The spontaneous speech of seven children was monitored 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. (JE)
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 proverbs (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**

<table>
<thead>
<tr>
<th></th>
<th>WHAT</th>
<th>WHERE</th>
<th>WHO</th>
<th>HOW</th>
<th>WHY</th>
<th>WHICH</th>
<th>WHEN</th>
<th>WHOSE</th>
<th>TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRO-VERBS</strong></td>
<td>2323</td>
<td>2101</td>
<td>165</td>
<td>69</td>
<td>80</td>
<td>10</td>
<td>4</td>
<td>7</td>
<td>4668</td>
</tr>
<tr>
<td></td>
<td>(.854)</td>
<td>(.938)</td>
<td>(.632)</td>
<td>(.489)</td>
<td>(.252)</td>
<td>(.417)</td>
<td>(.308)</td>
<td>(.778)</td>
<td>(.83)</td>
</tr>
<tr>
<td><strong>DESCRIPTIVE</strong></td>
<td>397</td>
<td>131</td>
<td>96</td>
<td>72</td>
<td>238</td>
<td>14</td>
<td>9</td>
<td>2</td>
<td>959</td>
</tr>
<tr>
<td><strong>VERBS</strong></td>
<td>(.146)</td>
<td>(.061)</td>
<td>(.368)</td>
<td>(.511)</td>
<td>(.748)</td>
<td>(.583)</td>
<td>(.692)</td>
<td>(.222)</td>
<td>(.17)</td>
</tr>
</tbody>
</table>

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.
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 Delays. Questions without verbs constituted .28 of the children's questions overall and were of two kinds: incomplete questions in which a verb was obligatory in the adult model but was not used in the child's utterance, for example, "what that?" or "where 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 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 contingent 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 question, 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 relationships 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 account for the differences among the different wh-forms in relative linguistic contingency and use of descriptive verbs. In particular, why questions 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.
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 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 operates 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 meaning relations and connectives. Moreover, they appear early, well before three years of age and well before the acquisition of why and when questions (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 requirements; rather, there are a number of factors that interact with one another 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 contrast with one another in at least the following ways: what, which emerges early, is a pronominal form that replaces sentence constituent, occurs more frequently with pro-verbs than descriptive verbs, increases in frequency of ellipsis, and occurs with moderate 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

<table>
<thead>
<tr>
<th>Complexity Factors</th>
<th>WHAT</th>
<th>WHERE</th>
<th>WHO</th>
<th>HOW</th>
<th>WHY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntactic function</td>
<td>pronominal</td>
<td>——&gt;sentential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selective verb distribution</td>
<td>pro-verbs</td>
<td>——&gt;descriptive verbs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discourse</td>
<td>ellipsis</td>
<td>——&gt;expansion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verb deletion</td>
<td>moderate</td>
<td>——&gt;least</td>
<td>——&gt;most</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linguistic contingency</td>
<td>moderate</td>
<td>——&gt;least</td>
<td>——&gt;most</td>
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</tbody>
</table>
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.

References


