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ABSTRACT
              The spontaneous speech of seven children was
monitored for "wh" questions. The children were observed
longitudinally from about age 24 to 36 months. The pattern of
development with regard to the deletion of non-obligatory verbs
revealed that "what," "where," and "who" questions presented
increasing verb ellipsis, while "how" and "why" questions presented
an expansion of utterance length. "Why" questions, which were
characterized by an abundance of descriptive verbs, exhibited the
greatest verb cohesion and linguistic contingency, indicating that
the source of linguistic contingency was the verb relation in the
prior adult utterance. A large number of descriptive verbs also
occurred with "how," but "how" showed the least verb cohesion,
indicating that the children were not depending only upon the
linguistic context for the source of their use of descriptive verbs.
It appears, then, that shared verbs in discourse is only a part of
the explanation of the differential occurrence of descriptive verbs
with "wh" forms. It can be assumed that the use of descriptive verbs
is also a function of the meaning and structure of the different "wh"
forms themselves. (JB)

Discourse Factors in the Acquisition of Wh-Questions[1]

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The sequence in which children learn wh-questions forms has been
explained most often in the child language literature as resulting from
constraints on cognitive development (e.g., Smith, 1933; Ervin-Tripp,
1970 and Tyack and Ingram, 1977). In the last several years we have
been exploring the acquisition of wh-questions and have observed that
there are important linguistic and discourse constraints operating as
well. In an earlier paper (Wootten, Merkin, Hood and Bloom, 1976) we
reported the sequence of emergence of wh-question forms by four chil-
dren and demonstrated that both the syntax of the questions and the
semantics of the verbs used in these questions covaried with develop-
mental sequence. Further investigation of three additional children
has now confirmed the results found with the first group (see Methods
section below), and the emergence of the most frequent wh-forms for all
7 children, what < where < who < how < why, is presented in Figure 1
below in terms of average rank order of frequency and average age of
emergence. (An arrow in Figure 1 indicates that question was not pro-
ductive for one or two of the children.)

Figure 1
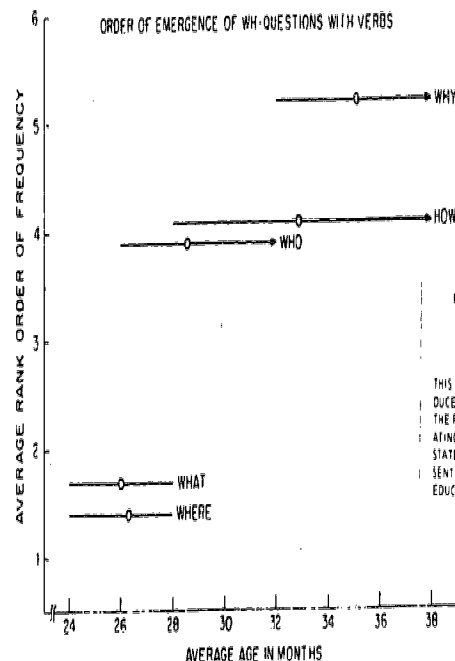
ORDER OF EMERGENCE OF WH-QUESTIONS WITH VERBS

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With respect to the relationship between syntax and sequence of emergence, what, where and who functioned as wh-pronominals that ask for the major sentence constituents they replace. In contrast, why and how, which emerged later, do not replace major sentence constituents, but ask for information pertaining to the semantic relations among all the constituents in a sentence. With respect to the relationship between semantics of verbs and order of emergence, the more general pro-verbs (the copula, do, go, happen) showed a different pattern of distribution across the wh-forms from the semantically more complex descriptive verbs (e.g., ride, break, sleep): (1) what, where and who occurred most often with pro-verbs, (2) why occurred most often with descriptive verbs and (3) how occurred equally with verbs of both categories. This distribution is presented in Table 1 for the wh-questions overall, and developmentally in Figure 2, according to Brown's (1973) Stages II through V.

Table 1

DISTRIBUTION OF DESCRIPTIVE AND PRO-VERBS

	WHAT	WHERE	WHO	HOW	WHY	WHICH	WHEN	WHOSE	TOT
PRO-VERBS	2323	2010	165	69	80	10	4	7	4668
	(.854)	(.938)	(.632)	(.489)	(.252)	(.417)	(.308)	(.778)	(.83)
DESCRIPTIVE VERBS	397	131	96	72	238	14	9	2	959
	(.146)	(.061)	(.368)	(.511)	(.748)	(.583)	(.692)	(.222)	(.17)

The present paper is concerned with the use of wh-questions in discourse and will report the results of three discourse analyses with all seven children: the first analysis concerns systematic verb deletion within a wh-question; the second explores the linguistic contingency between a wh-question and its adjacent linguistic context and the third examines verb cohesion, or the use of verbs repeated from a prior adult utterance. In general, different patterns of discourse adjustments and contingency were expected among the different wh-questions, reflecting differences in their forms, functions and sequence of emergence.

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Figure 2

USE OF DESCRIPTIVE VERBS: PROPORTION OF ALL
QUESTIONS WITH VERBS WHERE VERB IS DESCRIPTIVE
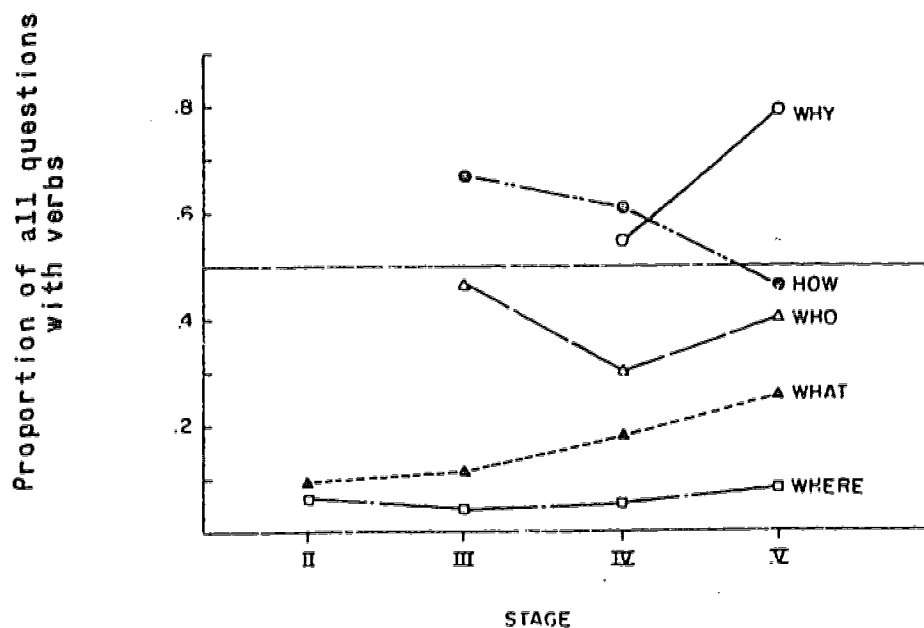
METHODS

This report is based upon an investigation of approximately 8,000 wh-questions asked by 7 children in informal play sessions with their mothers and/or a familiar adult. These children were observed longitudinally from about age 24 to 36 months, at intervals of from three to six weeks. The data were audio-recorded and the transcriptions that were used for the analysis of discourse include the complete linguistic context (the speech of others) and descriptions of relevant non-linguistic context. Although there was individual variation among the children, they were essentially similar to one another, so that the data could be combined in reporting these results. The pooling of data was based upon MLU according to the stages described by Brown (1973), and average MLU at each stage was 2.14, Stage II; 2.83, Stage III; 3.45, Stage IV; 4.58, Stage V.

ANALYSES AND RESULTS

Verb Delet___ ___ ___estions without verb___ ___ ___ .28 of the children's ques___ ___ ___ ___ .11 and were of two kin___ ___ ___plete questions in which a verb was obligatory in the adult model ___ was not used in the child's utterance, for example, "what that?" or "w___ ___re dog?", and

(2) questions in which a verb would not be expected, for example, the single-word "why?" or "what?", and multi-word questions such as "what book?" in response to such an utterance as "Give me the book."

We expected that questions without verbs would be more frequent in the early samples and would decline as the children learned to use more different verbs. In fact, the children did learn to use more different verbs over time, but there were, moreover, clear developmental patterns in the systematic deletion of verbs in discourse contexts. Across all wh-forms, incomplete questions in which an obligatory verb did not occur decreased between Stages IV and V as utterance length increased, and as the children learned more of the formal requirements for asking questions. At the same time, there was what appeared to be a gradual increase from Stages II to V in the occurrence of questions without verbs, where the verb was not obligatory. Closer examination of non-obligatory verb deletion for the individual wh-forms, however, showed an increase over time only for what, where and who (the most frequent question that the children asked). In contrast, the occurrence of how and why questions without verbs, where the verb was not obligatory, showed a decrease over time. This result is presented in Figure 3.

Figure 3

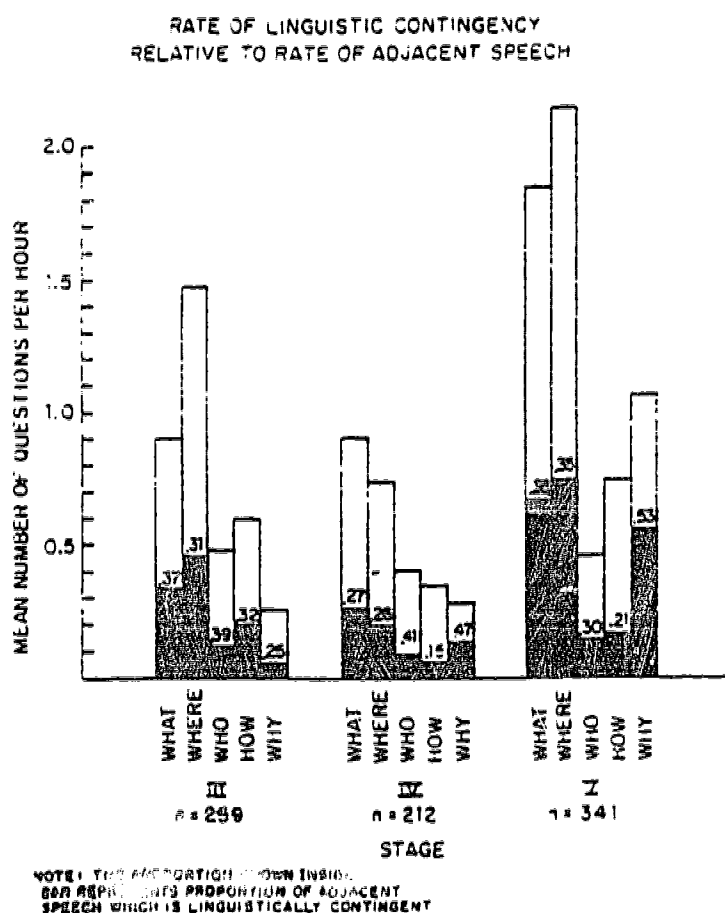### VERB DELETION WHERE VERB IS NOT OBLIGATORY
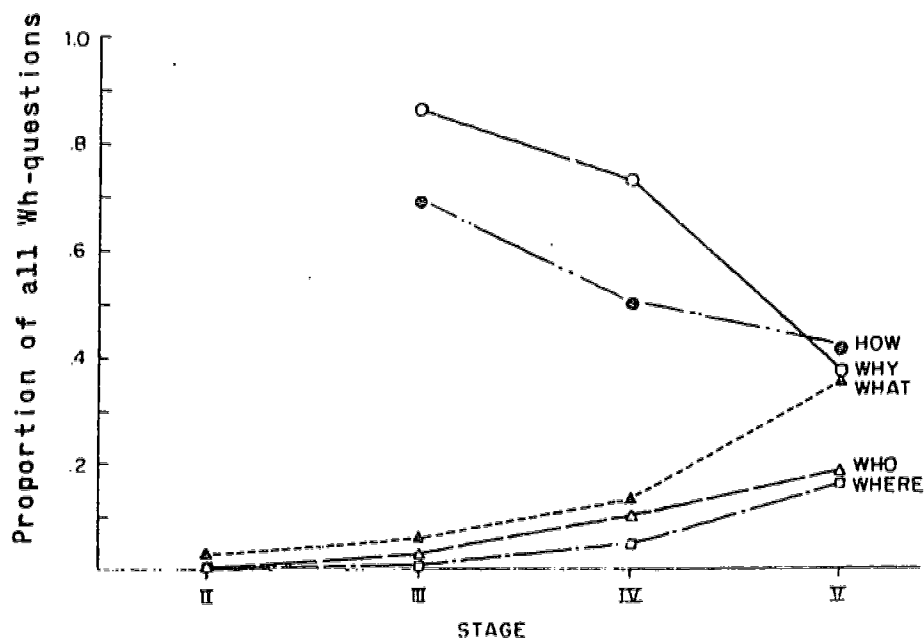
The discourse adjustments that the children made with respect to whether a verb was expressed were different for the different wh-forms; what, where and who questions presented a pattern of increasing verb ellipsis or shortened utterance length; how and why questions presented a pattern of increasing expansion of utterance length.

Linguistic contingency. For this analysis a subset of the corpus of wh-questions with verbs was examined for evidence of contingency. This subset consisted of those questions with verbs (except for the copula) that were temporally adjacent to a prior utterance in connected discourse. A child's utterance was contingent if it shared any constituent or referent of a constituent with an adult utterance that occurred within five turns in connected discourse.

Because of the substantial differences among the wh-questions in relative frequency, and the fact that observation sessions varied in duration from 5 to 8 hours, the rate of adjacent speech and the rate of linguistic contingency per hour was determined. In terms of absolute frequency, what and where questions were the most frequent questions and also presented the highest rates of adjacency and contingency. This result can be seen in Figure 4, where the rate of linguistic contingency

Figure 4

RATE OF LINGUISTIC CONTINGENCY
RELATIVE TO RATE OF ADJACENT SPEECH

NOTE: THE PROPORTION SHOWN INSIDE
EACH REPRESENTS PROPORTION OF ADJACENT
SPEECH WHICH IS LINGUISTICALLY CONTINGENT

relative to the rate of adjacent speech per hour is averaged for the seven children. However, when the relative proportion of adjacent questions that were contingent for each of the wh-forms was considered, it was observed that why questions showed the highest proportion of linguistic contingency; how questions showed the lowest proportion of contingency and only about one-third of the what, where and who questions were con-

tingent. These proportions are indicated in each of the bars in the
Figure 4 histogram, and are plotted in the graph in Figure 5 below. Thus,
given that a child asked any wh-question, it was most likely to be a what
or where question and given that a child asked a linguistically contin-
gent question, it was still most likely to be a what or where question in
terms of absolute frequency. But, given that a child asked a why ques-
tion, that question was more likely to be linguistically contingent than
if the child were to ask any other kind of wh-question.

Figure 5

LINGUISTIC CONTINGENCY: PROPORTION OF
ADJACENT QUESTIONS WITH VERBS
THAT ARE LINGUISTICALLY CONTINGENT
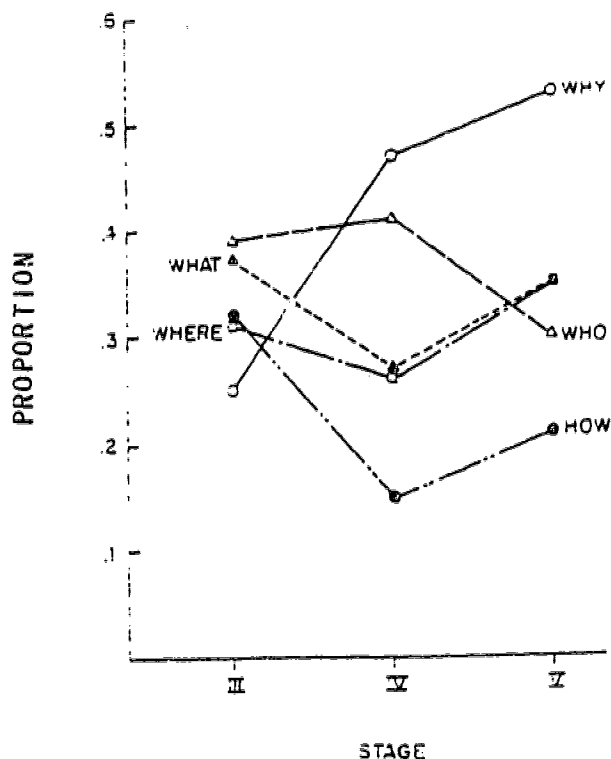
Verb cohesion. In this final analysis, we wished to explore the rela-
tionships among (1) the relative amount of linguistic contingency, (2) the
relative use of descriptive verbs and (3) the degree to which the child's
question shared the verb from an immediately prior adult utterance, for
each wh-form. By clarifying these relationships, we hoped to better ac-
count for the differences among the different wh-forms in relative linguis-
tic contingency and use of descriptive verbs. In particular, why ques-
tions were proportionately most contingent and occurred most frequently
with descriptive verbs, so that it was hypothesized that the source of the
descriptive verbs in why questions was a prior adult utterance.

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All of the adjacent questions with descriptive verbs were examined, and the proportion of questions that shared verbs, or verb cohesion, is presented in Figure 6. For all of the question forms except how, there

Figure 6

VERB COHESION: PROPORTION OF QUESTIONS WITH DESCRIPTIVE VERBS WHERE VERB IS REPEATED FROM ADULT UTTERANCE
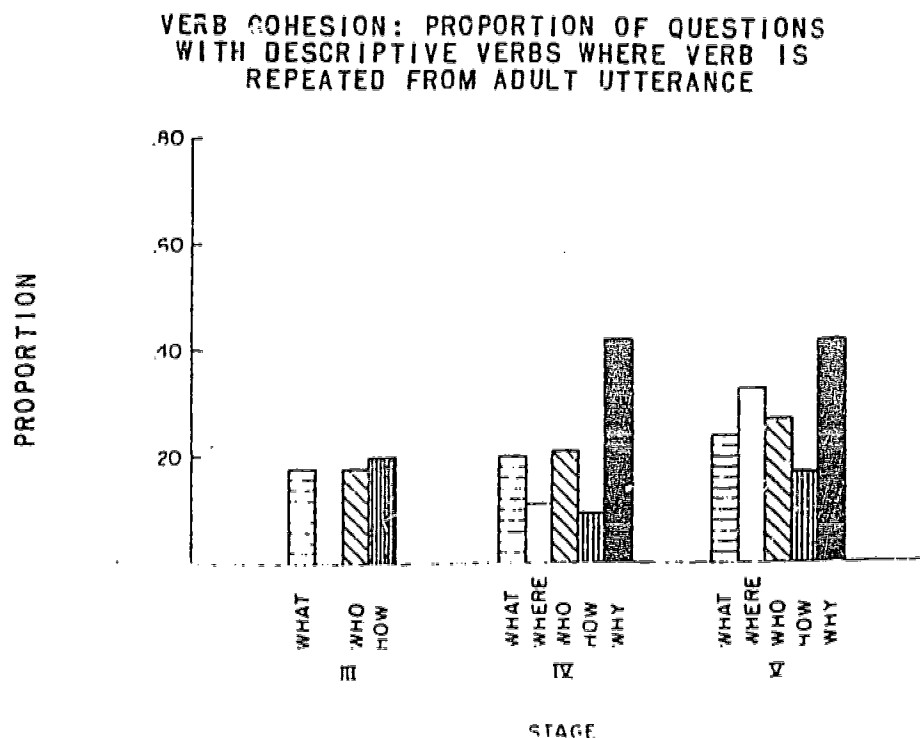
was an increase from Stage III to Stage V in the extent to which children made use of descriptive verbs from the adult discourse context. Further, wh-questions shared the adult verb more frequently than any other wh-question, but only about .40 of the time. How-questions, on the other hand, with the second most frequent use of descriptive verbs, displayed the least amount of verb cohesion with the adult utterance at Stages IV and V.

Thus, it was the case that verb cohesion was different among the wh-forms. As expected, verb cohesion was greatest with why-questions which were also most often linguistically contingent, indicating that the source of linguistic contingency was the verb relation in the prior adult utterance. The children were learning to ask why-questions with many descriptive verbs, in the context of contingency relations with the adult utterances in which they tended to repeat the verb from the adult utterance. However, a large number of descriptive verbs occurred with how, but how showed the least verb cohesion, indicating that the children were not depending only upon the linguistic context for the source of their use of descriptive verbs. It appears, then, that shared verbs in discourse is only a part of the explanation of the differential occurrence of descriptive verbs with wh-forms. Since why and how functioned differently in discourse, it can be assumed that the use of descriptive verbs is also a function of the meaning and structure of the different wh-forms themselves.

In conclusion, cognitive complexity may be one factor that oper-
ates to influence the sequence of acquisition of wh-forms, to be sure.
However, the cognitive hypothesis is only a post hoc explanation that
is, as yet, unsupported by independent evidence and, in fact, there is
evidence to refute it. For example, when the children learned complex
sentences, causal and temporal interclausal meaning relations and the
syntactic connectives that encode them are among the most frequent mean-
ing relations and connectives. Moreover, they appear early, well before
three years of age and well before the acquisition of why and when ques-
tions (Bloom, Lahey, Hood, Lifter and Fiess, 1980). Further, children
learning a second language at age five or six acquire wh-questions in
precisely the same order as has been observed in first language learning
(Lightbown, 1977). Cognitive development, then, could not be the factor
that determines sequence of acquisition in a second language for a five-
year-old child who already has the conceptual ability to ask all of the
same questions in a first language.

Different wh-questions do not differ only in their conceptual require-
ments; rather, there are a number of factors that interact with one an-
other and, together, produce the contrast among the wh-questions that
determines their sequence of acquisition. Several of these factors are
schematized in Figure 7 below. For example, what and why questions con-
trast with one another in at least the following ways: what, which
emerges early, is a pronominal form that repla   sentence constituent,
occurs more frequently with pro-verbs than descr tive verbs, increases
in frequency of ellipsis, and occurs with modera e linguistic contingency
and verb cohesion. In contrast, why, which emerges late, is a sentential
form, occurs far more frequently with descriptive verbs than pro-verbs,
expands in sentence length and occurs with the greatest proportion of
linguistic contingency and verb cohesion.

Figure 7

Order of Emergence

	WHAT	WHERE	WHO	HOW	WHY
Complexity Factors					
Syntactic function	pronominal ————————————————→ ←——————sentential				
Selective verb distribution	pro-verbs ————————————————→ ←——— descriptive verbs				
Discourse:					
Verb deletion	ellipsis————————————→ ←————————expansion				
Linguistic contingency	moderate ————————————— / ——— least —— / — most				
Verb cohesion	moderate ——————————— / ———least—— / — most				

The results of the present study provide substantial support for
the integrative model of language acquisition presented in Bloom, Miller
and Hood (1975) and Bloom (1976), that is, there is no single factor that
can explain the substance and process of language development. While
children do learn to ask wh-questions in a particular order, they are
doing so in the context of learning other aspects of language such as
the syntactic functions of the wh-words, semantic aspects of verbs and
the requirements of discourse. There are, then, multiple factors that,
together, determine when and how children learn to ask the different
forms of wh-questions.

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