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A REEXAMINATION OF THE PRINCIPLES OF CHILDREN'S WORD FORMATION

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1. Introduction

Eve Clark has undoubtedly been one of the most productive researchers in the study of the child’s acquisition of the lexicon. In the early 1970s, she proposed the Semantic Feature Hypothesis, in which she claimed that children’s acquisition of a word meaning can be characterized as the successive addition of semantic features to the lexical entry of the word in their mental lexicon (Clark (1973)). She conducted a number of experiments to test this hypothesis in such semantic fields as dimensional adjectives, deictic expressions, locative prepositions, kinship terms, etc. However, several problems associated with the hypothesis emerged, and in the early 1980s she abandoned it (Clark (1983)).

During the 1980s, her study of children's lexical semantics was centered around the notions of Contrast and Conventionality, two very general principles of acquisition that apply to the lexicon (as well as syntactic constructions) (e.g. Clark (1988)). At the same time, she

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started a new line of research into children’s word coinages. As has been noted in the literature, children acquiring English coin a number of novel words to fill gaps in their lexicon—a fascinating phenomenon testifying to the child’s capacity to “construct” a language. She observed that in so doing children prefer certain word formation devices over others. Along the same general line as Slobin’s Operating Principles of language acquisition (Slobin (1973, 1985)), she proposed a few principles of word formation to account for such preferences (Clark (1981), Clark and Hecht (1982)). She and her co-researchers conducted a number of well-designed experiments to test such principles in children’s use and understanding of the word formation rules for agent and instrumental nouns in English and Hebrew. She also kept astonishingly detailed diary records of her son Damon, and examined these principles in terms of the data from his spontaneous production of novel words. The book under review here, The Lexicon in Acquisition (hereafter LA), is essentially the outcome of this second period of Clark’s research during the 1980s.

LA consists of two major parts. Part 1 concerns the assumptions that children bring to the task of mapping meanings onto forms. Two general principles that Clark suggests are the Principles of Contrast and Conventionality. She further discusses three other principles used in children’s initial analyses of word structure and in their formation of complex words: the Principles of Transparency, Simplicity, and Productivity. In Part 2, Clark discusses several case studies of word formation by young children, examining the rules they use in terms of these principles. The data come from both elicitation experiments and diary studies conducted by Clark and her colleagues, as well as those done by others. A wide range of languages are examined, including English, German, Dutch, Icelandic, French, Polish, Hungarian, and Hebrew.

The general principles that Clark proposes in LA on the child’s acquisition of the lexicon and word formation rules represent a very important contribution to the field. This is so above all because her study brings together data from a number of languages in a way unimaginable without her initiatives in proposing and refining specific hypotheses. In this sense, LA is truly “a landmark book in the study of the lexicon” (Dan Slobin, from the blurb of LA). However, a closer look at LA suggests that there is reason to reformulate the proposed principles, as I will argue in this review article.
In this article I will mainly discuss Clark’s principles of word formation, described in Part 1 of the book and applied in the case studies reported in Part 2. I will first point out unfortunate inconsistencies and redundancies in her formulation and application of the proposed principles. I will then propose a reformulation of the principles. I will also discuss one factor that might be explored further: the division of labor between syntax and the lexicon. For this purpose I will provide data from my own diary study of one Japanese-speaking child.

2. Transparency, Simplicity, and Productivity

One issue that Clark tries to account for is why children prefer certain word formation devices over others. Young children acquiring English, for example, opt for compounding in forming agent nouns (e.g. plant-man for ‘gardener’, sweep-man for ‘someone who sweeps’) or zero conversion from nouns to form action verbs (e.g. broom for ‘hit with a toy broom’ and rubberband for ‘put in a rubber band’). Clark’s three principles of children’s word formation—Transparency, Simplicity, and Productivity—are designed to account for such patterns.

2.1. Examination of Transparency and Simplicity

Clark states that children prefer formally simple word formation devices. To account for this, she formulates the Principle of Simplicity, which is stated as follows:

(1) Simplicity of form: Speakers find it easier to interpret and coin a new word the simpler it is in form—that is, the less its root changes in its construction. (p. 120)

Clark uses this principle to predict that children should prefer zero conversion over other options; that compounding is used before affixation; that in early compounding affixes are dropped; and that affixation requiring no root changes should be used before affixation that requires such changes (e.g. p. 145).

The formulation just quoted is somewhat misleadingly phrased. The above formulation does predict that affixes requiring no change in the root will be used before those requiring root changes (p. 145). However, as phrased, it would also be interpreted to predict that affixes that do not change root forms should be used as early as zero conversion; for example, -ness suffixation, which does not make any
changes to the adjective root to which it is attached, should be on a par with zero conversion, which likewise makes no such changes. Formal simplicity, rather, should be defined in terms of formal operations in general, not just root changes, as Clark in fact states on pp. 547–548. An additional assumption left implicit here is that morphological operations (affixation, compounding, etc.) are applied to the word (cf. Aronoff (1976)). Taken together, Simplicity is supposed to state that the less formal changes one need make on a word, the simpler the derived word is.

The Principle of Transparency is formulated as follows.

(2) **Transparency of meaning:** Speakers try to interpret and coin new words that are transparent in meaning—that is, words that are based on known roots and affixes. (p. 116)

The Principle of Transparency as formulated above appears to say little by itself: how can a speaker use elements other than known roots or affixes in forming complex words? The real point of this principle lies in its combination with other assumptions. Clark assumes that words are acquired before affixes; given this, she argues, Transparency predicts that children should prefer zero conversion and compounding over affixation.

Obviously, this principle often makes the same predictions as Simplicity. The question is, then, why we should need both principles. Clark argues that both are indeed necessary and that the difference between them emerges once children have begun to identify affixes. At this point, an affix becomes as transparent as a word, and therefore Transparency predicts that children can use both in word coinages at this stage (p. 124).

This acquisition process can be diagramed in Figure 1. At Stage I, when children know only words and not affixes, simple options and transparent options coincide. At Stage II, when children have identified affixes, simple options are a subset of transparent options. At this stage, Clark claims, children’s choice depends on the productivity of the options (see sec. 2.2 below), with children shifting their preferences from simple options to productive ones.
stage I

formally simple options

semantically transparent options

stage II

Figure 1. Relationship between Transparency and Simplicity based on \textit{LA}

This means, however, that Transparency plays quite a different role from Simplicity (and Productivity). Transparency merely restricts usable options, while simplicity and productivity select the particular options that children prefer.

In this regard, it should be noted that Clark's statements concerning the relationship between Transparency and Simplicity are sometimes inconsistent. In some parts of \textit{LA}, she explicitly states that in general simple devices are all transparent but not all transparent devices are simple (pp. 124, 242). This must be true, given Figure 1. However, on other occasions Clark states that Transparency and Simplicity can contradict each other. For example, the reader is told on p. 125 that "[i]f [a complex word form] is not transparent but is simple, [children] should find it harder. And if it is transparent, but not simple, it should again be harder to produce." She also states that Transparency may take priority over Simplicity in languages in which bare roots cannot be used in forming new words (p. 125). In such languages (e.g. French), Clark observes, children produce few innovative words until they begin to use affixation. However, it is possible to regard this as something other than a case of Transparency taking priority over Simplicity. One might instead say that children do respect both Transparency and Simplicity at an early stage, but that in some languages they cannot find options that are simultaneously simple and transparent. The situation in such languages can be diagramed in Figure 2.
Another problem with Transparency is that Clark at times appears to be using this principle in a sense rather different from the formulation quoted in (2). In her discussion of children's use of Hebrew agent and instrumental nouns, Clark states that Transparency predicts that options which are specialized for agentive meaning or instrumental meaning should be acquired before those which are not (p. 187). Here, Clark is using Transparency to mean children's preference to deal with one meaning per form (i.e., the meaning of an item which is consistently used for one particular meaning is easier to identify). Further, in her discussion of French agent and instrumental nouns, she uses this principle to account for children's tendency to rely on a single suffix (among several) for agents (p. 191). Here she is using Transparency to mean children's preference for having one form per meaning.

These "predictions" based on Transparency would make sense if in fact children are not good at discovering the meaning of a polysemous affix (many meanings per form) or an affix that has other irregular allomorphs (many forms per meaning). However, it is not clear whether this is what she really wants to say, at least in terms of Transparency. Clark denies that children prefer one-to-one mapping

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1 This is in fact subtly different from the assumption of no polysemy (no form can have more than one meaning). Children would naturally find it easy to identify the meaning of a form specialized for one meaning if they assume that a form can have only one meaning. However, such a form might still be easier for children even when they know that a form can have more than one meaning.
of meaning and form (p. 115), inasmuch as homonymy (formal identity of two or more words) does not cause any difficulty to children (p. 113). If homonymy does not cause any problem, it is not clear why polysemy does. As for one form per meaning, Clark does note that children tend to use only one form to indicate a meaning when the adult grammar has several forms (allomorphs) to mark the same meaning (the case of overregularization). This, however, she explains in terms of the general principle of Contrast (p. 115): children opt not to produce several forms having the same meaning because they assume that any two forms should differ in meaning. Thus, children's preference for one form per meaning is supposed to be explained by Contrast, not by Transparency.

How did such unfortunate inconsistencies and redundancies in *LA* come about? It appears to me that they originate in the way the various principles have developed in Clark's research. Clark's principles of word formation have changed over the years. Some were added later, with others being discarded, and the definitions of those which were retained have undergone alternation. In earlier papers she proposed the Principles of Transparency, Productivity, and Regularization (e.g. Clark (1981)). Her original Transparency Principle was formulated as: "Those word formation devices that mark their meaning clearly (i.e. with one-to-one matches of meaning and form) are easier to acquire than those where multiple meanings are expressed by one form, or vice versa" (Clark (1981: 313); see also Clark and Hecht (1982: 3-4)). She further claimed that this principle had two attendant strategies: "Look for devices that mark only one meaning," and "Look for devices that are words in their own right" (Clark (1981: 313)). The Principle of Regularization was formulated as: "Paradigms in language—the subsystems found in inflection and word formation—are regular in form" (p. 313). This principle, she stated, had one attendant strategy: "Use the same device everywhere to mark the same meaning" (p. 313). Note that there is a slight overlap here between Transparency and Regularization: preference for one form per meaning is expressed in Regularization while preference for one meaning per form is expressed in the first attendant strategy of Transparency, although the definition of Transparency itself includes the notion of one-to-one mapping.

In later papers the Principle of Regularization ceased to appear, perhaps absorbed by Transparency. In the meantime, a new principle
of Simplicity was introduced in Clark and Berman (1984). Simplicity was defined in terms of fewer formal changes on words (pp. 547-548), a characterization which in fact was in partial overlap with the second strategy associated with Transparency ("Look for devices that are words in their own right"). (Clark and Berman defined Transparency in more or less the same way as Clark (1981), with its two attendant strategies.) However, they did not discuss this facet of Transparency, and considered only the one-to-one mapping aspect of Transparency in making predictions from this principle.

Clark and Berman were faced with the fact that preference for one-to-one mapping and preference for words as word-forming elements yield different predictions in Hebrew. They observed that the formally simpler option of zero conversion is not specialized for marking agents or instrument, while the formally more complex options of vowel intercalation and affixation are specialized for agent or instrumental marking. Here, Transparency and Simplicity make different predictions. This, however, was because only the one-to-one mapping aspect of Transparency was considered. In LA, this one-to-one mapping aspect of Transparency is discarded (or is supposed to have been discarded), with the preference for one meaning per form denied and Contrast taking over the preference for one form per meaning. The result is that the need for a distinct principle of Transparency is unclear.

The history of the different principles indicated above is summarized in Figure 3.

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**Figure 3. History of Different Principles**
Now one can see why LA suffers from inconsistencies in the use of Transparency. In spite of Clark's new definitions, she appears to slip into older, different definitions of Transparency on some occasions.

2.2. Examination of Productivity

The only principle that has been used with relative consistency throughout Clark's study of word coinages is the Principle of Productivity, which is now stated as follows (p. 136):

(3) **Productivity:** In forming new words, speakers rely on the most productive option with the appropriate meaning.

She states that the productivity of a word formation device can be measured by the speaker's preference for the use of the device in coining novel words. Such a preference, she argues, is an outcome of a number of factors—structural constraints on the application of the rule, the number of existing words formed by the rule, etc.

The Principle of Productivity is used, for example, to account for children's early use of compounding and zero conversion in languages like English, in which these options are productive, and the rarity of these options in languages like French, in which they are not productive (pp. 176, 218). It is also used to account for children's choices among different options for forming novel words at later stages of acquisition, such as their choice of the suffix *-er* over other suffixes like *-ist* and *-man* compounding, which are less productive than *-er* (pp. 180-181).

An important point which should be made at this point is that in fact two different senses of productivity are subsumed in this principle. One concerns the productivity of word formation rule types (e.g. compounding, zero conversion, suffixation, vowel intercalation); the other has to do with the productivity of each affix (or other specific device). Consider, for example, the formation of agent and instrument nouns by English-speaking children. Children first rely on compounding, producing such nouns as *plant-man* and *open-thing*. This is due to the productivity of compounding in English as a means of forming complex nouns. However, compounding of a verb and a noun *-man* is not productive in adults, and forms like *open-thing* are in fact ungrammatical. What makes the early agent and instrument noun compounding possible is the general use of compounding as a productive type of word formation rule to form nouns in the adult English language. In this respect, the above two kinds of productivity
—productivity of word formation rule types and productivity of particular devices must be distinguished. The former is closely related to the typological nature of the language being acquired—what kind of word formation rule types are predominant in the given language.

Clark makes an interesting and plausible claim about the interaction of transparency and productivity; once (or as soon as) several options become transparent, children should opt for the most productive one (pp. 180, 183; see also the discussion related to Figure 1). This claim, however, remains to be confirmed: how soon children actually shift to the most productive option is not entirely clear. Some relevant facts are found in agent and instrument noun formation in children acquiring Icelandic. Mulford’s study quoted by Clark (pp. 182–185) shows that Icelandic-speaking children continue to rely on zero conversion from verbs to form instrument nouns even after they begin to use -ari suffixation, the most productive option among adults. This suggests that a wholesale shift to the most productive option might not take place right after that option becomes transparent; preference for words (free morphemes) as building blocks for new words may persist for some time.

3. Reformulations

3.1. Reformulating Some Principles

We have seen some problems with Clark’s formulation and application of the principles which children rely on in coining novel words. How, then, can these principles be reformulated? Before answering this question, let me summarize the major findings reported in LA, to see what it is that we are supposed to be accounting for. One important general finding is the early preference for word-based options (i.e. compounding or zero conversion) if they are available in the input for the kinds of words children would like to coin. This is seen in the early preference for compounding in forming agent and instrumental nouns in English, and for zero conversion in forming instrument nouns in Icelandic or in forming action verbs in English. Reliance on this option dwindles or ceases if there is a more productive affix available (e.g. English -er), as children begin to use that option more often. In languages such as French, in which the word-based option is not productive for noun formation in the input, such preference for compounding or zero conversion is absent, and in fact
children do not seem to coin many words until they begin to use affixation.

These phenomena can be accounted for by the following guidelines that children presumably use in their early years in forming words.

(4) a. **Word-based options**: Use elements which are words in their own right.

b. **Productive types of options**: Use productive types of word-forming rules found in the input for the formation of each part of speech.

These two preferences are time-bound: children rely on them at an early stage of acquisition. They represent two kinds of limitations children initially have in using word formation rules—the elements used in word formation are limited to free morphemes, and children look at the productivity of word formation rule *types* (e.g. compounding) rather than particular devices (e.g. *man*).

As children identify more morphological options, including the use of various affixes, they begin to attend to the productivity of particular devices (e.g. *man*, *er*). At this later stage, children increasingly rely on the guideline stated in (5).

(5) **Particular productive devices**: Use particular productive devices found in the input.

These preferences work in the way described below. At Stage I, in which children know only words (no affixes), the only available options are word-based. If they are productive types of options as well (in forming the category of words that children are trying to coin), then these are the options that children choose. (In French, there is no such overlap between word-based options and productive types of options.) In Stage II, some affixes become available in children's lexicon. In Stage III, children rely on the most productive devices, shifting away from word-based options if they are not the most productive ones. It is not clear how rapid the transition from Stage II to III is.
3.2. Is There a Need for Other Principles?

Do the preferences proposed above cover all the guidelines that children bring to the task of word formation? A careful look at the data presented in LA shows that there is no convincing evidence for other kinds of preferences.

The above reformulation of Word-based options draws a line between compounding and zero conversion on the one hand and affixation on the other, and does not predict any differences among different structural types of affixes; the only differences predicted for different affixes come from productivity. The question naturally arises, do children have any guidelines for choosing one type of affix over another aside from productivity—specifically, an affix which requires no root change over an affix which does? In this respect, the findings reported in LA are not conclusive. It has been found that children learning Polish today do indeed prefer a suffix requiring no change in the root over one which requires a change; but the former is more productive than the latter anyway (p. 167), and therefore this preference might reasonably be attributed to productivity alone. Thus, it is not clear whether this property of affixes is really necessary as a factor determining whether certain affixes are easier to acquire than
Consider next the preference for a form specialized for one meaning (i.e., the meaning of a form having only one meaning is easier to identify). Examination of the data in *LA* suggests that there is no phenomenon which can be accounted for only by such a preference, and that there are some phenomena that run counter to it. This preference is discussed in relation to Hebrew and French agent and instrument nouns in *LA*. Hebrew, first of all, provides children with several options for forming agent nouns: zero conversion from the present tense form, compounding (with a slight modification of the noun root), -.an suffixation, and vowel intercalation in root consonants. Clark and Berman found that children initially rely on zero conversion, but soon begin to use -.an suffixation predominantly, with other word formation rules rarely used. Clark and Berman (1984) and Clark in *LA* account for the early reliance on zero conversion by appeal to Simplicity (my Word-based options), and for the later reliance on -.an suffixation by appeal to Productivity and Transparency (i.e. preference for a form specialized for one meaning). (The suffix -.an is the most productive among agent-forming devices and is the option used predominantly for agent marking). Note here, however, that the preference for a form with one meaning is not the only possible explanation; the reliance on -.an can also be accounted for by Productivity alone.

The acquisition of instrument nouns by Hebrew-speaking children casts further doubt on this alleged preference. For instrument nouns, the options are zero conversion, compounding, -.an suffixation, and ma-prefixation. Clark and Berman found that, except for the youngest group, Israeli children relied on -.an suffixation more often than the other options; they also appealed to compounding and the extended use of existing words, especially in the beginning; while ma- prefixation was rarely used. Clark and Berman account for the early use of compounding in terms of its formal simplicity, and the predominant use of -.an suffixation in terms of its productivity. The rarity of the use of

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2 As in Clark and Berman (1984) and Clark in *LA*, -.an suffixation here subsumes both the simple suffixation of -.an to a stem and suffixation plus intercalation of a vowel (*CaCC*-an).

3 Here ma- prefixation is meant to subsume the formation of both masculine ma-*CeCC* forms and feminine ma-*CeCC*-a forms.
ma- is accounted for by its limited productivity. At the same time, ma- is the option most specialized for instrument marking; yet this prefix is dispreferred here in spite of its putative advantage of being non-polysemous. This is good evidence for the unimportance of this factor.

Data from French can be accounted for without appealing to the preference for a form specialized for one meaning. According to Clark this preference would predict that the agentive suffix -eur should be learned earlier than -iste or -ien because the latter two, unlike -eur, are polysemous, having adjectival as well as nominal uses (cf. p. 162). This prediction is borne out by the data, but this fact can also be accounted for by a productivity difference alone (p. 191).

Thus, neither the Hebrew nor the French data provide convincing support for the preference for items specialized for one meaning. Unless some phenomena are found that can only be accounted for by the preference for items of this kind, such a preference cannot be held to exist (see also Bowerman (1985) for an examination of the alleged preference for “unifunctionality” in grammar; cf. Slobin (1985)).

In summary, the data presented in LA seem to be accounted for by three preferences that children have in choosing word formation devices: a preference for productive types of options, for word-based options, and finally for particular productive devices. There is no clear evidence for other kinds of preferences.


Another point that I would like to raise is the need to consider syntactic alternatives to word coinages. Clark states that children coin new words to fill gaps in their lexicon; that is, they create a new word for something they have no word for. Coining a new word, however, is not the only option that children can use. They can alternatively make use of syntactic options.

This fact is remarked on in LA. Clark notes that French-speaking children do not rely much on zero conversion to form new transitive

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4 Bowerman (1985) points out that one problem with Slobin's (1973, 1985) Operating Principles is the existence of several principles to account for the same phenomenon, and argues that the necessity for each principle must be carefully examined. What I have done in this section is similarly motivated.
verbs from nouns. Instead, she observes, they often use periphrastic, syntactic causative forms to talk about causative events for which they do not have appropriate verbs (p. 209).

Reliance on this strategy can be greater than one might think in languages in which zero conversion and compounding are rare in children. Japanese appears to be one such language.

In comparison to Clark's earlier Semantic Feature Hypothesis, there has been relatively little interest in Clark's theory of word formation among researchers on the acquisition of the Japanese lexicon (but see Matsumoto (1984a, b)). Why has this been the case? One reason appears to be the relative poverty among Japanese children of word coinages of the type Clark discusses.\(^5\)

The relative scarcity of word coinages of the type Clark deals with can be seen in the results of my diary study. I observed the development of words in my son Nobuyuki from 2:3 till 3:6. The following are all the novel word coinages that I have been able to observe. The first four are derived by suffixation, with -ya 'professional' (<'house') (indicating a person who by profession deals with the things denoted by the preceding noun) and -san (an ending for a term of address). The others are N-N or A-N compounds.\(^6\) All were pronounced by the child in a one-word accent pattern.

\[
(6) \quad \text{kuriimu-ya-san (cream—'ya'—'san')} \text{ 'a cream seller' (2:10;0)}
\text{booru-ya-san (ball—'ya'—'san')} \text{ 'a ball seller' (2:10;0)}
\]

\(^5\) In Matsumoto (1984a, 1984b), I argued that Clark's early formulations of word formation principles can also be seen at work in the formation of a kind of expression different from those studied by Clark, viz., numeral expressions consisting of a numeral and a classifier. Japanese has two series of numerals—free numerals (e.g. i\_ch\_i, ni, etc.), which are mostly Sino-Japanese in origin, and bound numerals (e.g. hi\_to-, fu\_ta-, etc.), which are native morphemes—and the choice depends on which classifier is added to them. I observed that children prefer to use free numerals where bound ones are called for, producing such expressions as it\_tsubu (for hi\_to-tsubu 'one grain of') or san-nichi (for mik-ka 'the third day'). I accounted for this phenomenon by an appeal to Clark's early formulation of transparency and regularization. In the reformulations suggested in the present review, this would be accounted for by the preference for word-based options. Contrast (i.e. one form per meaning) might also be involved, but it is highly doubtful that the children tested do not know that ichi and hi\_to- are semantically identical.

\(^6\) Adjectives in such compounds are in the stem (i.e. nontensed) form.
juusu-ya-san (juice-“ya”-“san”) ‘a juice seller’ (2:10;2)
oategami-ya-san (letter-“ya”-“san”) ‘a mailman’ (2:10;9)
papa-dokei (father-watch) ‘father’s wrist watch’ (2:11)
akachan-papa (baby-father) ‘a father of a baby’ (2:11)
shinkansen-yoochien (bullet.train-kindergarten) ‘a kindergarten to which children go on a bus that is shaped like a bullet train’ (2:11)
oshikko-ase (urine-sweat) ‘sweat that looks like urine’ (3:1;21)
hoso-tonbo (thin-dragonfly) ‘a damselfly’ (3:1;22)
ao-tonbo (blue-dragonfly) ‘a blue dragonfly’ (3:1;22)
kaeru-tonbo (frog-dragonfly) ‘a dragonfly nymph’ (3:1;22)
madara-kaeru (stripe-frog) ‘a striped frog’ (3:1;22)
sukii-jidoosha (ski-car) ‘a car which has skis placed on its ski rack’ (3:3;15)
appuru-juusu-koohii (apple-juice-coffee) ‘a coffee that tastes like apple juice’ (3:4;16)
jiensha-sukii (bicycle-ski) ‘a snow scooter’ (3:4;24)
raion-usagi (lion-rabbit) ‘a rabbit that looks like a lion’ (3:6;20)

All these cases of compounds serve to express subcategories. (There was a sudden increase in the use of established and novel compounds for subcategories around 3:1;20 when Nobuyuki began to ask for names for subcategories.) What is noteworthy is the lack of agent and instrument nouns comparable to wash-man and fix-thing, which were prevalent in Damon’s speech. (The nouns in -ya-san are not regarded as agent nouns here, in that they are not related to action verbs.) Also noteworthy is the complete lack of verbs derived from nouns through zero conversion.

How did Nobuyuki otherwise fill lexical gaps in his repertoire of nouns, then? One option he used from an early period for expressing meanings comparable to English agent and instrument compounds was to have recourse to relative clauses. Examples include the following (see Okubo (1984: 66) for similar examples):

(7) utsu hito (hit person) ‘a person who hits; a batter’ (2:3;26, etc.)
nageru hito (throw person) ‘a person who throws; a pitcher’ (2:3;26, etc.)
“baan”-tte yaru yatsu (“baan”=Quot do thing) ‘a thing with
which to do “bang”; a bat’ (2:3;26, etc.)

*hakaru yatsu* (measure thing) ‘a thing with which to measure; a ruler’ (2:9;20)

*n-san-kiro=kana=tte miru yatsu* (what-kilo=Q=Quot see thing) ‘a thing with which to see how many kilos; a ruler’ (2:9;20)

*koko=ni “pan”=to yaru yatsu* (here=Goal “pang”=Comp do thing) ‘a thing with which to do “pang” here; a lid’ (2:11;5)

*osu toko* (push place) ‘a place to push; a switch button’ (2:11;14)

“*pyon”=tte yaru yatsu* (“*pyon”=Quot do thing) ‘a toy that jumps’ (3:6;20)

Some of these may look superficially similar to English compounds like *wash-man* and *open-thing*, but in Japanese they are well-formed NPs involving a normal relative clause.

Nobuyuki also used the genitive construction (*N=no N*) to refer to subcategories, where English-speaking children would typically use compounds (e.g. *orange trees*). 8

(8) *uma=no buubu* (horse=Gen car) ‘a car of a horse; a carriage’  
(2:10;8)

*hikooki=no untenshu* (plane=Gen driver) ‘a driver of a plane; a pilot’ (2:11;13)

*kaeru=no ki* (frog=Gen tree) ‘a tree of frogs (a tree which has frogs instead of leaves)’ (3:0;10)

In order to fill in lexical gaps in his repertoire of verbs, Nobuyuki again used syntactic options, and in particular dummy verbs like *suru* ‘do’, *yaru* ‘do’, or *iu* ‘say’ with onomatopoeic expressions, often with direct sound imitation or quotation. 9 Examples include the following

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7 In uttering this, Nobuyuki reveals his confusion of the units used for measuring weight and length.

8 The Kokuritsu Kokugo Kenkyuusho corpus of the speech of one Japanese-speaking child on his second birthday (Kokuritsu Kokugo Kenkyuusho (1982)) contains examples like *batta=tte yuu mushi* (grasshopper=Quot say insect) and *batta=no mushi* (grasshopper=Gen insect) to refer to grasshoppers as a subcategory of insects.

9 See Poser (1992) and Matsumoto (1996b) for the phrasal nature of *suru* periphrastic verbs in adult Japanese grammar.
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(see also the examples with yaru in (7)):

(9) acchi=no ho=ni “uu-uu” tta (there=Gen direction=Goal “woo-woo” said) '(speaking of a patrol car going past) It went away like “woo woo”.' (2:3;25)

okuchi=no naka=ni “ton”=tte yatte, ... (mouth=Gen inside=Goal “ton”=Quot do) ‘poking a skewer into my mouth, ...’ (2:8;16)

nyoro-nyoro guuru shi-yoo (“nyoro-nyoro guuru” do-Hort) ‘Let’s make the toy rails go meandering around.’ (2:9;6)

poozu-kachi shi-yoo (“Pose! (=“Smile!”)”-“click” do-Hort) ‘Let’s take a picture.’ (2:9;9, etc.)

“rin-rin kan-kan rin-rin kan-kan”=tte iw-anai=ne. (“rin-rin kan-kan rin-rin kan-kan”=Quot say-Neg=SFP) 'It’s not ringing! (noting that the chapel bell is not ringing)' (2:10;27)

There are several factors contributing to Japanese children’s preference for syntactic options for filling lexical gaps. Japanese does not have the option of zero conversion for verb formation, and thus zero derivation is not a productive type of option for Japanese children in forming verbs. Japanese does have several options for deriving agent and instrumental nouns from verbs (see Nagashima (1980) for some discussion). Renyookei nominalization (the use of a particular verbal inflectional form for nominalization) is commonly used for forming action nouns (e.g. nusumi ‘stealing’ < nusum-u ‘steal’) and nouns indicating produced object (e.g. kotae ‘answer’ < kotae-ru ‘answer’), but it can also be used to form agent nouns (e.g. yopparai ‘a drunkard’ < yoppara-u ‘get drunk’) and instrument nouns (e.g. hasami ‘scissors’ < hasam-u ‘put in between’). Japanese also has an agent-forming suffix -te (derived from the noun te ‘hand’), which is suffixed to the Renyookei form of a verb (e.g. utai-te ‘singer’, uri-te ‘seller’). Other options include N-V compounds for instrument nouns (e.g. tsume-kiri (nail-cut) ‘nail clipper’), and V-N compounds for agent and instrument nouns (e.g. odori-ko (dance-girl) ‘dancer’, keshi-gomu (erase-rubber) ‘eraser’) (in both of which V takes the Renyookei form). Among these, N-V compounding is probably the most productive option for

10 There are also several different Sino-Japanese agent morphemes that may be suffixed to Sino-Japanese verbal nouns: -sha (e.g. roodoo-sha ‘worker’), -shi (e.g. soojiu-shi ‘pilot’), -shu (e.g. unten-shu ‘driver’), and -fu (e.g. sooji-fu ‘janitor’).
instrument nouns, and -te suffixation, for agent nouns, although I do not have solid evidence to back up this intuition of mine. In any event, what is clear is that Japanese children do not in fact make use of such morphological means to create novel agent and instrument nouns.

One important reason for the non-use of morphological options for talking about agents and instruments might be the early availability of syntactic means—genitive constructions and relative clauses—for describing things and people in Japanese. Japanese children’s preference for using the genitive construction is well known. The genitive N=no N’ construction appears at the two-word stage, first in the narrow possessive meaning but soon in other possible senses (the range of meanings is somewhat similar to that of English of). Some children even overgeneralize the genitive pattern to relative clauses, marking relative clauses with -no (i.e. [relative clause]=no N; see Clancy (1985)).

Japanese children also begin using adult-like relative clauses earlier than English-speaking children. Unlike English-speaking children, who often start out with structurally impoverished forms of relative clauses (e.g. This is my did it; Hamburger and Crain (1982)), Japanese children begin to use adult-like relative clauses early in the first half of the third year (Clancy (1985), Okubo (1984)). (In Okubo’s (1984: 46) data, 3 percent of the verbs used by the child between 2:0 and 3:6 occurred in relative clauses. There are no comparable statistics for English.) The early use of relative clauses usually consists of a single verb preceding a head noun, like some of the examples in (7) above. The early use of examples like hakaru yatsu (measure thing) ‘a thing with which to measure’ in (7) is impressive, especially since its English counterpart is clearly beyond the capacity of 2-year-olds. There are a couple of reasons that adult-like relative clauses are relatively easy to produce in Japanese: Japanese relative clauses do not have a relative pronoun, and they are positioned prenominally, just like all other modifiers of the noun. For these reasons, relative clauses with a single verb preceding the head noun look very much like simple adjectival modification.\(^{11}\)

\(^{11}\) The early use of adult-like relative clauses by Japanese children does not necessarily mean that these children have an adult-like knowledge of the structure of relative clauses. The acquisition of relative clauses in Japanese is a long process extending over several years, just as in English (see, for example, Hakuta (1981)).
Thus, these syntactic means for filling nominal gaps in the lexicon are available to children from early on. As syntactic rules, such means are fully productive and use words as their input; hence use of these options is highly advantageous.

The syntactic means for expressing verbal meanings described above are also available to Japanese-speaking children very early. Japanese-speaking children as young as the age of 2 are known to precociously produce verbal complements with *iu* ‘say’ to quote speech or report sound (Clancy (1985: 382)). The use of onomatopoeia is also common in children (Okubo (1981)), as well as in baby-talk. Okubo (1981) further notes that the child she observed produced many onomatopoeic expressions (appearing alone in the sentence, not as a verbal complement) in order to compensate for the poverty of his verbal vocabulary.

The early preference for using syntactic means in expressing verbal meanings is also congruent with the typological nature of Japanese. In his study of lexicalization in motion verbs, Talmy (1985) argues that English tends to lexicalize manner of motion in the verb, while Japanese tends to express manner independently by adverbial means (e.g. *tobo-tobo aruku* (“tobo-tobo” walk) ‘plod’; see also Matsumoto (1996a)). This is true of other lexical domains as well. For example, English has a number of verbs expressing manner of speaking (e.g. *shout, murmur, whisper, cackle*), while Japanese has only a few, with manner usually expressed adverbially, often via onomatopoeia (e.g. *hiso-hiso hanasu* (“hiso-hiso” talk) ‘whisper’). Thus, the division of labor between lexicon and syntax differs between Japanese and English.

Children are known to be sensitive to such typological differences in lexicalization quite early (Choi and Bowerman (1991)). In a language like Japanese, then, children might well rely on syntactic means to fill gaps that would be filled by lexical means in languages like English. The rarity of compounds or zero conversion would thus be causally related to the early use of syntactic options. It is thus interesting to explore which causes which—does the non-dependence on compounding and zero conversion make children choose syntactic options, or does the availability of syntactic options lead children not to choose morphological options? A more systematic cross-linguistic study would reveal how the availability of syntactic options relates to children’s use or non-use of compounding and zero conversion in different languages including Japanese.
5. Conclusion

In this review article I have looked at the principles of word formation that children use. I pointed out that Clark’s discussion in LA suffers from unfortunate inconsistencies and redundancies partly because of the changes she has made in her formulation of these principles in the past. I presented alternative principles and also pointed out one factor—syntactic alternatives to word coinages—that might be examined further in obtaining a clearer picture of children’s word coinages.

The points I have made are in no way intended to detract from the value of the work reviewed. The phenomenon of lexical innovations in children is clear evidence for children’s active role in the construction of language. This fascinating phenomenon could never have been brought to light on such a scale without Clark’s work. It is hoped that more data will become available to distinguish the effects of the various principles that children use, so that one can better understand the mystery of these prodigious language makers.

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