

No verb is an island
Negative evidence on the Verb Island hypothesis

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Abstract

The Verb Island hypothesis (Tomasello, 1992) is a theory of how children develop verbal argument structure constructions. It claims that young children's verbs are islands, each developing its own mini-syntax independently of other verbs. Simple patterns are learned by imitation; more complex ones develop from the simpler antecedents for each verb separately. Recent research findings do not support the insularity hypothesis, showing considerable inter-item transfer in children's earliest syntax. The present study tested the second claim of this theory regarding the construction of complex schemas from simpler antecedents. The original analysis of searching the Travis corpus for antecedents of 3-word sentences was repeated, concentrating only on novel verbal argument constructions. The results showed that 40% of the verbs in novel SVO constructions had no antecedent uses in the corpus, and none of the VIO patterns had. Regardless of the presence or absence of antecedent paradigms, the development of the SVO pattern for new verbs was facilitated by other verbs previously learned in the same syntactic construction. The findings make it unlikely that more complex verbal argument structure constructions develop by combining less complex constructions for the relevant verbs. New constructions are probably learned from the linguistic input, the learning task facilitated by transfer from the syntax of other verbs. Apparently, children's developing grammar is not a collection of verb-islands but a system from day one.

No verb is an island: Negative evidence on the Verb Island hypothesis

Verbal argument structure constructions

The Verb Island hypothesis (Tomasello, 1992) is a theory of how children develop verbal argument structure constructions. A verbal argument structure construction is a sentential schema for the expression of a verb and its valency-required lexical complements or elaborators (Allerton, 1982; Halliday, 1967; Hudson, 1990; Matthews, 1981; Quirk, Greenbaum, Leech, & Svartvik, 1972). As a prototypical example we might take a three-element sentence schema consisting of a verb and its subject and direct object, the English subject-verb-object transitive frame, as in the sentence 'Oliver damaged the key'. Allerton (1982), from whom this example is taken, calls these constructions "verb valency structures". Hornby (1945), one of pioneers of the systematical listing of English verbal argument structures, calls them "verb patterns". In the tradition of Construction Grammar, these schemas are called "constructions" (Croft, 2001; Goldberg, 1995; Kay & Fillmore, 1999). There are major crosslinguistic differences in the valency-required constructions of different languages; in particular, the constructions used in ergative, active and focus (Philippine) languages are inherently different from the set around which the syntax of nominative/accusative languages like English is organized. The typological variety does not cause complication in theories of language acquisition that assume that children learn their grammar from the linguistic environment rather than from their genes. As the problems of explaining the development of verbal argument structures in children is the same regardless of language type, in the following the discussion will stay with the familiar accusative patterns.

A verbal argument structure construction is defined the same regardless of the degree of elaboration of its nominal or noun-phrase elements. Namely, a sentence in which an intransitive verb occurs with its single valency-complement, the subject, is regarded as the same verbal argument construction whether the subject is a single-word pronoun, an elaborately modified noun or a complex multi-word noun-phrase with a subordinated relative

clause. In terms of a constituent-structure grammar, the entity fulfilling the role of the verbal argument is an NP, whatever its internal composition. Similarly, adverbial elements modifying the verb, verb-phrase or sentence do not alter the verbal argument-structure expressed in that sentence; they only increase its structural complexity.

There are, according to Allerton (1982), Hornby (1945) and Levin (1993), about 25-30 formally different verbal argument structure constructions in English. All but a tiny minority employ nominal phrases as the lexical expressions of the required verbal arguments. The most basic constructions are the subject-verb (SV), subject-verb-object (SVO) and subject-verb-indirect object-direct object (SVIO or SVOI) constructions, representing, respectively, monovalent, divalent and trivalent verbal patterns. These are also the earliest-learned by young children, and the target of the majority of the attempts to explain the processes by which children come to master verbal syntax.

Item-specific learning in early grammars

The Verb Island hypothesis was constructed as a new way to account for the well-known lexical-specific application of grammatical rules in young children's speech. Since the early days of the modern study of child language, researchers have repeatedly pointed out the piecemeal, item-specific nature of early grammatical learning, displayed in the lack of uniformity in the morpho-syntactic frames in which different verbs appear in the same period.

The relevant grammatical patterns for which this phenomenon has been documented in the seventies and eighties of the last century include verb-morphology such as inflection for tense, aspect, and person (Berman & Dromi, 1984; Bloom, Lifter, & Hafitz, 1980); wh-question constructions (Bloom, Merkin, & Wootten, 1982; Forner, 1979; Klima & Bellugi-Klima, 1966; Kuczaj & Brannick, 1979); constructions with complement-taking matrix verbs getting *to* infinitives and other connectives (Bloom, Rispoli, Gartner, & Hafitz, 1989; Bloom, Tackeff, & Lahey, 1983); argument structures and syntactic multiword constructions (Bowerman, 1976; Braine, 1963; Clark, 1978; Gropen, Pinker, Hollander, Goldberg, & Wilson, 1989; Maratsos, 1983; Ninio, 1988; Pinker, 1984; Slobin, 1985). It was agreed in the

field (at least among empiricist, non-nativist authorities) that initially, young children learn grammatical rules for specific words in a piecemeal fashion, and that their grammar does not show the uniformity of application over all lexemes which is expected from general and categorical knowledge.

On this background, Tomasello (1992) constructed a radical hypothesis according to which verb-specific knowledge implies the absence of connections between different verbs in the child's linguistic system. This is the Verb Island hypothesis, so called in order to emphasize the insularity of participant items and the absence of system characteristics of young children's grammars and of the routes by which their grammar develops. The central domain of development to which this hypothesis applies is the development of verbal argument structure constructions.

Early syntactic development according to the Verb Island hypothesis

The Verb Island hypothesis is a two-stage theory of the development of verbal argument structure constructions. Its major claim is that for a considerable time in which children produce verbal argument structure constructions, their knowledge is completely lexically based; that is, tied to particular verbs. Children's grammar is insular, namely, each verb is its own island of organization in an otherwise unorganized system. Verbal grammar is an inventory of independent item-specific verbal argument structure constructions, lacking any measure of generality and connectedness which would make it into a system. Only at a second and later stage do children develop abstract categories and constructions, and construct an interconnected verbal system.

At the insular stage of development, children are thus said to possess an inventory of item-specific schemas, each defined by the specific predicate involved. Each "verb island" construction has its own mini-syntax with its own semantic roles for the expressed arguments of the verb, dependent on the specific verb involved and its semantics. For example, the verb 'spill' has a preverbal position for the person doing the spilling and a postverbal position for the thing spilled. The specificity of these semantic roles is the reason why, according to the

Verb Island hypothesis, children cannot generalize the mini-syntax of one predicate to another, or of an old verb to a novel verb: they lack the general semantic roles 'actor', 'patient' and so forth that would apply to the old and the new verbs equally (Tomasello & Brooks, 1999).

The lack of contact between different verbs is a major component of the theory. As Tomasello (2000) says in a summary of the Travis case study,

"[A]t any given developmental period each verb was used in its own unique set of utterance-level schemas, and across developmental time each verb began to be used in new utterance-level schemas ... on its own developmental timetable irrespective of what other verbs were doing during that same time period." (p. 68).

The picture is of independent and "insular" lexical items proceeding on their own developmental route, irrespective of what else is happening to other verbs in the child's developing grammar.

According to the Verb Island hypothesis, the development of item-specific constructions involves two different, sequentially ordered, learning processes. First, in a pregrammatical phase, children learn by imitation simple two-word schemas centered on specific verbs as pivots, often with an open slot or variable element for the nominal. These word-combinations are non-syntactic in nature, representing two-element partitioning of events rather than productive symbols.

As a second step, children construct more complex verbal argument structure constructions for individual verbs by adding a new argument to a simple schema or by combining two or more of the simple schemas learned previously for the same verb. According to the theory, the antecedent schemas on which the more complex constructions are based are not mere fragments of grammatical constructions: Just like the result is a full sentential schema, the antecedents, too, must be fully usable speech acts (Tomasello & Brooks, 1999, p.178).

This process is said to operate not only in the generation of complex verbal argument structure constructions but in the composition of more complex sentence schemas in general: the modifying operations consist of combination, addition, substitution and reordering of less-

complex sentential schemas already mastered by the child for the same predicates. This component of the Verb Island hypothesis is very similar to Piaget's constructivist model of development (e.g., Piaget, 1952). The strict constructivist element of the theory resurfaces in the more recent Usage-Based Theory of syntactic development (e.g. Tomasello, 2000), where "cutting and pasting" sentences the child has previously said (her "stored linguistic experience") is claimed to be the single productive process generating children's longer utterances.

The Verb Island hypothesis thus makes two radical claims: strict insularity of lexical items, and strict constructivism of developmental processes. The two claims are interlocked into a coherent whole: the developing lexical verb is said to "know" only its own antecedent grammatical behavior, but it is "blind" to the already-learned grammar of other verbs. Learning can only be "vertical", from the more simple specific alternative to its more complex relative, but not "horizontal", from a similar construction already learned for a different verb. Blindness for other items and their grammar thus blocks transfer of learning and facilitation, and effectively removes similarity and analogy as possible sources of new knowledge at this stage of the developing grammar.

The theory explicitly compares the predictive value of the two potential sources of facilitation, namely, the verb's own past use and the use of other verbs in the same construction:

"Overall, by far the best predictor of T's use of a given verb at a given time was *not* her use of other verbs at that same time, but rather her use of the same verb at an immediately preceding time" (Tomasello, 1992, p. 256, italics in the original).

Thus the conclusion reached on the basis of the evidence of the T corpus is that the grammar learned for other verbs does not serve as input to the learning process by some possible mechanism of similarity, analogy, or item-based transfer of learning.

In addition, the learning process implied by this vision of development considerably devalues the linguistic input as a source of knowledge and the target of learning processes. It points to processes of small alteration and modification of previously mastered grammatical skills pertaining to the relevant specific lexeme as the way of constructing novel syntactic

patterns for it, and de-emphasizes the possibility that the child learns such novel patterns from the input, in which the relevant structures are invariably presented to the child. The difference may be seen as one of emphasis rather than of essence, but it bears serious consequences for the definition of the learning processes involved in the mastery of novel patterns. An input-oriented theory would treat the sentences modelled in the input with the relevant verb as the major source of learning, with already learned simpler patterns for the same verb as a possible facilitating factor, reducing the amount of new material to be learned. The Verb Island hypothesis treats the adult model as inherently unlearnable; it can be learned only on condition the child already knows to produce it from her own resources. In the phrasing of Tomasello (1992, p. 237), in order for the adult model to contribute to the child's linguistic system, the child has to be able first to comprehend the model sentence, using essentially the same cognitive operations she would have used to produce it herself. Thus even in the rare instances when the child appears to have learned some pattern from the input, appearances are misleading; in fact she is already able to produce the same sentence herself. It needs no saying that adult speech is not the source of the cognitive operations that underlie the production of sentences in this theory.

Evidence challenging the claim of insularity of early syntactic development

Recently much evidence has accumulated that does not support the insularity element of the Verb Island hypothesis. The contradictory evidence consists of the demonstration of considerable inter-item transfer and facilitation in the children's earliest syntactic system (e.g., Abbot-Smith, Lieven & Tomasello, 2002; Childers & Tomasello (2001); Kiekhoefer, 2002; McClure & Pine, 2002; Ninio, 1999; Savage, Lieven, Theakston & Tomasello, 2002), a phenomenon which is not supposed to happen according to the central claim of inherent insularity in the Verb Island hypothesis. For example, McClure and Pine (2002) showed that verbs learned after children reach the MLU of 2.0 generate, when first used, more complex utterances in terms of MLU and the number of verb-arguments expressed than the starting utterances of verbs learned earlier. This study demonstrates that the general level of syntactic

knowledge a child has at the time a new verb is learned influences the specific syntactic knowledge she learns of an individual verb's combinatorial possibilities. Abbot-Smith et al. (2002), Childers and Tomasello (2001) and Savage et al. (2002) showed that presenting young children with many transitive sentences in a very short time brings about considerable productive use of novel or nonce verbs in transitive constructions, without the children having first heard these test verbs in a transitive sentence. Apparently, children at the earliest stages of producing combinatory speech are well able to transfer to novel items knowledge gained through the enhanced modelling of a syntactic construction for some items. Finally, Ninio (1999, in press), Kiekhoefer (2002), Ninio and Keren-Portnoy (2002), and Abbot-Smith and Behrens (2003) showed that the more verbs children already know to combine in a certain syntactic pattern, such as the subject-verb-object or the ditransitive constructions, the faster they learn new ones in the same pattern. Apparently children's lexically specific, item-based learning of individual word-combinations for some verbs facilitates the lexically specific, item-based learning of a similar construction for other verbs. The Kiekhoefer (2002) and Abbot-Smith and Behrens (2003) studies and their findings are especially convincing since the studies used the corpora of two children, one learning English and the other German, whose observations were unusually dense: The children's speech was recorded five days a week for one hour each time during the relevant period. As Tomasello (2002) pointed out, high-density sampling provides an unusually robust and reliable basis for estimating the important developmental phenomena of age and order of acquisition.

It might be summarized that the recent findings display considerable inter-item transfer and facilitation in the children's earliest syntactic system and do not support the insularity claim of the Verb Island hypothesis.

Examining the strict constructionism of early syntactic development

In view of the counter-evidence to the insularity component of the Verb Island hypothesis, the question is what should be the fate of the second and interlocking claim of this theory regarding the strict constructionism of syntactic development. According to this component

of the Verb Island hypothesis, children compose their more complex sentences using structural schemas they have previously used in less complex sentences with the same verbs, by making minimal changes in them. In the case study on which the derivational component of the hypothesis was first tested (Tomasello, 1992), the author reports on a remarkably high success of the suggested method of syntactic derivation to account for the child's sentences.

The case-study is a diary study of Travis (T), Tomasello's daughter acquiring English whose every multiword sentence was recorded from her first word combinations at 1;3.20 until the age of 1;8;08. The study was carried out in order to document the child's acquisition of verbal syntax, covering not only verbs proper but also other kinds of predicate words such as prepositions which are treated as equivalent to verbs in this study. The hypothesis that T derived her more complex sentences from less complex sentences using the very same verbs was tested by collecting all the sentences of more than two words that she produced until 1;8.08 and tracing down the previous paradigms in which the same verbs appeared. There were 271 sentences in this database, and the summary was that "roughly 92% of T's first three-or-more-word sentences involved only a single simple change from previous sentences with that same verb" (p. 236). Another 4% of the sentences could also be traced to their more simple sentential antecedents but involved more than one changing operation. Only 4% of the whole corpus could not be traced to an antecedent use of the same verb in a less complex sentence.

The results of this study are extremely compelling, and they seem to stand in direct contradiction to the findings mentioned earlier that show a large degree of interconnectedness, transfer and facilitation in the earliest syntactic systems. If children indeed use transfer of learning from one verb to another in developing their syntactic patterns, it is unlikely that virtually all complex, three-or-more-word sentences can be attributed to antecedents utilizing the same verbs only. Under the assumption that transfer and facilitation from one verb to another is a central developmental process in the relevant period, we would expect that a considerable number of complex verb argument constructions emerge directly as such, without the child first expressing their separate components in partial argument constructions. The results of this study seem at first blush to be irreconcilable with the

evidence of other studies about the presence of transfer and facilitation in the development of verbal argument structures in the relevant developmental period.

However, a closer examination reveals that the estimates cited above, i.e., that 92% of T's first three-or-more-word sentences involved only a single simple change from previous sentences with that same verb, do not by themselves illuminate the process by which the child developed her argument structure constructions. The reason is that the majority of the three-word sentences the estimate was based on did not represent an innovation in the verbs' argument structure construction. According to the statistics provided in Table 8.3 of Tomasello (1992, p. 236), 177 of the 271 sentences, or about 66% of the total, were different from previous ones only in the nominal expression used as subject or object of a verb but not in the number of arguments per verb expressed in the utterance. About a further 73 or 27% of the sentences differed from previous ones only in the addition or elaboration of an adverbial element. Some of these changes do increase the grammatical complexity of the utterance (e.g., when a noun phrase is enriched by the addition of some modifier) but without turning the verbal argument structure into a more complex one. In other words, 93% of the changes involved in T's three-word utterances developing from previous paradigms with the same predicates are not directly relevant to the question how she arrived at her more complex verbal argument structure constructions and whether it was invariably on the basis of previously existing paradigms with a smaller number of arguments expressed. In order to throw light on the route by which the child derived her verbal argument structure constructions, it is necessary to focus exclusively on the sentences that represent a change and an increase in the verbal argument structure construction used with a particular verb.

The aim of the present study was to return to the T corpus and repeat the analysis by retracing the antecedents of three-and-more-word utterances, focussing this time explicitly on the emergence of verb argument structure constructions. The basic methodology consists of identifying those sentences in T's three-and-more-word corpus in which there are two or more syntactically expressed verbal arguments in the same sentence, and which are the first time the child produced such a type of sentence with the same verb. Then, for each innovating sentence the total corpus as presented in the Appendix of Tomasello (1992) will be searched

for more simple antecedent paradigms in which the same verb is expressed with only a single verbal argument (or with two, in case we find any innovative sentences in which three arguments are expressed). This in order to compute the percent of cases in which complex argument structure constructions are built on previously used less complex antecedent paradigms. The decision to search the corpus afresh was motivated by a desire to apply strictly formal criteria to verbal arguments, since Tomasello (1992) used semantic definitions such as 'actor', 'object' and so forth, rather than syntactic ones such as 'subject' or 'direct object', to define argument types.

Method

Subject and language recording

Travis (T) is the child whose development is reported in Tomasello (1992). Tomasello's was a diary study concentrating on emergent patterns; all utterances which were not identical verbatim to already recorded ones were included. T's speech was recorded daily by her parents who in addition made 60-minute long audiotaped and videotaped recordings of her speech once a month. Both were annotated with contextual comments. The start of the systematic recording was at 1;0, and continued till 1;11.0. Until 1;8.8 every sentence was recorded, thereafter only if its structure was more complex than that of those produced previously. As the focus of the study was the emergence of the syntax of the verbs and other predicates, purely nominal utterances (as in labelling statements) were excluded, and single-word utterances were not systematically recorded. With the exception of perfect repetitions of the same expression in the same context, the data base is close to a complete record of all T's multiword sentences involving some predicate word.

All the recorded utterances are reported in the Appendix of Tomasello (1992), arranged by the predicate words around which the sentences are built. The record in the Appendix provides the date of production and contextual notes for each sentence.

Data analysis

The source for the following analysis was Table 8.2 of Tomasello (1992) (pp. 230-232) in which all T's sentences of more than two words up to 1;8.8 are listed. In this table, repeated

instances of exactly the same sentence type with a change only of the specific nominal complement (i.e., 'door' instead of 'window' as the direct object of 'close') are not registered separately but rather their number is given in parenthesis next to the first sentence of this type that T ever produced. The first three-or-more-word sentence was produced at 1;6.24, so the period of dense recording on which Table 8.2 is based lasted about a month and a half. Including the repetitions mentioned above, the total number of different sentences of three words or more produced by T in this period was 271. For each sentence type, this table also lists the previous and less complex paradigms in which T had used the same predicates prior to the present utterance.

The first step of the present analysis consisted of searching the table for sentences in which verbs are expressed with two or more of their valency arguments in a single clause. These were then classified into types of valency constructions such as SVO, VIO and so on.

For each sentence, the corpus as presented in the Appendix was searched for antecedent and less complex sentences with the same verb, thus double-checking the original search for antecedents.

The definition of what are grammatical arguments of the verb was slightly more strict than in Tomasello (1992) as the latter used semantic rather than syntactic definitions to define argument types. In particular, vocatives preceding verbs in the imperative were not considered grammatical subjects even if they referred to the potential actor of the request, as in the sentence, "Daddy, give me a book". In concrete terms, the impact of switching to formal syntactic definitions was the exclusion from the data base of SVO sentences of two utterances with vocatives which had been included in Table 8.2. They are copied here with the original ages and contextual notes:

- | | | |
|---------|------------------------|--|
| 1;07.21 | Daddy have this wallet | (Holding his wallet, wanting him to have it) |
| 1;07.22 | Daddy open this top | (medicine bottle (wants off)) |

Travis used many vocatives with her requests during this period. When the addressee was not the potential actor of the requested action, the vocative was usually clearly marked as such in the corpus, for example:

- | | | |
|---------|-------------------|-------------------------|
| 1;07.26 | Maria!...Have-it. | (wants chalk Maria has) |
|---------|-------------------|-------------------------|

1;07.26 Daddy, have the bottle (requesting bottle from Daddy)

The exclusion of the utterance 'Daddy have this wallet' from the SVO list turned a later descriptive utterance with the same verb, namely, 'Girl have that umbrella', into the "starting sentence" of SVO with this verb. The exclusion of the utterance with 'open' from the SVO list removed the verb 'open' from the list as there were no other recorded SVO sentences with this verb in the corpus before observations ceased.

Word-segmentation decisions of the original were respected. Thus, the analysis follows Tomasello's decisions about segmentation, e.g. apparently unsegmented verb-clitic combinations like *get-it* are considered single words and not two-word combinations. This principle was strictly followed in the present study and especially in the search for potential antecedent paradigms, so that a verb-clitic combination was not considered a verb-object syntactic combination, neither in the definition of SVO sentences nor in the definition of antecedent VO sentences. In concrete terms, there was only one case in which the original included a verb-clitic antecedent as a verb-object combination but excluded in the present reanalysis and that was the case of treating "Do-it" as the verb-object antecedent of "Weezer did it". In fact, this sentence is not a valid antecedent either because the verb stem is in a different tense-form than the verb of the SVO sentence. Different tense-forms are, in general, considered a different "verb" for the present analysis. Thus, Tomasello (1992) lists 'make' and 'made', 'eat' and 'ate' and so on, as two different verbs in the Appendix. This principle is violated in the original in the case of 'do' and 'did', but remedied in the present reanalysis.

As in the original analysis, unsegmented verb-clitic combinations like *get-it* are considered equivalent to the clitic-less forms, i.e., *get*. No changes were made in the original decisions to treat a two-word pattern as an antecedent of a three-word one just because the complex pattern had the clitic-less verb form and the antecedent the verb-clitic form. There is no formal criterion that could decide whether or not this decision is correct; the decision has to do with the theoretical presuppositions of the researcher on what counts as a similarity-class in early child language. As with other methodological decisions, the reanalysis followed the insights of the original investigator and considered *get-it* and *get* as free variants of the same word.

The present reanalysis defined 'antecedent' as produced up to a day before the target complex sentence. Simplex constructions produced on the same day as the complex one did not count as its antecedent. In the reanalysis this affected only one pattern, the SVO sentence 'Cinnamon lick-it hands'. Table 8.2 had 'Lick-it X' as an antecedent verb-object construction to this sentence but the Appendix lists the two-word pattern as first produced on the same day as the SVO one and thus it does not count as an antecedent. Similarly, on the same day T also produced a subject-verb combination with the same verb, 'Travis lick-it', which also does not count as an antecedent. This makes no difference to the analysis as the SV sentence was not listed in Table 8.2 either.

It is unclear if the criterion defining 'antecedent' as being produced up to a day before the target complex sentence is a correct one. Constructing a novel syntactic pattern is not a momentary process but sometimes a quite prolonged one (Braine, 1963). It is possible that simplex components of the novel sentence frame that first appear only a day or two before the complex sentence is produced in its entirety should not be seen as independently existing sentence schemas. For example, the first sentences in the VO pattern 'buy X', namely 'Buy this plum', 'Buy this sponge' and 'Buy Weezer cat', were all produced only one day before the SVO pattern 'Daddy buy this' (which was a declarative sentence rather than an imperative like the VO sentences). It is possible that these sentences should better be seen as part of, rather than preceding, the construction of the SVO pattern. Similarly, 'X made' was produced only 4 days before the first SVO sentence. In the present study, both cases are counted as antecedent patterns, regardless of the short time they preceded the SVO sentence.

Results and Discussion

Antecedents to the SVO transitive constructions

Before the systematic observations ended, T produced 19 sentences which expressed a subject-verb-object transitive pattern (with sometimes additional elements) for different verbs. She also produced a single sentence with a subject-verb-adjectival complement pattern which is similar enough to SVO to be included in the series. This made a round 20 sentences of this type.

Insert Table 1 about here

Table 2 presents the summary statistics concerning the existence of antecedent paradigms for the SVO sentences.

Insert Table 2 about here

It appears that a total of 60% of T's subject-verb-object sentence types had two-word antecedents of the components of SVO. Half of the verbs generating SVO sentences appeared previously in VO constructions, making VO the most likely previous paradigm occurring before SVO for specific verbs. By comparison, only 15% of the verbs generated SV sentences previously, including the one verb with both a VO and an SV antecedent.

Unexpectedly, a full 40% of the verbs appearing in the SVO pattern had not been used at all by T in combination before the first SVO sentence. A separate check revealed that these verbs were not recorded at all in T's speech before the SVO sentence, namely, they were not used in single-word utterances either, before the SVO sentence. Their antecedent-less emergence is the more surprising in that it happens so early in the development of this construction: Already the 3rd and the 4th verbs forming SVO sentences had neither SV, VO, nor single-word antecedent paradigms.

It seems that prior use by the child in a simple paradigm is not a necessary condition for a verb to develop an early SVO construction. In fact, such a past use confers no more than a slight advantage on the relevant verbs over previously unused verbs for the privilege of being among the first 20 verbs to develop an SVO pattern. Moreover, the "precedented" and "unprecedented" constructions distribute quite randomly among the first 20 SVO patterns, showing that the possession of a simpler paradigm with the same verb does not translate to an earlier acquisition even among the set of the earliest-learned verbs themselves.

The present estimate of 40% of new patterns directly learned from the linguistic input and not from antecedent constructions is ten times higher than the 4% estimated in Tomasello (1992). This finding makes it unlikely that in Travis's early speech, constructions with two or

more verbal arguments such as SVO, develop invariably as an extension of an existing one-argument pattern such as SV or VO for each verb separately, on an individual basis. In other words, when we focus specifically on the development of verbal argument structure constructions, Travis's data does not support the Verb Island hypothesis. Forty percent is a very high percentage of novel verbal constructions not based on previous paradigms if the theory considers the latter the almost exclusive source of new verbal syntactic knowledge in the child.

Similar conclusions are reached from the examination of the development of a second construction. During the relevant period T also produced a double-object, ditransitive construction (VIO) with 3 different verbs, namely, 'told', 'called' and 'buy'. The first utterances with each were 'Maria told me have one too', 'Dana called me Lauren', and 'Buy Weezer cat(food)'. In none of these cases was there an antecedent sentence with VO or VI before the first VIO sentence was produced. Nor were there single-word uses recorded for the relevant verbs.

Two of these sentences were in fact SVIO, and as such were already treated in Table 1 as constructions including SVO; nor did they have SV as an antecedent. There was only one extra sentence with SVIO after the systematic observations ended, built on the verb form 'gave', 'Aunt Lulu gave me boots', and this sentence was not anticipated by any of its components either, including single-word use. For VIO and SVIO, the non-antecedent pattern is 100% of the cases.

Lack of antecedents and the speed of acquisition of new constructions

We have seen that prior use by the child before in a simple paradigm is not a necessary condition for a verb to develop an early SVO construction, and does not even much improve the chance of a verb to be learned early with a more complex construction. The question now to be asked is whether the possession of a simpler paradigm increases the speed at which a new verb is added to T's repertoire of SVO constructions, relative to the addition of a new verb without a previous paradigm. Figure 1 presents the accumulation of SVO constructions

as a function of the age at which each new verb started to be used in an SVO pattern. This graph is similar to one of the graphs presented in Figure 2 of Ninio (1999), but not identical to it in all details. One of the verbs of the former graph ('kick-it') is removed from the series as its inclusion was based on a misreading of the text, T having said 'lick-it' and not 'kick-it' in the SVO sentence it was based on. Second, the former graph included only the data of SVO sentences while the present graph also includes one verb generating an SVA_{adj} sentence..

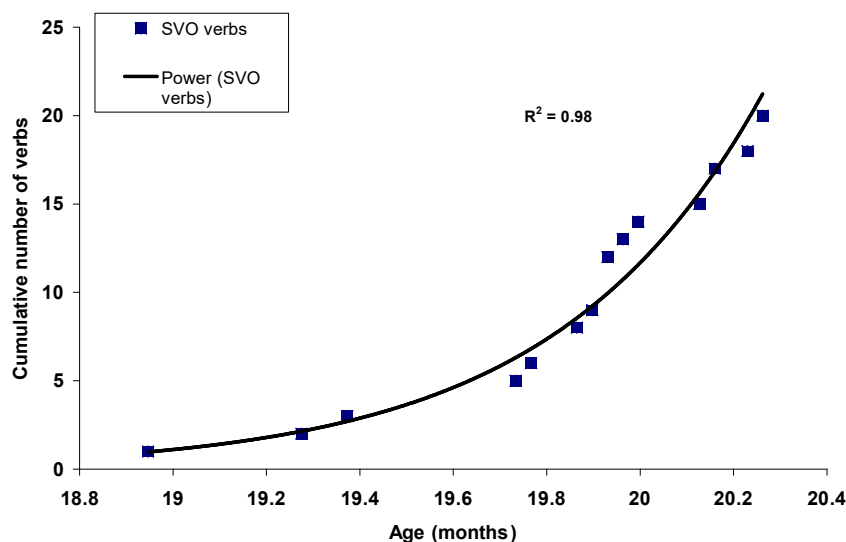


Figure 1. Cumulative number of different verbs in SVO construction as a function of age at first production

The 8 verbs appearing in the SVO construction without a simple antecedent paradigm are the 3rd, 4th, 8th, 9th, 11th, 15th, 16th and 20th of the series. Inspection of Figure 1 reveals that there is no evidence that the possession of a simple paradigm makes a difference for the speed by which a novel verb is added to the repertoire of SVO constructions. Instead, all verbs, regardless of whether or not they have simpler antecedents to SVO, form one smooth series.

The series is an accelerating growth pattern, here fitted with an increasing power-law function. Acceleration was judged on the basis of the degree of fit of the power function relative to a linear function, using the R^2 statistics derived by the graphics program of Excel. The power-law function explained 98.0% of the variance, while the best linear function fitted to the same series of points only explained 85.5%, an increase of 12.5% for the power

function. Namely, the accelerating power-law function has an almost perfect fit to the empirical series of acquisition data.

The graph has the characteristic shape of a gradually accelerating learning curve: The time it took to apply the new construction to yet another verb was much longer at the beginning of acquisition of that format, and shortened the more verbs T had already learned to produce in the same syntactic pattern. The acceleration is a sign that previously learned verbs facilitated the acquisition of later-learned ones, in the SVO syntactic pattern.

It can be summarized that there is strong evidence for a gradually accelerating spread of the syntactic pattern over different verbs, and hence for facilitation of learning. The more verbs a child already knows how to combine with a subject and an object, the faster she can learn a new verb in the same pattern. Verbs possessing simpler antecedents to SVO participate in the accelerating facilitation pattern just like the verbs that do not possess any antecedents.

The conclusion is that, regardless of the presence or absence of antecedent paradigms, the development of the SVO pattern for new verbs is facilitated by other verbs previously learned in the same syntactic construction. The true antecedents of a new argument-structure construction for some verbs appear to be the same argument structure construction which the child had previously learned for other verbs.

Conclusions

No verb is an island

The results of this study do not support the strict constructivist component of the Verb Island hypothesis. The findings make it unlikely that more complex verbal argument structure constructions develop by combining less complex constructions for the relevant verbs. In particular, the very first complex divalent construction typically learned by children, namely, SVO, apparently does not develop as an extension of an existing VO or SV pattern for each verb separately, on an individual basis. In the child on whose data the Verb Island

hypothesis was constructed, namely Travis, 40% of the first 20 verb-specific SVO patterns had no antecedent in the child's previous speech and none of the first VIO patterns had. Even at this early stage of complex structure building, children apparently do not proceed in the completely item-specific manner hypothesized, constructing insular patterns out of individual building blocks that owe nothing to other verbs in the developing linguistic system of the child. The results also raise doubts about the validity of the Usage-Based theory of syntactic development, for the same reasons.

It is clear now that much of the previous high estimate of 92% for the presence of antecedent patterns in Tomasello (1992), reflected changes and developments in the filler NP elements of existing verbal constructions, rather than the route by which novel verbal argument structure constructions are built up from their verb-specific components. There is of course a principled difference between choosing the noun arguments of a well-known pattern so that they fit present communicative needs, and the learning of a new syntactic pattern. For a well-established construction it is by definition expected that related 'antecedent patterns' be found, using different filler elements than the present utterance. By contrast, in the case of a brand new construction for a given verb, the necessary presence of 'antecedent patterns' is a specific theoretical prediction, expressing the hypothesis that new constructions invariably develop from such simpler antecedents. This prediction is apparently incorrect. Novel verb constructions do not need to have related simpler antecedents in the child's speech. Sometimes there are such antecedents and sometimes there are not; it seems to make no difference to the course of development.

These results fit well the recent research findings that do not support the insularity element of the Verb Island hypothesis, demonstrating instead a considerable inter-item transfer and facilitation in the children's earliest syntactic system (e.g., McClure & Pine, 2002; Savage et al., 2002). The accelerating growth curve seems to represent a quite general phenomenon, as it joins other findings according to which each different new syntactic construction learned by a child starts slowly, then the learning accelerates (Ninio, 1999, in press; Kiekhoefer, 2002; Ninio & Keren-Portnoy, 2002; Abbot-Smith & Behrens, 2003). It appears that after all, there is no conflict between the way children learn to build relatively more complex verbal

constructions and the way they transfer syntactic knowledge from an old verb to a new one, as in priming experiments. On the contrary, the two processes make equal use of the major device of transfer of learning from previous to present learning tasks. Complex constructions for new verbs are most certainly not learned obligatorily or even as a major strategy on the basis of their verb-specific component paradigms. They are most probably learned from the linguistic input, with much reliance on similar constructions already learned for other verbs for facilitation of the learning task.

In summary, children's developing grammar is not a collection of verb-islands, each developing its own mini-syntax independently of the other verbs. It is probably much more like a web, with all items connecting to each other by various dimensions of similarity. Children's linguistic system is a system, from day one.

Item-based learning does not imply insularity

The interpretation of the results of this study as reflecting processes of transfer of learning and inter-item facilitation resolves an apparent paradox in the characterization of early grammars. On the one hand, there is much evidence for item-specific learning of grammatical behavior of individual lexical items. Apart from the studies from the seventies and the eighties listed above, more recent studies (e.g., Allen, 1998; Clark, 1996, Tomasello, 1992) have also come up with the same developmental picture. It seems a safe generalization that young children learn grammatical rules for specific words in a piecemeal fashion, and that their grammar does not show the uniformity of application over all lexemes which is expected from general and categorical knowledge.

This consensual conclusion is in apparent contradiction with the recent evidence according to which children at the very same early period of development are already able to generate various syntactic constructions with experimentally introduced novel verbs without being exposed to the relevant syntactic behavior on an item-specific manner in the linguistic input (e.g. Savage et al., 2002). These new evidences of productivity are sometimes taken to indicate that young children do possess abstract grammatical rules and categories underlying

their generalization of constructions to novel items. This of course is in direct contradiction to the conclusion we have reached on the basis of piecemeal learning and lack of universal application of the same rules in their naturally occurring speech.

The contradiction is only an apparent one, however. It arises from a mistaken dissociation between item-specific learning and generalizable knowledge. It is very possible that children learn grammatical rules for each lexeme separately from the linguistic input, on an item-specific basis, yet be able to use the same item-specific knowledge in order to deal with other lexical items. We need only realize that facilitation and productivity are processes operating between individual items, and do not involve a "second-stage" of abstraction and generalization. The key to these inter-item relations are transfer and analogy, not categorization, abstraction, generalization or any other switch from concrete to abstract representation of grammatical knowledge.

In this view, children's grammatical system does not develop in stages, and does not change its nature from item-based to general and abstract. There is no developmental task of abstracting categories or general rules, nor of gradually strengthening them from some "weak" beginning. With an item-and-analogy system, the developmental task is to learn more syntax on a lexical, item-specific basis. This by itself will increase the efficacy of analogy as it raises the probability that the learner will find a source of analogy for the present learning task. In addition, it is very possible that children's analogy-making skill improves with cognitive development (Brown & Kane, 1988). The role of transfer, similarity and analogy in adult cognition and learning is well-described in such publications as Gick and Holyoak (1983) or Singley and Anderson (1989). Recently, children's ability to engage in analogy-making and transfer in developing grammar has been a target of much research (e.g., Duvignau, Gasquet, Gaume, & Gineste, 2002; Fisher, 1996; Gentner & Markman, 1997; Hilaire & Kern, 2002; Hirsh-Pasek & Golinkoff, 1996; Ninio, in press; Winner, 1979; Winner, Rosenstiel, & Gardner, 1976). The present study hopes to contribute to this literature by indicating that item-based learning enhanced by analogy might afford a better description of children's acquisition of their earliest verbal argument structure constructions than the Verb Island alternative.

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Table 1

*Travis's first 20 verbs participating in Subject-Verb-Direct Object (SVO) constructions¹
and their previous use in Subject-Verb (SV) and Verb-Object (VO) constructions*

Age	First SVO utterance with verb	Previous uses in SV or VO constructions	Antecedent
1;06.29	Maria made this duck	X made	+
1;07.08	Big Bird ride horsie	Ride X	+
1;07.11	Weezer did it	--- ²	--
1;07.22	Cinnamon lick-it hands	--- ³	--
1;07.23	Girl have that umbrella	Have X	+
1;07.23	Pete hurt the fingers in there	Hurt X	+
1;07.26	Maria hit me	X hit. Hit X	+
1;07.26	Maria told me have one too	---	--
1;07.27	Dana called me Lauren	---	--
1;07.28	Danny got me	Got-it X	+
1;07.28	Daddy take the bottle	---	--
1;07.28	Weezer drinking the eggs	Drinking X	+
1;07.29	Mommy get sauce	Get-it X	+
1;07.30	Daddy buy this	Buy X	+

Table 1 (Continued)

Age	First SVO utterance with verb	Previous uses in SV or VO constructions	Antecedent
1;08.03	Cookie Monster love cookies	---	--
1;08.04	... Weezer climbing a tree	--- ⁴	--
1;08.04	Bunny Rabbit playing music	Play X	+
1;08.06	Daddy singing chicken	X singing	+
1;08.07	Daddy put-a...new pajamas on	Put X on	+
1;08.07	Pete feel better now	---	--

¹ Based on Table 8.2, Tomasello (1992), p. 230.

² Table 8.2 has the single-word frozen combination 'do-it' as an antecedent, which however is in a different tense form and also does not count as a syntactic VO antecedent.

³ Table 8.2 has 'lick-it X' as an antecedent but the two-word pattern was produced the same day as the SVO one and does not count as an antecedent.

⁴ Table 8.2 has 'climbing X' as an antecedent, but such a two-word sentence is not listed in the Appendix.

Table 2

The distribution of T's Subject-Verb-Object sentence types according to their simpler antecedent paradigms (N=20)

Previous paradigms	Sentence types	
	Number	Percent
Previous paradigms - Total	12	60.0%
Subject-Verb	2	10.0%
Verb-Object	9	45.0%
Subject-Verb & Verb-Object	1	5.0%
No previous paradigms	8	40.0%
Total sentence types	20	100.0%