Fast mapping between grammatical constructions and meaning
Two experiments in French children aged 3 to 4

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Synopsis

The goal of this work is to replicate the experiment of Casenhiser and Goldberg (2005) with French speaking children aged 3 to 4.

Casenhiser and Goldberg demonstrated that English-speaking children aged 5-6 were able to learn to associate a new grammatical construction (NNV) with an abstract meaning (apparition). This was done using only nonce verbs. Different nonce verbs were used for training and testing.

The age of the children and the different between French and English were accounted for by reproducing the experiment in two different syntactic contexts:
1) Use of word order only
2) Use of a prepositional element

Training phase: Children see 2 x 8 films with a related new construction. All verbs used in the construction are nonce verbs, so children cannot rely on lexical information to memorize the meaning of the construction.

Testing phase: Children see 12 new films which include two films side by side. They hear a sentence that describes one of the two films and must choose which is the film that corresponds. New nonce verbs are used for testing.
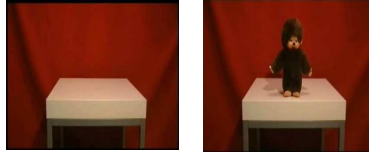
Learning a new construction

Form:
Before the apparition: Le singe la table va *fener*
(the ape the table is going *to 'fen'*)

After the apparition: Le singe la table a fené
(the ape the table *'fened'*)

Function:
Before and after the Apparition of an element

Time

A single film clip is played.

Testing the training

Two film clips are played side by side

Time

| Before and after apparition | No apparition (transitive construction) |

Apparition film clips are included in the test phase. They use nonce verbs that were used for training. All situations were also new, so it was not only necessary to memorize the films, but to understand the construction.

Transitive film clips: they are used as distractors during the test phase. In transitive film clips, all objects are present since the beginning and one object interact with the other. There is no apparition of object in these film clips.

For each pair of clips, a sound described one of the film clips, either apparition or transitive. All items were balanced with respect to side (left or right) or sound (same number of items where the apparition was described or the transitive was described). Four different test sets were used to allow for all possible organisations (left vs. right for stimuli).

Participants

Eighty-nine French-speaking children were recruited in kindergarten. They had normal language development as indicated by a standardised test battery (Evaluation du langage oral – ELO: Khomsi, 2001).

Experiment 1:
N= 49, ranged between 3;4 and 5;1 (average age was 4;0).

Experiment 2.
N= 40, ranged between 3;1 and 6;1 (average age was 4;3)

Experiments and material

The same films were used in the two experiments, only the sounds changed

Exp. 1. Word order construction

Targets : NG NG VG construction

Le nounours le tabouret a 'vocaté'*
(the teddy bear the stool has 'vocated')

Le train le canapé a 'voudé'
(the train the sofa has 'vouded')

Distractors : transitive constructions

Le monstre a 'batenré' le bonnet
(The monster has 'batenred' the cap)

Exp. 2. Construction with a nonce preposition

Targets : NG VG PrepNG construction:

Le nounours a 'vocaté' dom le tabouret.
(the teddy bear has 'vocated' dom the stool)

Le train a 'voudé' dom le canapé.
(the train has 'vouded' dom the sofa)

Distractors : transitive constructions

Le chien a rudé le panier.
(the dog has 'ruded' the basket)

Results

For both experiments, no significant differences were found on training orders (two versions), on testing orders (four versions) nor on side designation (left vs. right).

Experiment 1 (abstract word order).

For both conditions (apparition film clips or transitive film clips), the results were at chance level (respectively, t(45)=-1.68, p=.10 and t(45)=-0.94, p=.35). An ANOVA was conducted on the subjects' scores (dependent variable) including age as a between-subjects independent variable (3-year-olds vs. 4-year-olds) and the presenting condition (apparition vs. transitive) as within-subject independent variable. They was no effect of condition (apparition vs. transitive), F(1,44)=0.427, p=.52. They was also no effect of age, F(1,44)=0.048, p=.82. There was no interaction (condition by age) effect, F(1,44)=3.612, p=.06.

Experiment 2 (prepositional construction)

For the transitive condition, the results were at chance level (t (39) = -1,75, p =.09). For the apparition condition, they were significantly different from the chance level (t (39) = 3,24, p< .0024). An ANOVA was conducted on the subjects' scores (dependent variable) including age as a between-subjects independent variable and the presenting condition (apparition vs. transitive) as within-subject independent variable. They was a effect of condition (apparition vs. transitive), F(1, 39) = 8,35, p< .01. They was no effect of age or interaction effect.
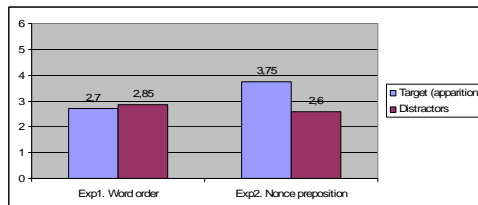
Discussion

Using only a few learning exemples, four year-old French-speaking children :

-are not able to learn an association between a new syntactic form (word order construction) and a new function (apparition), contrary to what was demonstrated in Casenhiser and Goldberg (2005) for five-year-olds (see EXP 1.)

BUT

-are able to learn an association between a new syntactic form (nonce preposition) and the same new function (apparition) (see EXP 2.)

At this age, for French-speaking children, association between abstract meaning and form seems to require the existence of an explicit lexical or morphosyntactic element (the nonce preposition). It remains to test whether the position of this element in the utterance is or not a critical feature for the children's performance.

Differences with the Casenhiser and Goldberg study could be dued to language difference (English versus French) or to children age difference (5-7 versus 3-4). So, the experiment 1 has to be replicated with older children.

Construction grammar (Goldberg)

Goldberg (1995): « C is a construction if C is a form-meaning pair ⟨Fi,Si⟩ such that some aspect of Fi or some aspect of Si is not strictly predictable from C's component parts or from other previously established constructions ». Within this approach, any language form that has an interpretation (any linguistic behaviour) is a construction (more precisely an occurrence of a construction). Constructions cover a wide range of size and complexity, from the most simple (lexical items), to the most complex (discourse organisation). In the middle, there are the syntactic constructions. Syntax is not just a way to order properly the elements of a phrase or a sentence (the form part Fi), it also adds additional meaning to the elements (other constructions) it links together (the meaning part Si).

Examples of constructions

Basic constructions (lexical elements)	'glisse'	SLIDE	'slice'	SLICE
Verb phrase	il glisse	INTRANSITIVE + HE SLIDES	he sliced the bread	TRANSITIVE + HE SLICED + THE BREAD
Verb phrase	il glisse un livre à Marie	DITRANSITIVE + HE SLIDES + MARIE + A BOOK (give with sliding)	he sliced Chris a piece of pie	DITRANSITIVE + HE SLICED + CHRIS + A PIECE OF PIE

Nonce verbs

Real verbs were extracted from lexical databases (Manulex: Lété et al., 2004; and Novlex Lambert & Chesnet, 2001) and checked for frequency. All verbs were frequent and had a simple syllabic structure. Nonce verbs were created by changing two phonemes of each verb, one consonant and one vowel, with changes reduced to a single phonological feature. The nonce verbs were controlled using a questionnaire to ensure that they had no phonological neighbours. All nonce verbs used are considered as belonging to the first grammatical group of French verbs (ending in –er), which contains only regular verbs and which is the only productive group of French verbs.

badocer	boganler	batenrer	bauler
chonder	fener	laner	muder
nérer	pober	ruder	sanfer
taver	tufer	vainrer	vocater
vouder	zouter		

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