & Garman, 1986). Such issues have, over the history of the field, invoked complicated theoretical debate about what types of learning strategies should be attributed to the child (Karmiloff-Smith, 1983, 1986; Bates & MacWhinney, 1987; Bowerman, 1982b) and about the nature of the input that children receive (Brown & Hanlon, 1970; Bowerman, 1983; Baker & McCarthy, 1981). In addition, U-shaped developmental trends have created some confusion about what is implied (for both theoretical and empirical discussions) by the hypothesis that language learning consists of distinct "phases," or even "stages," of acquisition. In general, even though such conclusions are typically based upon cross-sectional, rather than longitudinal data, adopting a stage model presumes that children at the same stage in development are

> dealing with their language in the same fundamental way, whether conceived of in terms of common rules, strategies, organizing principles or whatever...[And] as regards their treatment of language forms, therefore, this implies that subjects at a common stage will group or partition these forms in a common manner, as a function of the particular rule or strategy employed (Derwing & Baker, 1986, pg. 336-7).

In reviewing the success of the R&M model in accounting for developmental phenomena, such as U-shaped trends, P&P outline in considerable detail a "standard explanation" of the acquisition of English morphology. They begin by pointing out that "it is by now well-documented that children pass through two stages before attaining adult competence in handling the past tense in English" (pg. 75). They go on to offer a detailed scenario of the mechanisms involved in such a developmental progression, positing two general production mechanisms, rule application and rote usage. With the help of a hypothesis-judging mechanism which allows children to "distinguish real from apparent regularities" (pg. 74) in their input, children move through development toward a compatible integration of rote and rule-governed production mechanisms. This integration is achieved, according to P&P, as children figure out that the mechanisms are designed to operate on two distinct categories of verbs, regulars and irregulars. Indeed, much of their discussion rests on establishing that, because irregular (or strong) verbs comprise a disjoint and heterogeneous set, they must be produced by rote, rather than rule-like, processes. In their words, strong verbs

> consist of sets of subclasses held together by phonologically-unpredictable hypersimilarities which are neither necessary nor sufficient criteria for membership in the class...The past tense forms (of strong verbs) must be memorized. (pg. 59)

In P&P's model, then, qualitative and psychologically-real distinctions exist between both the *linguistic categories* of irregular and regular verbs and the *mechanisms* which generate the past tenses of items in those lexical categories. The existence of two dissociable production mechanisms which take on different roles at different phases of development and which require that the child identify the basis for the linguistic distinction between irregulars and regulars, are just those points which P&P identify as the non-trivial

differences between the symbolic and the connectionist accounts.

P&P's standard developmental story goes as follows: In the first phase of development, children haven't yet figured out that regulars and irregulars are different. They produce past tense forms appropriately, even irregular ones, because each one is generated as it is heard in the input. The child has a list of exemplars upon which each entry is more or less an unanalyzed "amalgam" identified independently of any general system of relationships that may obtain between root forms and their past tenses. With development, the ability to abstract regularities in the input kicks in and the commonality across the set of regular verbs is extracted and incorporated into a productive rule. At some point after the systematicity in the system is noticed (at the very least when overgeneralizing), children must change strategies for generating the past tenses of verbs. At this phase/stage, children switch from producing the past tenses of verbs as "amalgams" governed by rote mechanisms, to treating verbs as linguistic entities that are uniformly subject to the application of a general rule. It follows that although children have changed their production strategy, they are still not sub-categorizing verbs into two classes (a point that P&P don't really discuss). That is, the onset of rule-based overgeneralizations does not necessarily cooccur with the establishment of the linguistic distinction between regular and irregular verbs. For children in this stage, verbs are presumably uniformly subject to the "add -ed" rule -- verbs are "mostly regular." This conclusion is generally supported by the finding that when children are overgeneralizing familiar verbs, they overgeneralize most nonsense forms as well, suggesting that new verbs entering the child's lexicon will be automatically categorized as regular.

According to P&P, at some point children must achieve the distinction between regular and irregular verbs. Like adults, they must recognize that two distinct categories of verbs exist which are subject to different production mechanisms. Children enter this third phase of development (in which verbs that were previously overgeneralized are now produced correctly) when they begin making decisions about which verbs are regular (and thus productively generated), and which are irregular (and thus must be memorized). Here, the interesting problem for the child (as well as the researcher) centers on one particularly intriguing question: What *triggers* children to begin this process of generating some forms by rule and some by rote mechanisms? Such a transition requires that the child begin to evaluate information from the

input in a new way -- in terms of two verb classes, not just one homogeneous set of regular ones. In addition, the child must begin to reject previously stored forms, and to reevaluate their past tense rule, concluding that it is too general and therefore inappropriate for a large class of verbs, namely the irregular ones.

Unfortunately, it is not enough to say that the input that the child receives during the period of overgeneralizations somehow "forces" him/her to treat information about past tenses in this new way (Marchman, 1984; Karmiloff-Smith, 1983). Information that would tell the child that overgeneralizations are not part of the adult system (i.e., implicit in the fact that adults (usually) don't make those errors) has been there throughout development. It is generally accepted, then, that children must use the same basic set of exemplars from which the rule was abstracted in the first place to draw the conclusion that their rule is too general and that the exceptions must be taken into account on a one-by-one basis. Further, errors appear to be eliminated on the basis of positive evidence alone. That is, children do not receive explicit or direct information that they are making errors at all, let alone which forms are erroneous and why. It must be, then, that somehow the language learning device itself undergoes a reorganization which results in the "adult" mix of linguistic categories and production mechanisms. Unfortunately, most researchers, including P&P, do not deal directly with what motivates this shift. While they describe the mechanisms of production themselves in detail (see also Pinker, 1984), they feel that

> little needs to be said about the shift from the second stage...to the third (adult) stage, in which application of the regular rule and storage of irregular pasts *cooccur*...This stage is attained, we suggest, not by incremental strength changes in pattern-finding mechanism, but by a mechanism that makes categorical decisions about whether a hypothesized rule candidate is a genuine productive rule and about whether to apply it to a given verb. (pg. 82, emphasis added)

From what I can gather, then, at least three developmental milestones can mark the onset of the transition from the second to the third phase. Further study is needed to clarify the developmental mechanisms which motivate their onset and the relevant role of each in a model of children's language acquisition.

(1) The child sees that verbs should no longer be treated as a uniform lexical class, but rather that

there are two types of verbs which are generated via two distinct production processes, rote and rule;

(2) In addition to (1), the child achieves the ability to *coordinate* the mechanisms of rote and rule-production, aligning generative processes with verbs that they have identified as regular and rote mechanisms with those that are identified as irregulars;

(3) Or from the beginning, children do indeed partition verbs into two classes and both production mechanisms are operative yet independent until the emergence of the candidate-hypothesization mechanism. However, it is still unclear what motivates the onset of this mechanism. Working with the two production mechanisms and two lexical categories, this third mechanism allows the child to identify verbs as irregular or regular and to "distinguish general productive rules from restricted productive rules from accidental patterns" (pg. 74) -- skills that, according to P&P, do not characterize production systems at the earlier stages of development.

Developmental Data: A Second Look

At this point, I would like to take a second look at children's past tense productions focusing on those aspects of performance which are not customarily addressed in the standard perspective. First, there are interesting implications of the (somewhat obvious) fact that, at any point in development, children do not overgeneralize every single irregular verb in their vocabulary and that often "correct and overgeneralized forms coexist" (P&P, pg. 75) during the second phase of development. In my study of past tense production, even though past tense errors were made by children in all age groups (from 3;9 to 9 years of age), erroneous output comprised a maximum mean of only 36.8% (see Total Errors in Table 1). Thus, while the majority of verbs included in the procedure were irregular (approx. 76%) and thus amenable to the typical "add -ed" error, even the most avid group of overgeneralizers (5 year olds) produced an erroneous form only about one-third of the time. This must imply that rote mechanisms operate throughout development, controlling the production of some irregular forms even when children are productively applying the "add -ed" rule. Assuming of course that the verbs I used in my study were representative of natural vocabularies, these data suggest that it may be misleading to talk about children who are *at the stage of over-generalizing*. Descriptions such as these imply a

relatively homogeneous approach to the task of generating past tense forms and tend to leave a large portion of performance unaccounted for. Models of acquisition clearly must account for why children make overgeneralization errors in the first place, but also why they make non-errors at the various stages of development, most notably after they have begun to overgeneralize. Two additional points of further study follow from this point:

(1) As discussed above, in addition to performance with novel forms, the most straightforward evidence that children have become "rule-users" rather than merely "rote producers" is their overgeneralization of the regular rule to irregular forms. And, once children have achieved that stage in development, the standard view typically assumes that the past tense forms of all *regular verbs* are productively generated by applying the general "add -ed" rule as well during this phase. However, this conclusion may be misleading as well, in that it is unclear to what extent children are producing the correct past tense forms of regular verbs by rote in addition to the irregulars that they do not overgeneralize. In light of these facts, do we have sufficient evidence to know exactly *what rules children are learning*? In other words, it may be premature to say that children first abstract a *general rule* of the form "add -ed to any stem" if we consider that (a) children are frequently making errors (presumably rule-generated) and non-errors (presumably rote-generated) simultaneously, and (b) rote process are being applied to exemplars in both regular and irregular verb classes. Making a similar point in their recent review of morphological acquisition research, Derwing and Baker (1986) conclude that a complete description of the parameters guiding children's use of morphological rules is far from complete. As they note in reference to drawing conclusions about rule usage from Berko type nonsense data: "It is one thing to show that a child can produce and/or understand novel word forms...but quite another to ascertain the specific linguistic regularity that the child was exploiting in the process" (pg. 332). [2]

(2) Regardless of the exact form of the rule that

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[2] A related question: To what extent is it accurate to characterize the "add -ed" rule as stable across development? In other words, is it necessary to assume (as is generally done in the standard perspective) that once the child is overgeneralizing, he/she has "got" the "add -ed" rule in a general form that is not modified substantially in *kind*, but rather, in *scope*. In the transition between the second and the third phases of development, P&P acknowledge that the child is testing various rule hy-

children are applying, why do children view some verbs as candidates for the application of the general rule and not others? One possibility, suggested by Bybee & Slobin, is that children will process exemplars in terms of whether they fit the "schema" of ending in a *d* or *t* (i.e., the most common past tense ending). P&P basically reject this suggestion on the basis that it is only one of "a full range of possibilities (that) are consistent with the data" (pg. 89). Until more definitive phonological analyses can disentangle the possible explanations, however, I can simply point out that my data were consistent with Bybee & Slobin in that error types were predicted by the phonological shape of the stem (verb class): (a) children were more likely to avoid adding endings (e.g., want > want) to verb stems that already ended in a dental, and (b) the tendency to overgeneralize the *-ed* ending to dentals increased with age.

Secondly, I would like to underscore the suggestion that while the distinction between regulars and irregulars may indeed be "psychologically-real" for adults, as P&P suggest, this "does not prevent speakers from formulating generalizations about these forms" (Bybee & Slobin, 1982; pg. 4), nor does it mean that this distinction must play a significant role in acquisition. In my data, during the period from 3 to 9 years, 3.5 to 12.8% of the errors that children made could not be identified as overapplications of the "add *-ed*" rule (see Table 1). Using a classification system which groups verbs according to the type of change they undergo from the stem to the past tense form [3], non-regular errors would be "overapplications" (application where the procedure does not normally apply) of the patterns identifiable from *irregular verbs,* null ending (class 1) or change of an internal vowel (classes 3-8). For example, *sit > sit, hit > hat, fly > flow,* or *pick > pack*. For the youngest children (3-4 years), about half of their errors were this type. And, while the absolute number of these decreased across development just as "add *-ed*" errors, these non-regular errors constituted a substantial proportion of the erroneous output even in the oldest group. In addition, for almost all of the children, their errors could *not* be described in terms of a single "type" of overgeneralization (e.g., it was not the case that some kids are uniformly regularizers,

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potheses. However, they tend to view the child as devoting most of his/her energies to figuring out which verbs are regular and which are irregular, rather than modifying the rule itself.

[3] See Bybee and Slobin (1982) and P&P's modified version (not discussed here.)

some kids don't add anything to the stem, etc.). When errors were analyzed within-subject, *simultaneous* "add *-ed*", null marking, or vowel change overgeneralizations were common. Younger children productively applied *both* the "add *-ed*" and the null marking procedure, with the vowel change procedure joining in around 6 1/2 years (but never being more common than the other two procedures). Based on these data, then, children do not analyze the morphological changes between present and past tense forms *only* in terms of the "add *-ed*" procedure. Rather, they are also sensitive to patterns of stem changes exhibited within the system of *irregular verbs* from the point at which they begin to regularize until very late in development.

These findings suggest that the relevance of children's "add *-ed*" errors may have been overemphasized, while other systematicities in children's performance have been downplayed. The mechanisms guiding children's production of correct *and* incorrect forms should continue to be investigated, as well as what types of errors are made *throughout the entire past tense system*, in particular, those that are linked to the systematicities inherent in irregular verbs. In my data, I attempted to capture these aspects of performance through a qualitative, rather than a quantitative, approach to analysis. Children's performance was investigated, not simply in terms of how many errors the child made, but in terms of where the child applied no marking, an internal vowel change, and "add *-ed*," and where he/she did not. As outlined in Figure 1, four "Production Categories" were defined according to how a child used each of the three procedures *where it should be applied* (within-class) and *where it shouldn't* (outside of the class). These Production Categories grouped children who were making errors and non-errors in a similar way: Underusage (A), Inappropriate Usage (B), Overusage (C), Appropriate Usage (D).

Using these, I found evidence that productive or rule-governed usage says little about whether a child has identified the verbs to which that rule should be applied (i.e., within class). In other words, the majority of the children underapplied an rule within class at the same time that they were overgeneralizing outside the appropriate class (Inappropriate Usage (B): e.g., changed internal vowels on some regular verbs, while they were adding "*-ed*" to some irregular forms). In addition, this tendency to "overgeneralize while underapplying" often occurred with more than one procedure within the same child. In other words, there is evidence for an interplay between productive usage and the identification of within-class members

which does not guarantee that the exemplars from which the rule was "abstracted" are exempt from concurrent overapplication of an alternative procedure. These data suggest that a complex "competition" may exist between the various procedures, in that children are simultaneously sensitive to several different patterns in the input which compete for application within and across the appropriate verb classes.

Taking the analyses of the Production Categories a step further, one can group children together who are in the same category for all three past tense procedures. Analyses using the three production categories taken together gives a picture of how each child is dealing with the past tense system as a whole at any one point in development. A child's Production Pattern (their production categories for all three procedures), then, reflects their style of errors and non-errors on verbs in each of three sets of classes -- those that add nothing to the stem (no marking - class 1), those that change an internal vowel (classes 3-8), and those that "add *-ed*" (regulars). Using the same categories of Underusage (A), Inappropriate Usage (B), Overusage (C), and Appropriate Usage (D) mentioned above, 27 possible types of Production Patterns are possible (3 procedures, 4 production categories). Interestingly, about 70% of the children in this wide age range were grouped into one of 4 production patterns, BAB, BAC, CAB, and BBB (see Table 2), which reflects their production category for the no marking, vowel change and "add *-ed*" procedures, respectively. Like the analyses of the individual categories, these most frequent patterns suggest that children are more likely to overgeneralize more than one type of past tense procedure at a time. This tendency results in the fact that within-class errors still occur even though the child is using the procedure productively (i.e., using a general "rule").

Further, while children in the 4 patterns perform similarly in terms of within- and outside-class errors, it is interesting to note that they were not predictive of which children would make the most number of errors (of all types) -- See Table 2. That is, the mean number of errors produced for each of the groups was surprisingly similar. [4] In addition, the Patterns do not appear to occur at any particular age or developmental period. The mean ages of the children in the four groups did not differ significantly from one another (although there was a trend toward the BBB group being

older than the BAB group). Further, a distributional analysis by age indicated that 75% of the 4 year olds and 100% of the 5 and 6 year olds were categorized into one of the 4 most frequent patterns. This is in contrast to the 7 and 9 year olds (41%) who were more likely to be idiosyncratic in their style of dealing with the three procedures (Other). Thus, the performance of children who were at the top of the U-shaped curve (i.e., making the most errors) could not be described as "partitioning these forms in a common manner" at this phase/stage of development. Rather, there appears to be (at least) *four different* organizations of the past tense system that characterize children's performance between the ages of 3 1/2 and 6 1/2 years of age, which do not bear directly on the total number of errors made. These within-subject analyses suggest that the observed developmental pattern in performance (i.e., overall decline in number of overgeneralizations with age) may not necessarily reflect any uniform "stages/phases" of acquisition. That is, even though group performance as shown in Table 1 is suggestive of the second and third phases of the U-shaped curve, individual analyses indicate that this pattern may be an artifact of significant and persistent individual differences. Rather than proceeding through a single sequence of stages ("rote" to "rule" to "rule+rote"), several distinct but logically related ways exist for children to organize exemplars contained in the "competition pool" (Bates & MacWhinney, 1987) on their way to adult-like performance. Researchers should perhaps shy away from the "three phase" metaphor and focus instead on acquisition as a protracted and continuous process of identifying regularities within both regular and irregular verbs, integrating those into a coherent 3-procedure system, and identifying all appropriate exemplars.

Using techniques like these (see also Derwing & Baker's notion of *response coincidences*), we are able to look more closely at how a given child approaches the production of past tense forms in the system as a whole. First, these data indicate that children are sensitive to several types of regularities that govern the formation of the past tense of verbs throughout a wide span of development, not just "add *-ed*." Further, children appear to be testing out several procedures simultaneously, in that productive usage in conjunction with within-class errors were the norm for all three types of procedures (null marking, vowel change and "add *-ed*"), In this respect, *children did not treat irregular verbs qualitatively differently than regular verbs across acquisition.* Second, across the age range assessed here, there does not appear

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[4] Children categorized in the production pattern BAB produced more errors than those in the other three groups.

to be a common, developmentally-related, sequence in how children organize the categories of regular and irregular verbs and their corresponding rote and rule-governed production mechanisms. Group trends in the proportion of errors produced were predicted by four organizations of the system, distributed more or less randomly across the age range. While it is sufficient at one level to account for the fact that children make fewer errors as they get older, it is also important to account for qualitative similarities in performance between children of vastly different ages (i.e., who have different amounts of linguistic experience).

Conclusion

In this paper, I reviewed one account of rule acquisition, pointed out some unresolved issues, and provided some reasons to step back from the standard characterization of how children solve the learnability problem of acquiring a language. In reviewing R&M's simulation, P&P outline the role of lexical categories and their corresponding production mechanisms in detail for each of the developmental stages. However, the exact nature of the transitions and the mechanisms which guide them remains unspecified in this model. Furthermore, I suggested that it may be premature to operate as if there were conclusive evidence about the nature of children's rule candidates and the significance of verbal categories. Research using within-subject analyses like those I presented here, especially ones that extend analyses to the finer details of English phonology, may lead to a more thorough account of the determinants of how, when and from what forms children abstract regularities. Such analyses will provide firmer ground upon which to decide at what point the regular/irregular distinction is relevant for the acquisition of English inflectional morphology. In addition, my data suggested that addressing at least some of the interesting questions for language acquisition require looking beyond what children are supposed to be doing within any one "stage" of development. I emphasized the idiosyncratic and multi-faceted nature of children's rule-governed systems and asked whether the three-phased model is the most useful metaphor for understanding how children deal with the complexities inherent in the *systems* of language at various points in development. Rather than looking for ways to explain qualitative changes in rule types and their domain of operation, it may be productive to shift theoretical emphasis onto acquisition as a protracted resolution of several competing and interdependent sub-systems. Models of acquisition will consist of flexible learning and production mechanisms which account for the variability, as well as the universal patterns, that are observed across development and across individuals (e.g., Bates & MacWhinney, 1987). These perspectives offer a framework for deciding which intra- and interindividual variation is relevant to a complete understanding of the problem and which should be regarded simply as error. It is as yet unclear whether connectionist-like approaches will be successful on all counts, although some are more optimistic than others. Nonetheless, the debate surrounding these perspectives can be seen to encourage healthy reexaminations of the theoretical assumptions and analytic techniques that shape our conclusions about how rules and regularities guide the acquisition of language.