

for this data. Generation follows comprehension because generation cannot occur until comprehension learning adds words to the dictionary. Length of utterance increases because the number of words available to express a concept increases during comprehension learning. Knowledge of language meaning precedes knowledge of language syntax because syntax is indexed under word meanings and hence cannot be learned before the word meaning. Misunderstanding of utterances whose correct interpretation is not the semantically most probable occurs because children use their knowledge or probable meanings to augment gaps in their understanding. Finally, misunderstanding of utterances whose syntax suggests an interpretation different from the semantically most likely interpretation occurs because knowledge of syntax is learned after knowledge of meaning. This error is made when enough knowledge of meaning has been acquired to produce an interpretation, but not enough syntax has been learned to produce a correct interpretation.

There are certainly many other factors in child language acquisition which have not been considered here, but this paper offers support for the semantically-indexed syntax hypothesis and the comprehension-driven generation hypothesis as components of a complete model of child language acquisition. Further research must address questions posed by the data of more advanced child language acquisition, which could support other methods of indexing syntactic knowledge and other possible relationships between comprehension and generation.

ACKNOWLEDGEMENTS

Dr. Roger Schank's assistance in this work was invaluable. Dr. Richard Cullingford has made many valuable suggestions, and Dr. Katharine Nelson has provided many insights into problems of modelling child language learning. Peter Selfridge, Larry Birnbaum, Marie Bienkowski and Jamie Callan have contributed both ideas and criticisms.

REFERENCES

- [1] Benedict, H. (1976). Unjuimm. SwWlmMflvn itt m to 16. Month-old Infants.. (thesis) Department of Psychology, Yale University, New Haven, Connecticut.
- [2] Birnbaum, L., and Selfridge, M. (1981). in Inside artificial Intelligence: Five Programs plus Miniatures. Schank R. and Riesbeck C.K. (eds.), Lawrence Erlbaum Associates, Hillsdale, NJ.
- [3] Bloom, L., 1973. *One word at a Time* Mouton, The Hague.
- [4] Bruner, J.S., Goodnow, J. J., and Austin, G.A., (1956). *A Study of Thinking*. John Wiley and Sons, New York
- [5] Clark, I.?. and Clark, H.H., (1978). *Psychology and JkIMUItt*, Har court Brace Jovanovich.
- [6] Cullingford, R.E., Krueger, M.V., and Selfridge, M. (1981) *A Ploture and a Thousand Words: Automated Explanations as a Component of a Computer-Aided Design System*. Forthcoming.
- [7] Halliday, M.A.K., (1975). *Learning How to Mean Explorations the Development of Language* Edward Arnold, London.
- [8] Hoodenraad, R., Grieve, R., Baldwin, P., and Campbell, R. (1976). *Comprehension as an Interactive Process*. In R. N. Campell and P. T. Smith (eds.) *Recent Advances in the Psychology of Language*, Plenum Press, New York
- [9] Schank, R. C., (1973)- *Identification of Conceptualisations Underlying Natural Language*. In R. C. Schank and K. N. Colby (eds.) *Computer Models of Thought and Language* W.H. Freeman and Co., San Fransaloo.
- [10] Selfridge, M. (1980). *A Prooess Model of Language Acquisition*. Computer Science Technical Report 172, Yale University, New Haven, Ct.
- [11] Strohrer, H. and Nelaon, K.E., (1974). *The Young Child's Development of Sentence Comprehension: Influence of Event Probability, Non-verbal Context, Syntaotic Form, and Strategies*. *Child Day*.. 45:567*576
- [12] Westone, H. and Friedlander, (1973). *The Effect of Word Order on Young Children's Responses to Simple Questions and Commands*. *Child Day*. 44:734-740
- [13] Winston, P. (1975). *Learning Structural Descriptions from Examples*. In P.H. Winston (ed.) *The Pavohology of Computer Vision*. McGraw-Hill, New York.