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Children's comprehension of double negation

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Abstract

Double negatives in Cantonese express the logical meaning of a positive equivalent but this is not a must for English usage. For example, [我唔會唔食飯] (I not-will-not eat rice) in Cantonese equals to [我會食飯] (I will eat rice), whereas `nobody don't like me' in English may occasionally be interpreted as `nobody like me'. This study investigated age effects on children's comprehension of double negative sentences and explored the three stages of development proposed by Jou (1988). One hundred children in five age groups (means = 5;6, 6;6, 8;0, 9;6, 10;6) carried out actions with dolls according to three types of sentences: affirmative, negative, double negative. Significant differences in children's interpretation occurred across the five age groups. More specifically, younger children interpreted double negation [唔係冇] as just simple negation [冇]; older children inconsistently interpreted double negation either as a simple negation [冇] or as equivalent to a positive meaning [有]; only the oldest children consistently interpreted double negative sentences as equivalent to affirmative sentences. Three groups of younger children (age means = 4;6, 5;6, 6;6) showed similar trends in interpreting another common double negative command [唔好唔]. The paper discusses implications of the late acquisition of double negation, the effect of adding transformation to the sentences, and the phenomenon of cognitive overload in relation to Bever's model (1970). Clinical implication and further research are suggested.

Introduction

Continual language acquisition process from early to middle childhood: Chomsky (1969) revealed an interesting picture of children's acquisition of language - a few grammatical structures that were present in adult grammar and were part of ordinary language usage differed from, or were totally absent in, the grammar of five-year-olds. Gradual disappearance of these discrepancies was traced as children exhibited increased knowledge over the next four or five years of their development, when their command of the structures approached that of adults.

Children were generally assumed to be able to master the syntax of their native language by about age five (Chomsky, 1969). However, when we examine carefully the constructions of particular syntactic structures that are commonly found in adults' grammar, children in their middle childhood are apparently incompetent in understanding or producing them. As suggested by Chomsky (1969), comprehension tests involving these complex constructions could readily reflect children's competence over these constructions. Children's errors in interpreting these constructions reveal various aspects of the implicit psycholinguistic knowledge which they possess, and provide insight of their acquisition process. An example of these complex constructions is `double negation'. It is wrong to assume that children master all the negatives within pre-school period, as [1]indefinite negative forms (such as `nobody, nothing') are confusing even for adults. According to Owens (1988), children in `post-V Brown's stage of development (1973)' still had difficulty with double negatives. The natural assumption is hence: children acquire those complex structures at an older age.

Double negation in Cantonese and other languages: English `double negative' is defined as `a construction in which more than one negative word is used within the same clause' according to Crystal (1992). They are treated as combination of `negative operators' (Asher & Simpson, 1994) and their usage for `adding emphasis' rather than `cancelling each other out' is discouraged by standard

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[1] They are called `initiators' in Cantonese when they occur at the beginning of a sentence.

English. Some researchers did investigate the use of the logical positive sense of double negatives in psycholinguistic research (Sherman, 1976). Examples of double negatives included `no one + not', `no one + un-', `not + un-' in his studies. They were either `one negative adverb + one negative prefix in the following word' or `two negative adverbs in two clauses'.

Double negatives in Cantonese possess the `logical meaning whereby the two negatives make a qualified positive statement to typically make a point in an indirect or subtle way' (Matthews & Yip, 1994). Generally, double negatives are composed of two negative `markers' to express affirmation (Gao, 1980). Here are some examples: [唔係唔] in the sentence [我唔係唔想俾.....](I) (not-be)(not) (want give .....), and the expression [唔係冇俾](not-be)(not-have)(give .....). In both cases the two negative markers are adjacent to each other with one copular (be) in between. Double negatives can also be separated by nouns or verbs for modal constructions, for instances to express the meaning `all' or obligation, [冇人唔想.....](no)(people)(not)(want .....), [唔俾唔得](not)(give)(not)(okay), [唔好唔買.....](not)(good)(not)(buy.....). Taking a deeper look at the syntactic structures of these double negative markers, which are mainly combined by either [唔](not), [係](not-be) or [冇](not-have), we find that they are all of `adverbial' nature when verbs follow them. This structural classification is described by Gao (1980), Yiu (1981) and Matthews (1994). The marker [冇](not-have) is sometimes recognised as a `verb' when it expresses the `non-existence' of an object. It is however an adverb when it is for `denial' function with a verb following it. The two double negative expressions [唔係冇] (not-be)(not-have) (verb....) and [唔好唔](not-good)(not)(verb.....) used in this study were of adverbial nature. The former [唔係冇] represents `denial' semantically, according to the system proposed by Bloom in 1991 (also adopted by the Cantonese study by Lee, 1992 and Cheung, 1993), and the latter [唔好唔] represents `imperative form of prohibition', according to Chang (1992). However, due to the complex nature of these double negatives, they are sometimes regarded simply as `negative particles', for example, by Jou (1988) and Zhu (1986). Nevertheless, they both agree of the principle: two

negatives being equal to a positive, syntactically and semantically. This is also true for [2]Japanese (Malone, 1991). For [3]Russian, French, Middle High German, Spanish, Greek, Slavic language (Serbian), if double negatives are attached to different words, they have not the same effect upon one another, and the total result may be negative (Grenoble, 1992; Jesperson, 1965).

The issue is more controversial in English. While Sherman (1976) respected the affirmative nature of double negatives, Jesperson (1965), Crystal (1992), Asher and Simpson (1994) disagreed. They cited examples of Cockney and Black English to illustrate the use of double negation for `emphasising negative meaning rather than expressing affirmation' by them (for example, `I don't see nothing'). English children often overgeneralize the system of negation, hence using double negation to express simple negation (Clark & Clark, 1977; Owens, 1988). Jesperson (1965) pointed out that: "language is not mathematics. A linguistic negative cannot be compared with the sign - (minus) in mathematics". Therefore, double negatives (such as `not uncommon') do not absolutely cancel each other out to give a simple identical positive (such as `common'). Rather, a semantically weaker positive is obtained. Moore (1992) concluded that double negatives overburdened the receiver's cognitive capacity. Moreover, owing to their frequent appearance in non-standard language, the receiver must decide whether to interpret them as standard and positive, or non-standard and hence negative. Nonetheless, under the binary choice condition (such as the experimental task used in this study), double negatives only allow a positive interpretation with no alternative.

In view of the affirmative nature of Cantonese double negatives, Sherman's study (1976) which supported the affirmative meaning of double negatives is referred in this study. Regardless of the forms of negative information carried, negative sentences are cognitively more complex than their

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2 One of the semantic properties in Japanese double negation is similar to that in Cantonese: ¬¬ P = P

3 Some degree of semantic difference was reported for Russian that mainly lied in the polarity of the action and reflected the speaker's hesitation in performing the act. However, the syntactic form of Russian double negatives is positive.

positive counterparts. This was illustrated by an increase in verification time (Sherman, 1973; Wason & Jones, 1963; Osgood, 1980; Sherman, 1976). Similar effects on children were manifested by their later acquisition of negative form of information (Clark & Clark, 1977; Donaldson & Balfour, 1968; Kuczaj, 1975). Sherman (1973) suggested that in interpreting a negative statement, one firstly decoded the statement into a positive proposition, and secondly denied the proposition by performing an extra mental operation - the reversing of the positive proposition (also see Clark & Clark, 1977).

If we consider a negative as a one-step transformation from a positive original, double negation is then considered as a two-step transformation from firstly a positive statement and then its negative pair. Double negation is hence classified as `double - reversal' sentence by Zhu (1986).

Investigation of Cantonese double negation: Bever (1970) claimed that double negatives were perfectly comprehensible and acceptable. However, this is not the case for Mandarin studies done by Jou (1988) and Zhu (1986). The present study tried to provide empirical evidence for the comprehension of double negation by Cantonese children. Accordingly, there were two general goals: firstly, to assess the psychological reality of Cantonese children's competence; secondly, to determine which linguistic performance was influenced by the psychological factors.

More specifically, the present study aimed at three aspects of the use of double negation:

1. To indicate the age at which children can first accurately and consistently interpret a double negative expression as a positive equivalent, and compare with the results of Jou's (1988) and Zhu's (1986) studies;

2. To investigate and explain the process by which children can master the complex concept of double negation, in relation to the positive and negative counterparts;

3. To explore and examine the three stages of development proposed by Jou (1988), and provide empirical evidence for them. Issues about complexity and sentence processing of additional transformations will also be discussed.

Two experiments were conducted with two double negations, [唔係冇](not-be)(not-have) and [唔好唔](not-good)(not) respectively. Both structures consisted of adjacent negative adverbs.

Experiment 1: Method

Subjects

Subjects were one hundred native Cantonese-speaking children. They did not have history of language, hearing or visual problems. They all came from centres or nursery situated in public and semi-public housing estates. Thus, they were considered to have similar social background of lower-middle class, although it was not possible to control this variable accurately. There were five age groups with ten boys and ten girls each. These age groups were (1) 5;3-5;9 [mean age: 5;6] (2) 6;3-6;9 [6;6] (3) 7;9-8;3 [8;0] (4) 9;3-9;9 [9;6] (5) 10;3-10;9 [10;6]. Pupils were studying at N4, P1, P2, P4 and P5 respectively.

Stimuli

Adult norm: in order to collect the general norm of comprehension of the Cantonese double negation expressions adopted in both experiments, a group of twenty adults who were twenty-one-year-old university undergraduates, were invited to participate in the experiments. The results confirmed that the `double negative sentences' in both experiment 1 and 2 were interpreted as `affirmation' by logical sense. None of them gave alternative actions other than the predicted ones.

Design and stimuli: Interpretation of double negation was examined by asking the children subjects to carry out actions with animal dolls, according to sentences read aloud to them by the experimenter. The double negation expression in Cantonese [唔係冇](not-be)(not-have) was used in the experiment since it is frequently used by adults and youngsters. Furthermore, embedding this expression on both active and passive sentences still kept the whole sentences grammatical and meaningful. Except for adding this expression in the construction of the stimuli sentences, no other contextual or semantic constraints were provided to the children. The stimuli included eighteen

declarative sentences of noun-verb-noun type. The lengths of these sentences were of six to nine syllables. The verb used in this study was the transitive verb: step (on)[踩]. The nouns were animate agent / patient: bear / rabbit / pig [熊仔/兔仔/豬仔] which were approximately similar size soft dolls. There was one criterion in selecting the nouns or verbs that went with the double negatives in the declarative sentences. Only those that were syntactically and semantically plausible in combination with the double negation expression in both active and negative sentences, with no change in meaning, were used. The roles of agent and patient of the action were randomly and evenly distributed to the three animal dolls. Subjects could not make guesses on role as there was no role fixation or regular role assignment to the three dolls. (Refer to appendix 3 for the whole list of eighteen stimuli sentences and appendix 4 for their literal translations).

Three sets of six sentences each were constructed. The first set consisted of all affirmative sentences (represented as `+' hereafter), the second set of all negative sentences (-), and the third set of all double negative sentences (- -). Within each set, the six sentences were divided into two types of transformations: active and passive voices. Three repeated trials were generated for each voice. The whole list of eighteen stimuli sentences were derived from a simple basic sentence (S+) which is positive and active. [熊仔有踩兔仔] {the bear (does) steps on the rabbit}. This simple basic positive sentence was negated to form the negative basic sentence in the negative set (S-) [熊仔冇踩兔仔] (the bear does not step on the rabbit). Doubly negating this negative set formed the double negative sentence set (S- -), such as `[熊仔唔係冇踩兔仔] (bear)(not-be)(does not)(step on rabbit)'.

Passive transformation: The present study chose only passivization as the transformation added to the three basic sentence types S(+), S(-), S(- -). Why? Passive sentences are structures transformed cognitively from active ones and negative sentences are transformed from affirmative ones. Again, these negative sentences are further transformed to double negative sentences. The cognitive transformation involved in these processes was called [智慧運轉] and passive, negative and

double negative sentences were classified into `transformational-reversal sentences [逆向句]' by Zhu (1986), as they are associated with cognitive operations. In Jou's study (1988), other than passivization, three more transformations were included: subject topicalization, object topicalization, embedding. The present study abandoned these complex transformations because they were either ungrammatical or unnatural in Cantonese. Moreover, they would increase both the linguistic and cognitive complexities of the sentences so much that children's comprehension of double negation would be severely impaired. The addition of transformation (passivization) would increase the complexity and was hence considered carefully. Flavell (1985) suggested that children might not have acquired the `knowledge structure' for handling that piece of extra information in their representation system. Bever (1970; cited in Sherman, 1976) hypothesised that a kind of `cognitive overload' occurred for double negation, because maintaining its equivalent `affirmativeness', effort or space was taken up in the internal coding system. Therefore, too complex transformations (such as `embedding') were not used in the present study.

Materials and Set up

Two animal dolls (elephant, cow) and one (board) stage were employed as the main materials for demonstration. Three animal dolls (bear, pig, rabbit) and the stage were used in the formal test.

Procedures

One experimenter was involved in the experiment, which checked through subjects' `actions on dolls'. Introducing the doll figures and orienting the subjects to the game rules created a natural and easy atmosphere. This was to minimise their anxiety while keeping control of this free play context, with standard stimuli sentences presented. Labels of the dolls and their possible actions were provided to the subjects and then re-asked, prior to the doll-play. This was to minimise the likelihood of failure,

caused by subjects' unfamiliarity with the meaning of the individual words in the stimuli sentences. Subjects were tested individually. The first one to two minutes was allocated for casual conversation with the child so as to build up rapport and minimise his or her nervousness. Knowledge of the names of dolls was tested by asking children to point at the objects requested by the tester. All subjects in this study named all the dolls successfully in the first trial.

Demonstration: At the beginning, the tester introduced the two animal figures- a cow and an elephant. Then the tester told the children that there was a fighting game between these two animals on the stage. One would either jump up and step strongly on another one's head, or merely jump up and frighten another, `without really stepping on it'. Children were firstly explained the sequence of the game: initially, they had to help the dolls to get `prepared' by waiting on the stage after the bell ranged; secondly, they would start the `stepping act' after hearing the stimuli sentences; finally, both parties of the fight went down from stage after performing the act, and waited for next bell ringing. The tester read aloud a basic positive sentence and a basic negative one and demonstrated the acts accordingly.

Formal test trials: the tester reintroduced the three dolls (bear, pig, rabbit) and asked the children to act with the dolls. The instructions were: `this is your turn. Please help the dolls to play. Ring-ring (bell sound). Get prepared. Listen carefully. The bear.....' Only neutral verbal feedback (such as, "you did very quickly"), but no comment on the correctness of their act, was given on the whole process. It was strongly emphasised that if the doll did not really `step on another one's head', it must still `jump up and frighten' the recipient, as the agent was very nasty and fierce. All subjects could follow this procedure to act for the `presence (stepping) / absence (only frightening but no stepping) of actions'. None of them showed other actions (e.g. animal had no response but just sat on stage) to represent the `absence of actions: [冇踩] (does not step). Therefore, the `absence of actions' as indicated by `jumping high and frightening' was considered a valid representation of a negative

response. After the test, the experimenter would ask the subject to judge whether double negative equated to negative or affirmative sense, (mentioned in details in later part of this dissertation).

The order of presentation of the sentences was randomised. Subjects were allowed a reasonable processing time (up to fifteen seconds) to work out the meaning of the sentence and to act it out. The whole testing took around fifteen minutes for each child, and it was audiotaped. After the test, each child was praised and rewarded with a sticker. All subjects found this `test' a `funny fighting game, and were very attentive and enthusiastic in performing the tasks.

Experiment 1: Result

Scoring: four types of measures of the results were analysed. The first was the overall accuracy of the sentences, that was, both the action aspect (presence of action: jumping and stepping, versus absence of action: jumping without stepping) and the role aspect (dolls assigned to be the agent and the patient) were correct. The second was the action accuracy of the sentences, that was, the sentences in which the action aspect was acted out correctly. The third was the role accuracy of the sentences, that was, the sentences in which the role aspect was acted out correctly. The fourth was the [4]stage effect on the confidence (certainty) level the subjects showed for the sentences.

In this study, it was hypothesised that double negation was acquired at a later age and children would show little difficulties for both the affirmative and simple negative sentences.

1. The overall sentence accuracy (i.e. the sum of accuracy of all three sentence types) in each of the five age groups is shown in table 1. We know from the figures that the overall sentence accuracy increased with ages. The general trend for all three sentence types S(+, -, - -) was that accuracy increased with ages.

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[4] Three stages of development for comprehending double negation were proposed.

Table 1.

Relationship between age & mean overall sentence accuracy

Age groups	Mean % of accuracy [S(+)O + S(-)O + S(- -)O]
5;6	54.4%
6;6	70.6%
8;0	89.4%
9;6	92.5%
10;6	98.9%

Ceiling effects were observed for S(+) and S(-) after eight years old. The increase was the sharpest for the double negative sentence set, in which accuracy increased from 1.7% (for age group 5;6) to 35.8% (6;6), and then 73.3% (8;0), 82.5% (9;6), and finally reaching 96.7% (age group 10;6). Results were summarised in figure 2.

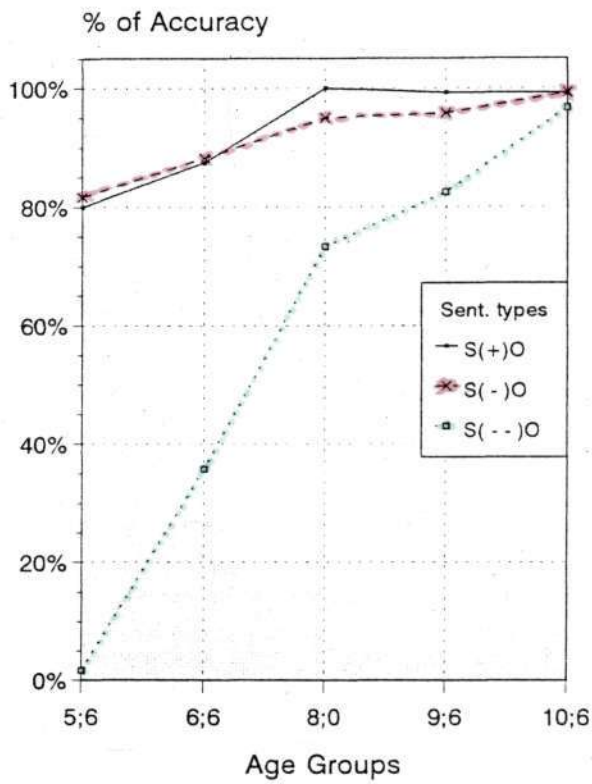

Figure 2. Overall Sentence Accuracy
Sentence types (+, - , - -) Vs 5 Age groups

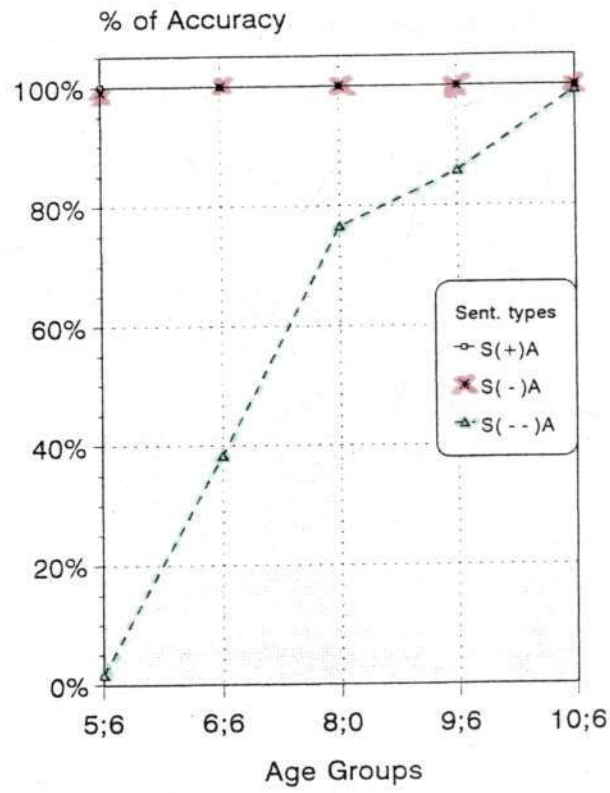

Figure 3. Sentence types & Age effects on Action accuracy
3 Sentence types (+, - , - -) Vs 5 Age groups

Sentence types effect was significant: $F(2, 190)=157.09$, $p<0.05$. A contrast between affirmatives (mean accuracy rate: 93.2%) and negatives (92%) was not significantly different for all age groups. A contrast between affirmatives (93.2%) and double negatives (58%) was only significant for age group 5;6 and 6;6 ($p<0.05$), as was a contrast between negatives (92%) and double negatives (58%) for age group 5;5 and 6;6 ($p<0.05$). Data shows that children gradually acquired the double negation gradually after 6;6. Age by sentence type interaction was also significant, $F(8,190)=25.20$, $p<0.05$. The overall trend was similar to that of Jou's (1988).

The sources of overall sentence errors came from two resources: the '[5]role-reversal errors' and the presence / absence aspect of `action errors', or a combination of both two.

Action accuracy: the sentence types effect was significant only for the double negatives. This is because subjects achieved 100% accuracy (that was, ceiling effect) for affirmatives and nearly 100% accuracy for negatives (figure 3). One-way MANOVA: 5 (age) x 1 (action accuracy of sentences), with repeated measure on action accuracy, was performed only for double negatives where there was no ceiling effect observed. There was a significant difference across age, $F(4,95)=58.29$, $p<0.05$. The action accuracy of double negative sentence increased with age. Scheffe' test shows that except between age groups 8;0 & 9;6, 8;0 & 10;6, 9;6 & 10;6. Differences among all other age groups were statistically significant ($p<0.05$).

Role accuracy: the sentence type effect was significant. $F(2,190)=4.69$, $p<0.05$. Ceiling effect at age groups 8;0, 9;6 and 10;6 was shown for role accuracy of affirmative sentences (refer to figure 4). A contrast between the affirmative sentences set (accuracy rate : 93.2%) and the negative sentence (91.8%) yielded a non-significant difference, $F(1,95)=0.71$, $p<0.401$. A contrast between negative and double negative sentence (role accuracy rate: 87.8%) yielded a significant difference, $F(1, 95)=4.68$, $p<0.05$. Generally, the role accuracy of all three sentence types increased with age (refer to figure 4).

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[5] If children reverted the agent and recipient of the sentence, it was a role-reversal error.

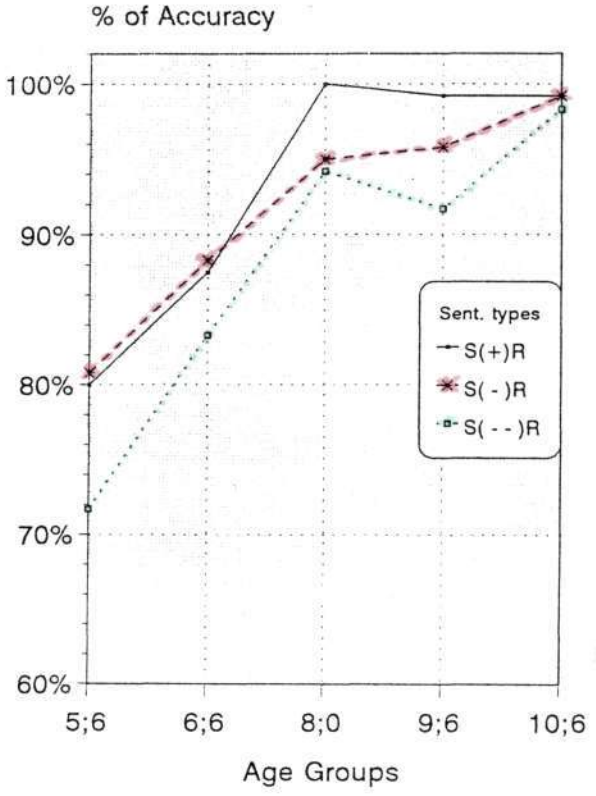

Figure 4. Sentence types & Age effects on Role accuracy
3 Sentence types (+, - , - -) Vs 5 Age groups

Table 5.

Sources of errors

(Minimum possible score = 0; Maximum = 600)

Sentence types	S+	S -	S - -
Total no. of `overall errors	41	49	252
Action errors alone	0 (0%)	1 (2%)	179 (71%)
Action error alone or together with role error			238 (94%)
Role errors alone	41 (100%)	48 (98%)	14 (6%)
Role error alone or together with action error			73 (30%)
Both action & role errors exist together	0 (0%)	0 (0%)	59 (23%)

Sources of errors: for the affirmatives and negatives, the amount of action errors occupied a small proportion of the overall inaccurate performance of the sentence. The action errors of affirmatives (S+) and negatives (S-) contributed 0% and 2% respectively to the total inaccuracy of the two sentence types, (refer to table 5.) In contrast, for double negative sentence, action error was a contributing factor in 94% of the time. The role relation component made a negligible additional contribution (6%) to the errors of the performances of the double negative sentences. For affirmative and the negatives sentence, the main error source was therefore the role reversal of the two nouns. It was rare for children to make an error on role relation and yet perform the action component of the double negation correctly. This result was reflected by the low percentage of role-error alone for the double negative sent (6%). That means, they either performed the action aspect wrongly, or performed both the action and role aspects wrongly, in the double negative sentence set.

On the other hand, the general patterns of distribution of errors were similar to that reported by Jou (1988). In this study, children made more role-reversal errors for double negative sent (73 out of a total number of 600 responses) as compared to affirmatives (41 errors) and negatives (48 errors). This finding suggests that double negation loaded the children's sentence processing capacity so much that it decreased their ability to deal with other aspect of the sentences. This was also observed in Sherman's study (1976).

Concerning only the action aspect of the double negative sentences, twenty nine out of one hundred children (mean age = 5;11) consistently interpreted the double negatives as if they were single negatives (refer to table 6) Then, there was a smaller subgroup of children in the middle age range, a total of twenty one of them (mean age = 7;10), whose responses to the double negation were at chance level. A total of fifty subjects, (that was 50% of the whole population) with mean age 9;4 reliably interpreted doable negatives as equivalent to positives. Children were classified into three stages of development in relation to comprehension of double negation: i) children who got one or less sentence correct out of the six double negative sentences in stage one; ii) those who got five or more sentences correct of the double negative sentences in stage three; iii) others who got between two to four sentences correct in stage two of development. The distribution of subjects in each age group across the three developmental stages is summarised in table 6.

Table 6.

Distribution of subjects of over the three stages of development of comprehension of double negation

Stages	Subjects' performances at this stage	Ages = 5;6	6;6	8;0	9;6	10;6	No. of subjects at this stage	Mean age of this stage in this study	Mean age in Jou's study
1	(- -)=(-)	19	9	1	0	0	29	5;11	6;7
2	(- -)=(+) / (-)	1	7	7	6	0	21	7;10	10;4
3	(- -)=(+)	0	4	12	14	20	50	9;4	11;11
Total no. of subject		20	20	20	20	20	100	100	110

Stage 1 performance mainly appeared in children below age 6;6, and stage 2 performance mainly appeared from 6;6 to 9;6. The characteristic of children at stage 2 is that they could recognise the difference between single negatives and double negatives, but their decoding of the latter into a meaningful and understandable representation was still unreliable. This phenomenon is considered as `transitional'. Stage 3 performance appeared as early as 6;6, but was more stabilised from 8;0 above. Certainty level that the subjects demonstrated in their behaviour: for a certain sentence, if a child showed any of the following signs, or showed a combination of them, that sentence would be scored as zero. These signs were: (1) thinking for a long time (over fifteen seconds) before responding, (2) requesting for twice or more times of repetition from the tester, (3) alternating actions on dolls, or (4) overtly reporting `I don't know'. The maximum possible confidence score for each sentence type was six and the minimum was zero. The means of certainty level for affirmatives, negatives, double negatives were 5.84, 5.73, 4.09 respectively. One-way MANOVA was performed for the contrasts between (S+ and S-), (S+ and S- -), (S- and S- -). The first contrast was not significant: $F(1,95)=1.60$, $p<0.21$. The second contrast was significant: $F(1,95)=91.05$, $p<0.05$. The third contrast was also significant: $F(1,95)=74.91$, $p<0.05$. One way MANOVA: (5) age x (1) sentence type, with repeated measure on the certainty level, was performed separately for S(- -) set, $F(4,95)=4.02$, $p<0.05$. Scheffe' test shows only significant difference between age groups 5;6 and 8;0 ($p<0.05$), (refer to figure 7).

Stage effect on double negative sentences for confidence level was significant, (refer to figure 8), with $F(2, 17)=8.27$, $p<0.05$. Scheffe' test shows differences among all three stages were significant. For stage 1 & 2: $F(1,48)=14.31$, $p<0.05$; for stage 2 & 3: $F(1,69)=6.62$, $p<0.05$; for stage 1 & 3: $F(1,77)=5.02$, $p<0.05$. It was noticed that subjects' certainty levels for double negatives were similarly high at both stages 1 & 3 but was obviously low at stage 2. These results confirmed that stage 2 was a transitional stage during which the subjects were mostly uncertain about the double negation. The general pattern shown in figure 8 was similar to that observed by Jou (1988).

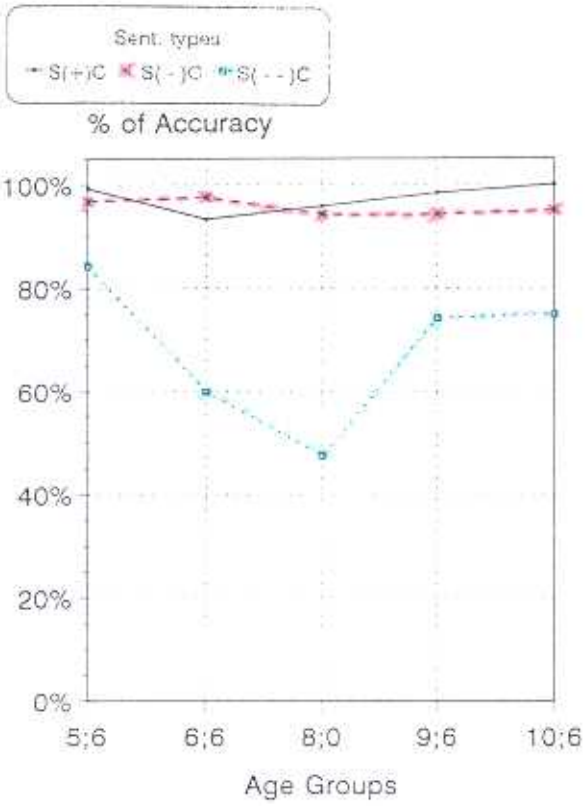

Figure 7. Sentence types & Age effects on Certainty
3 Sentence types (+, - , - -) Vs 5 Age groups

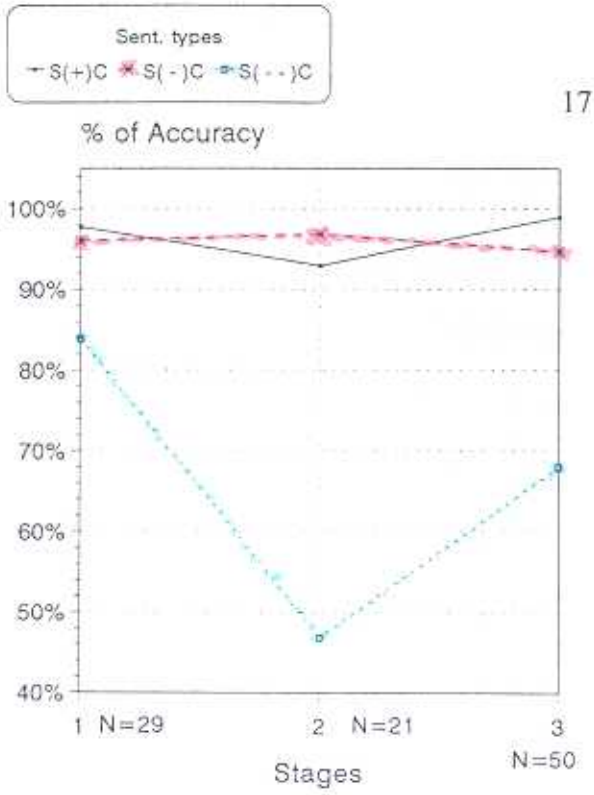

Figure 8. Sentence types and Stage effects on Certainty
3 types (+, - , - -) Vs 3 Stages of development
N= No. of subjects at that stage

Age of acquisition of double negation: considering only action accuracy in active sentences, children achieved 80% accuracy from 8;6 above, and ceiling was observed after 9;6 (refer to figure 9)

Effect of the complexity level of transformations: passivization decreased action accuracy in double negative sentence by 17%, as shown in figure 10.

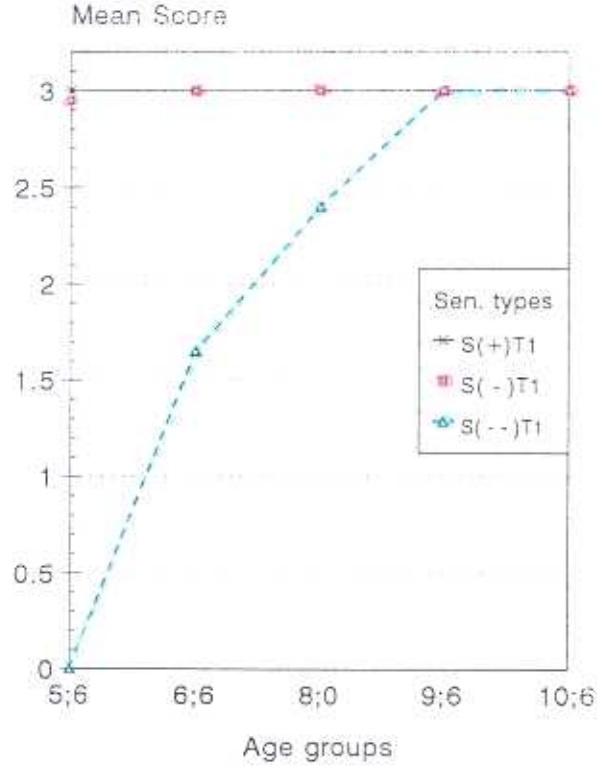

Figure 9. Age effects on 3 Sentence types (+, - , - -)
Measuring Action accuracy of active (T1) sentences
Min. possible score= 0 Max. possible score=3

Figure 10. Active Vs Passive transformations in S(+,-,- -)
Measuring: Action accuracy, Role accuracy, Certainty
Key: S1= S(+) S2= S(-) S3= S(- -)

It also decreased role accuracy and certainty level in all three sentence types, and the effect was observed across the first four age groups. Age (5) by transformation (2) interaction, with repeated measure for action accuracy in active and passive (S- -) sentences, yielded a significant effect: $F(4,95)=4.26$, $p<0.05$ (refer to figure 11).

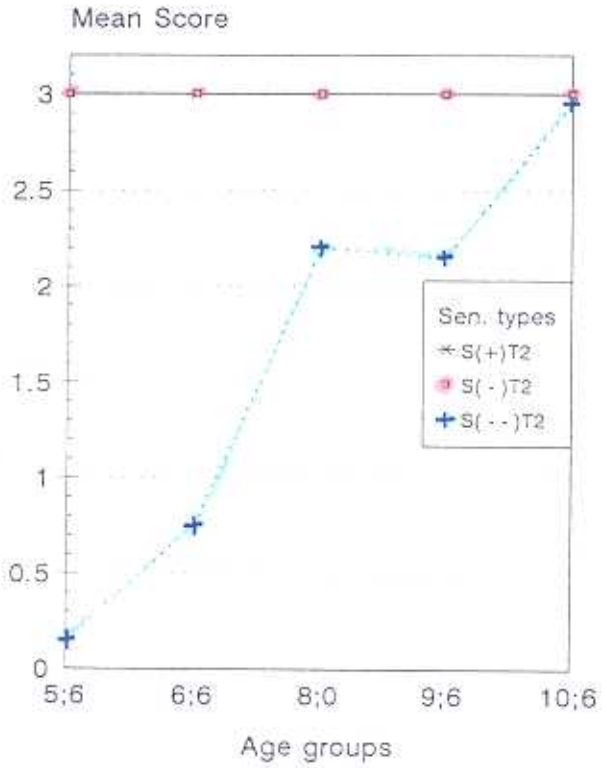

Figure 11. Age effects on 3 Sentence types (+, - , - -)
Measuring Action accuracy of passive (T2) sentences
Min. possible score 0 Max. possible score= 3

On the other hand, double negatives (S - -) also decreased role accuracy in active sentences by 7%, even though the drop was made more sharply for action accuracy (by 33%). There were more role errors in double negative sentence (total =73) than that in positive sentence (total =41) or negative sentence (48), as mentioned previously. If we consider passivization as one-step transformation from active sentence, and consider double negation as two-step transformations from positive and negative counterparts, we will naturally predict that two-step transformations (i.e. S- -) is more difficult than one-step transformation (i.e. passive) for children to interpret. Does the data support this claim?

[6]Comparing amount of action error in 'double negation' with that in 'passivization'. We find that passive sentences were relatively more difficult than active ones. There were 8.76 more times of action errors in double negation than that in passivization. We also find that there were only 3.38 more times of [7]roles errors in passivization than in double negation. The total overall error due to double negation was 113 whereas that of passivization was only 58.6 (nearly halved). Actually, negation alone was reported to have greater effect than passivization (Savin & Perchonock, 1965; cited in Slobin, 1971) on memory span and processing capability. A doubling of it (to give a double negation) is hence considered to have even greater effect due to its dramatic increase in complexity level.

Experiment 2 : Method

Subjects

Subjects for experiment two were another group of thirty native Cantonese-speaking children. Background information was similar as that above. They were divided into three age groups with five boys and five girls each. These age groups were (1) 4;3-4;9 [mean age:4;6] (2) 5;3-5;9 [mean : 5;6] (3) 6;3-6;9 [6;6]. Pupils were studying at N3, N4 and P1 respectively.

Materials and Stimuli

One animal doll (cow), one piece of fruit (orange) and one stage were employed as the main materials for demonstration. Three animal dolls (bear, rabbit, pig), two pieces of fruit (apple, pear) and the stage were used in the formal test trials.

The double negation expression [唔好唔](not-good)(not) is very frequently used by adult's imperative sentences to children. It is often heard in classroom or parental languages. Only active forms were constructed for all the three sentence types (+, -, - -). It was because passive imperative

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6 Formula: (S3T1A-S1T1A) Vs {[(S1T2A-S1T1A)+(S2T2A-S2T1A)+(S3T2A-S3T1A)]/3}

7 Formula: (S3T1R-S1T1R) Vs {[(S1T2R-S1T1R)+(S2T2R-S2T1R)+(S3T2R-S3T1R)]/3}

sentence is used less frequently (e.g. [熊仔唔好唔俾豬仔踩] `bear must- not-not by pig step'), and passivization of this imperative easily confuses subjects' judgement of the role (agent / patient) assignment. Moreover, passivization of this double negative expression would strengthen the sense of `active role' taken by the patient. Therefore, passive forms were not used. Inanimate objects were chosen as the recipients.

The subjects (agent) of the sentences were the animal dolls (bear / rabbit / pig), and the objects (recipient) were fruit (apple / pear). The verb was the transitive verb: eat [食], which was neutral in meaning and provided no cue for prohibition or promotion of a particular action. Six repeated trials for each sentence type were generated. A total number of eighteen stimuli sentences was presented to each child. An example of a double negative sentence is [熊仔唔好唔食蘋果] (bear)(must not)(not)(eat apple).

Procedures

The children were tested individually. Demonstration, instructions and formats of the formal test trials were similar to those in experiment 1. For the demonstration session, only the cow and the orange were used. For the materials: other than the three animal dolls used in experiment 1, two more fruits (pear / apple) were introduced. For orientation of games: instead of a fighting game, now it was a time for the farm master to order the animal to eat or not to eat a piece of fruit put on the stage.

For representing the absence of action (eat): again, even if the farm master (that was, the tester who read aloud the stimuli sentences) did not want the animal to eat the fruit, the animal was still to sit in front of the fruit on the stage and watch at it closely. This was a negative response. On the contrary, if it was a positive response, the animal would be moved to go and bite the fruit. After that, the animal had to go down from the stage and the fruit to be taken away. The order of presentation was also randomised and the whole test took around ten minutes to complete.

Experiment 2: Result

Scoring: only the overall accuracy (i.e. the action accuracy) of the sentences was measured, because there was normally no role error made in non-reversible sentences.

Trend: for the double negative expression [唔好唔](not-good)(not), the trend is similar to that of double negative active voice sentences for [唔係冇](not-be)(not-have) (refer to figure 10). One-way MANOVA: age (3) x sentence types (1), with repeated measure for action accuracy, was conducted with double negation only: $F(2, 27)=11.74$, $p<0.05$. Scheffe' test indicates only significant difference between the youngest and the oldest age groups. Ceiling effects were observed for both S(+) and S(-) sentences for all ages. Contrast between S(+) and S(-): $F(1,27)=1.98$, $p<0.18$ was naturally not significant. However, the contrast between S(+) and S(- -): $F(1,27)=74.61$, $p<0.05$ was significant, and the contrast between S(-) and S(- -): $F(1,27)=37.08$, $p<0.05$ was also significant. Children's comprehension of double negation increased with age, and the age effect on double negation was significant statistically. (Refer to figure 12)

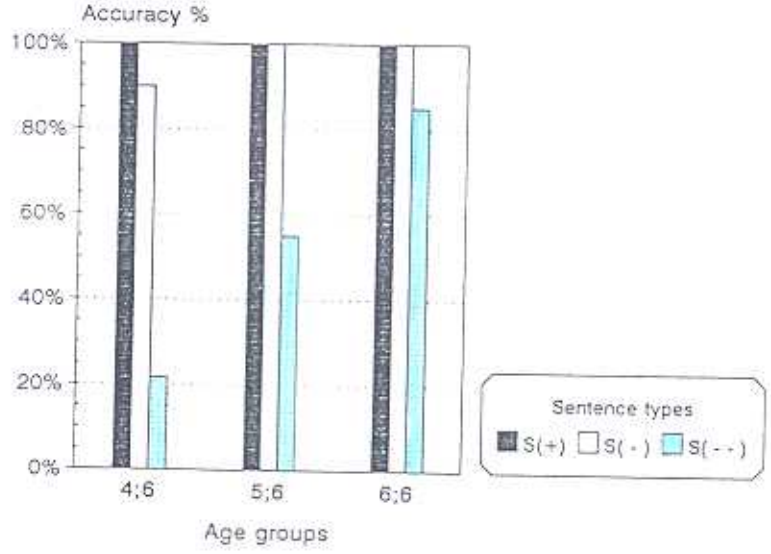

Figure 12. Age and Sentence types effects on Action accuracy of active [唔好唔] sentences

On the other hand, the age of acquisition (6;6) for this double negative [唔好唔] was earlier than that of [唔係冇] (8;0), by taking a 80% correct criterion. This might be due to the absence of

role-confusion in this experimental task. Familiarity effect ([唔好唔] is more frequently and commonly used with children than [唔係冇]) and the sentence nature (imperatives versus declaratives). Polarity of meaning and frequency effect were also reported and found by Sherman (1976). If taking the speech act into account: prohibitive type of negation is more easily comprehended than the declarative type (Asher & Simpson, 1994). In fact, the acquisition of double negation is closely related to other pragmatic issues, for example, facial expression and tones of the speaker when saying the `double negative expression'. The verb used is also one important factor.

Discussion (Experiment 1 and 2)

1. Age of acquisition. Results show that on the whole, accuracy in interpreting double negation increased with age. In the present study with a 80% criterion (as used also by Zhu, 1986), the age of mastery for overall double negation [唔係冇] set (including active and passive voice sentences) was older than 9;6. If measuring only active voice of double negation, it was older than 8;0, and it was older than 10;6 for only passive sentences. For the double negation expression [唔好唔], the experimental task included only active voice stimuli, and the age of mastery was older than 6;6. In Jou's study (1988) the age of mastery for the Mandarin double negation expression [沒有不] was older than thirteen, and it was older than seven for the Mandarin expression [沒有_不_](as an initiator here) in Zhu's study (1986). The empirical evidence shown by these studies, in addition to Sherman's (1976), all disagreed with Bever's (1970) contention that sentences containing two negatives are "perfectly comprehensible and acceptable." A second negative adds considerably to comprehension time and difficulty.

Here is the first question of interest: why do children acquire most double negations, universally, only at an advanced age? As explained briefly in the introduction part, the more complex the sentence structure, the more cognitive capacity may be requested. As negative information was proved to take longer time for processing (Savin & Perchonock, 1965), double negation would involve

a further transformation from the single negation. Children at a period of acquiring the adult's grammar would be very sensitive to these changes, and therefore reflect the difficulty level in their inaccurate performance. The particular sentence constructions, such as the linguistic contexts and the specific position that the double negatives could appear in a sentence, vary the difficulty level.

The double negations adopted by this study may not be representative for all possible cases. Nor may the exact age of acquisition be constant across different situations. There are at least two possible dependent variables: the first is the specific double negative expression. There are various syntactic forms, semantic functions and pragmatic usage, for instance, [唔好唔] is `easier' than [唔係冇]. The second is the specific syntactic structure. Any extra transformations added will increase the complexity level to various extents and hence delaying further the age of mastery. Nonetheless, the basic process that children pass through before they can master this principle (that two negatives being `equal' to a positive), may be generally identical.

2. Process in interpretation of double negation and relation between sentences types. The present study found that children treat double negation as simple negation firstly. Then they enter the `transitional stage' and they are inconsistently interpreting it as either negation or affirmation. Finally, they are confident and successful in equating it to a positive counterpart, even though the form may be less strong and direct.

Comparing the three sentence types (+, -, - -), we find that the positives and negatives were similar in level of difficulty in Sherman's (1976) and the present study. In Jou's (1988) and Savin's (1965), the negative set was more difficult than the positive set. Without exception, all studies reported the highest difficulty level in double negation set. Why was that so? Zhu (1986) explained that the more complex the cognitive transformation, the later the children's age of mastery. The interpreters must firstly possess the specific level of cognitive transformation required by the sentence structure, before they can master its structural features and meanings. The problem of `overloading

the sentence- processor' would be intensified if an extra transformation (such as the `passivization' adopted in this study) was added into the system. The result was that: the affirmative unity of the double negation could no longer be maintained. This was exactly the case in this study: adding extra transformation (passivization) into the double negation set decreased both action and role accuracy by 17% and 16% respectively (see figure 9). The similarity of ease level in positive and negative sentences types, as found in Sherman's (1976) and this study, was understandable. His subjects were adults whereas our subjects were children above five-and-a-half years old. According to Lee (1992) and Cheung (1993), children over five could generally understand negative words [唔] and [冇]. Subjects had already reached the age of mastery of negatives in both studies, and transformations of both sentences sets were within their cognitive load limits. Our subjects therefore presented with little difficulties for comprehending both sentence sets. In general, passivization as a type of transformation did increase role as well as action errors in double negative sentences. Memory might as well be a determining factor in ease of comprehension, which based on complexity of grammatical structures rather than the exact number of words contained in the sentences.

The second question of interest was: is passivization or double negation a more difficult cognitive and syntactic transformation for children? As empirical data evidenced 2.5 times of amount of errors (action as well as role-reversal) carried by double negation than passivization, we may conclude that `two-step' transformation is more than doubly difficult than `one-step' transformation.

3. Stage of development. At stage 1, children showed high confidence score together with high error rate. This implies that they simply never doubted that two negatives meant anything different from a single negative. Jou (1988) suggested that those stage one children invariably `deleted' one negative adverb from the input statement. Corder (1967) hypothesised that an element in the input was simply not taken in by the system, if the language learner did not have a cognitive structure to incorporate it, regardless of its presence in the input'. Some typical conversational exchanges were

collected and analysed after testing each subject. Before moving the doll, children consistently recited the sentences told by the tester with one negative word deleted. In contrast, stage 3 children retained the two negative words when replying the tester's question.

After executing one double negative sentence inaccurately, he or she replied the tester's question `why didn't the bear not step on the rabbit?' by `it was because the bear didn't step on the rabbit.' When the tester asked, `does it mean "does" [有] or "does not" [冇] for "isn't doesn't" [唔係冇] ?' the child usually replied 'that means "does not" [冇]'. When transiting from stage 1 to stage 2, `knowledge structure' emerged. At stage 2, children could sense the difference between single and double negatives, but could not reliably, act out the difference. This was reflected by their low certainty scores, in terms of such behavioural signs as uncertainty and doubtiness. It was because they have not reached the complete maturation for this grammatical structure. Double negation were actually weaker in polarity, i.e., its sense was weaker than the original affirmative. This might also contribute to children's hesitation. This was also a transition for knowledge consolidation process. During this stage, the processing of the same concept was sensitive to the information processing load, as exemplified by the effect of structural complexity, such as the presence of passive transformation (Sherman, 1976; Flavell, 1985; Jou, 1988).

When transiting from stage 2 to stage 3, the originally implicit knowledge became more explicit (Dulany, Carlson & Dewey, 1984). Children's fragile mastery of a concept could be disrupted by seemingly trivial changes in the optimal task (Brown, 1976; cited in Jou, 1988), and hence relapsing to the earlier mode. This was observed in children's accurate action response in double negation in active voice sentences, which relapsed to an earlier mode (i.e. inaccurate action response as in stage one) when encountering passive voice sentences of double negation. This was most salient in stage two, a `fragile' stage, whereas stage one and stage three were not affected by passivization, (refer to figure 13).

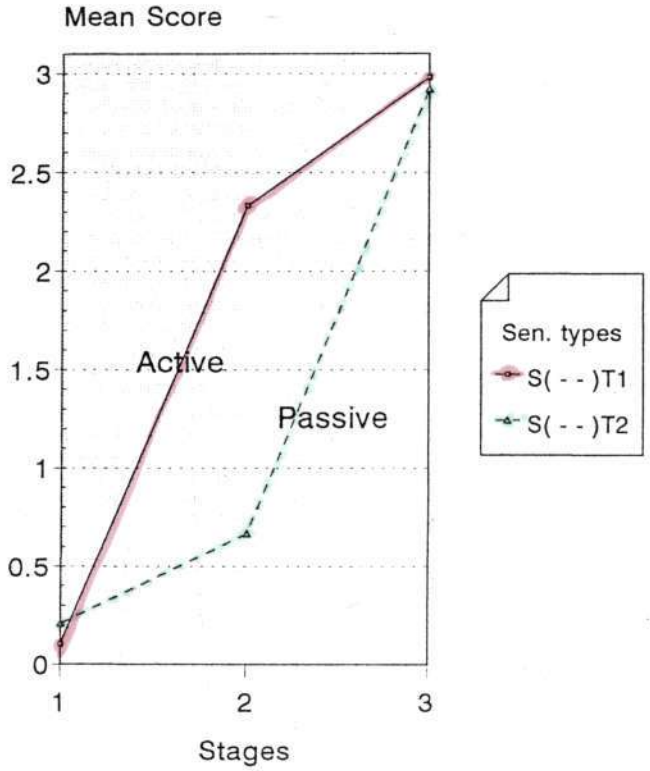

Figure 13. Stage effect on Double negatives (- -)
with Action accuracy in (Active Vs Passive) sentences
T1: Active T2: Passive | Min. score= 0 Max. score= 3

Clinical implications

1. The presence of a `transitional stage', at which increased structural complexity of sentences will decrease the accuracy comprehension, may be universal to other more advanced sentence types and structures. It may be universal to various populations, including normally developing children and those who have language disorders. This finding thus arouses our attention for the need of a more careful scaffolding for children's verbal learning. Crystal's bucket theory (1987) has discussed the interaction between linguistic levels in language disordered people (across various elements in language, such as phonology, semantics and syntax). Masterson and Kamhi (1992) discussed about the linguistic trade-offs in both populations: children with and without language disorders, for both within- and between- linguistic levels. Meyer (1973) discussed about the processing capacity and cognitive overload, which seemed to explain the above issues to certain extent. These studies supported the present study's claim: during transitional stage, extra piece of information added would revert the newly acquired knowledge to previous level of understanding or application.

2. Generally speaking, if we understand more from a psycholinguistic aspect of the advanced syntax type, we understand more the children's needs, difficulties and processes encountered in learning and comprehending language. We may then be more conservative in using double negation, or may elaborate its meaning more, in classroom and parental language with younger children.

Limitation

Only the transitive action verb [踩] (step - on) was used in the present study. This might limit the exploration for other possible syntactic, semantic or pragmatic usage of double negations, as the choice of verb used in the double negative sentence has great influence on the relative ease of comprehension.

Recommendations for future research

1. Only two double negatives were chosen in this study. Further may explore more deeply into the syntactic form, semantic category, usage and function (pragmatics) of other Cantonese double negatives.

2. This experimental administration only allowed binary condition, so as to contrast the presence and absence of action responses. This might however limit our exploration of more possible semantic aspects and pragmatic issues of the double negation expressions used by children.

3. This study did not present salient difference between children's response in positive and negative sentences. Presentation of other possible types of transformations was not under the scope of this study, and hence there was no point-to-point comparison with the results of Jou's study (1988).

4. This study only included children sample of age 5;6 and above (for [唔係行]) and responses from younger ones were not collected. On the other hand, there were only six trials for each sentence type. Moreover, no sample of children with language disorders was included in this study, such that comparison between the two populations was impossible. Further research may look into these issues and consider for possible modifications.

References

Asher, R. E. & Simpson, I M. Y. (1994) The Encyclopaedia of language and linguistics. Oxford: Pergamon Press. 5, 2769-2774.

Bever, T. G. (1970) The cognitive basis for linguistic structures. In Hayes, J. R. Cognition and the development of language. 279-352. New York: Wiley.

Bloom, L. (Ed) (1991) Language development from two to three. Cambridge: MIT Press.

Brown, R. (1973) A first language: the early stages. Cambridge: Harvard University Press.

Brown, A. L. (1976) The construction of temporal succession by preoperational children. Minnesota symposium on child psychology, 10, 128-183. Minneapolis: University of Minnesota Press.

Chang, H. W. (1992) The acquisition of Chinese syntax. Advances in psychology, 90, 277-295.

Cheung, M. P. (1993) Comprehension of Cantonese grammar in Hong Kong pre-school children. Dissertation. HKU.

Chomsky, C. (1969) The acquisition of syntax in children from 5 to 10. Cambridge: MIT Press.

Clark, H. H., & Clark, E. V. (1977). Psychology and language. New York: Harcourt Brace Jovanovich.

Corder, S. P. (1967) The significance of learner's errors. International review of applied linguistics, 5, 161-170.

Crystal, D. (1987) Towards a `bucket' theory of language disability: taking account of interaction between linguistic levels. Clinical linguistics and phonetics, (1), 1, 7-22.

Crystal, D. (1992) A dictionary of linguistics and phonetics (3rd ed) Cambridge: Blackwell.

Donaldson, M., & Balfour, G. (1968) Less is more: a study of language comprehension in children. British Journal of psychology, 59, 461-472.

Dulany, D. E., Carlson, R. A, & Dewey, G. I. (1984). A case of syntactical learning and judgement: how conscious and how abstract? Journal of experimental psychology: general, 113, (4) 541-555.

Flavell, J. H. (1985). Cognitive development. New York: Prentice-Hall.

Gao, H. N. (1984) Cantonese dialect studies. Hong Kong: The Commercial Press Ltd.

Grenoble, L. A. (1992) Double negation in Russian. Linguistics, 30, 731-752.

Jesperson, O. (1965) The philosophy of grammar. New York: Norton.

Jou, J. (1988) The development of comprehension of double negation in Chinese children. Journal of experimental child psychology, 45, 457-471. Duluth: Academic Press, Inc.

Kuczaj, S. A. (1975) On the acquisition of the semantic system. Journal of verbal learning and verbal behaviour, 14, 340-358.

Lee, L. (1992) Understanding negation "無", "唔" and "未" in Cantonese-speaking children. Dissertation. HKU

Malone, J. L. (1991) Semantic and pragmatic properties of Japanese double negation. General linguistics, 31, (1) 16-25.

Masterson, J. J. & Kamhi, A. G. (1992) Linguistic trade-offs in school-age children with and without language disorders. Journal of speech and hearing research, 35, 1064-1075.

Matthews, S. & Yip, V. (1994) Cantonese: a comprehensive grammar. 248-260. London: Routledge.

Meyer, D. E. (1973) Verifying affirmative and negative propositions: effects of negation on memory retrieval. In Kornblum, S. (Ed.), Attention and performance, IV, 379-394. New York: Academic Press.

Moore, M. (1992) Double negation. A review of general semantics, 49, (3) 305-309.

Osgood, C. E. (1980) Lectures on language performance. New York: Springer-Verlag.

Owens, R. E. (1988) Language development. London: Merrill Publishing Company.

Savin, H. B., & Perchonock, E. (1965) Grammatical structure and the immediate recall of English sentences. Journal of verbal learning and verbal behaviour, 4, 348-353.

Sherman, M. A. (1973). Bound to be easier? The negative prefix and sentence comprehension. Journal of verbal learning and verbal behaviour, 12, 76-84.

Sherman, M. A. (1976) Adjectival negation and the comprehension of multiply negated sentences. Journal of verbal learning and verbal behaviour, 15, 143-157.

Slobin, D. I. (1971) Psycholinguistics. London: Scott, Foresman and Company.

Wason, P. C. & Jones, S. (1963). Negatives: denotation and connotation. British Journal of psychology, 54, 299-307.

Yiu, P. C., Au Yeung K. A. & Chow, M. K. (1981) Cantonese dialect dictionary. Hong Kong: The Commercial Press Ltd.

Zhu, M. S. (1986) Researches on children's language development. Shanghai: Shanghai East China Institute of Education.

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My fellow classmates and friends.

基 本 資 料 搜 集

(請圈出或填寫你認為最合適的答案)

1. 你知道(或察覺)這位小朋友有以下的問題嗎?
   A. 視力困難(已配戴眼鏡者不計)
   B. 聽覺困難
   C. 發音咬字困難/發展遲緩
   D. 語言困難
   E. 智力方面困難/發展遲緩
   F. 其他(請注明)_____

2. 小朋友家中以何種語言溝通/交談為主?
   A. 廣東話
   B. 普通話
   C. 英文
   D. 方言(例如:台山話) 請注明_____
   E. 廣東話及英文並用
   F. 其他(請注明)_____

3. 小朋友有何家人同住?
   父 / 母 / 兄 / 弟 / 姊 / 妹 / (外)祖父母 / 其他親戚 / 佣人
   操何種語言? 如:廣東話/英文? 請注明_____

4. 就你所知,這位小朋友曾否接受言語/聽覺/智能方面的治療?
   A.曾
   B.否
   C.不清楚

5. 兒童姓名:_____

   性別: 男 / 女

   出生日期:_____

   年齡:_____歲_____月

多 謝 老 師 填 寫 此 表 格 !

A subject will choose randomly either an (a) or (b) sentence each time

Key : S(+) = Positive Sentence
S(-) = Negative Sentence
S(- -) = Double negative sentence
T1 = Transformation (active)
T2 = Transformation (passive)

Subject Name:
Sex / Age :
School / Grade :
Centre :
Date :

Appendix 3
Experiment 1 :
[唔係冇]

		Overall accuracy	Action accuracy	Role accuracy	Certainty
	S(+)T1				
1a	熊仔 (有) 踩 兔仔				
1b	兔仔 (有) 踩 熊仔				
2a	兔仔 (有) 踩 豬仔				
2b	豬仔 (有) 踩 兔仔				
3a	豬仔 (有) 踩 熊仔				
3b	熊仔 (有) 踩 豬仔				
	S(+)T2				
4a	熊仔 (有) 被 兔仔踩				
4b	兔仔 (有) 被 熊仔踩				
5a	兔仔 (有) 被 豬仔踩				
5b	豬仔 (有) 被 兔仔踩				
6a	豬仔 (有) 被 熊仔踩				
6b	熊仔 (有) 被 豬仔踩				
	S(-)T1				
7a	熊仔 (冇) 踩 兔仔				
7b	兔仔 (冇) 踩 熊仔				
8a	兔仔 (冇) 踩 豬仔				
8b	豬仔 (冇) 踩 兔仔				
9a	豬仔 (冇) 踩 熊仔				
9b	熊仔 (冇) 踩 豬仔				
	S(-)T2				
10a	熊仔 (冇) 被 兔仔踩				
10b	兔仔 (冇) 被 熊仔踩				
11a	兔仔 (冇) 被 豬仔踩				
11b	豬仔 (冇) 被 兔仔踩				
12a	豬仔 (冇) 被 熊仔踩				
12b	熊仔 (冇) 被 豬仔踩				
	S(- -)T1				
13a	熊仔 (唔係)(冇) 踩 兔仔				
13b	兔仔 (唔係)(冇) 踩 熊仔				
14a	兔仔 (唔係)(冇) 踩 豬仔				
14b	豬仔 (唔係)(冇) 踩 兔仔				
15a	豬仔 (唔係)(冇) 踩 熊仔				
15b	熊仔 (唔係)(冇) 踩 豬仔				
	S(- -)T2				
16a	熊仔 (唔係)(冇) 被 兔仔踩				
16b	兔仔 (唔係)(冇) 被 熊仔踩				
17a	兔仔 (唔係)(冇) 被 豬仔踩				
17b	豬仔 (唔係)(冇) 被 兔仔踩				
18a	豬仔 (唔係)(冇) 被 熊仔踩				
18b	熊仔 (唔係)(冇) 被 豬仔踩				

A subject will choose randomly either an (a) or (b) sentence each time

Key : S(+) = Positive Sentence
S(-) = Negative Sentence
S(- -) = Double negative sentence
T1 = Transformation (active)
T2 = Transformation (passive)

Subject Name:
Sex / Age :
School / Grade :
Centre :
Date :

Appendix 4
Experiment 1:
`isn't doesn't'

					Overall accuracy	Action accuracy	Role accuracy	Certainty
	S(+)T1							
1a	Bear	does	step	Rabbit				
1b	Rabbit	does	step	Bear				
2a	Rabbit	does	step	Pig				
2b	Pig	does	step	Rabbit				
3a	Pig	does	step	Bear				
3b	Bear	does	step	Pig				
	S(+)T2							
4a	Bear	does	by	Rabbit step				
4b	Rabbit	does	by	Bear step				
5a	Rabbit	does	by	Pig step				
5b	Pig	does	by	Rabbit step				
6a	Pig	does	by	Bear step				
6b	Bear	does	by	Pig step				
	S(-)T1							
7a	Bear	does not	step	Rabbit				
7b	Rabbit	does not	step	Bear				
8a	Rabbit	does not	step	Pig				
8b	Pig	does not	step	Rabbit				
9a	Pig	does not	step	Bear				
9b	Bear	does not	step	Pig				
	S(-)T2							
10a	Bear	does not	by	Rabbit step				
10b	Rabbit	does not	by	Bear step				
11a	Rabbit	does not	by	Pig step				
11b	Pig	does not	by	Rabbit step				
12a	Pig	does not	by	Bear step				
12b	Bear	does not	by	Pig step				
	S(- -)T1							
13a	Bear	isn't doesn't	step	Rabbit				
13b	Rabbit	isn't doesn't	step	Bear				
14a	Rabbit	isn't doesn't	step	Pig				
14b	Pig	isn't doesn't	step	Rabbit				
15a	Pig	isn't doesn't	step	Bear				
15b	Bear	isn't doesn't	step	Pig				
	S(- -)T2							
16a	Bear	isn't doesn't	by	Rabbit step				
16b	Rabbit	isn't doesn't	by	Bear step				
17a	Rabbit	isn't doesn't	by	Pig step				
17b	Pig	isn't doesn't	by	Rabbit step				
18a	Pig	isn't doesn't	by	Bear step				
18b	Bear	isn't doesn't	by	Pig step				

A subject will choose randomly either an (a) or (b) sentence each time

Key S(+) = Positive Sentence
S(-) = Negative Sentence
S(- -) = Double negative sentence

Subject Name:
Sex / Age :
School / Grade :
Centre :
Date :

Appendix 5
Experiment 2:
[唔好唔]

		Overall accuracy	Action accuracy	Role accuracy	Certainty
	S(+)				
1	熊仔 食 蘋果 Bear eat apple				
2	兔仔 食 蘋果 Rabbit eat apple				
3	豬仔 食 蘋果 Pig eat apple				
4	熊仔 食 啤梨 Bear eat pear				
5	兔仔 食 啤梨 Rabbit eat pear				
6	豬仔 食 啤梨 Pig eat pear				
	S(-)				
7	熊仔 (唔好) 食 蘋果 Bear (mustn't) eat apple				
8	兔仔 (唔好) 食 蘋果 Rabbit (mustn't) eat apple				
9	豬仔 (唔好) 食 蘋果 Pig (mustn't) eat apple				
10	熊仔 (唔好) 食 啤梨 Bear (mustn't) eat pear				
11	兔仔 (唔好) 食 啤梨 Rabbit (mustn't) eat pear				
12	豬仔 (唔好) 食 啤梨 Pig (mustn't) eat pear				
	S(- -)				
13	熊仔 (唔好唔) 食 蘋果 Bear (mustn't not) eat apple				
14	兔仔 (唔好唔) 食 蘋果 Rabbit (mustn't not) eat apple				
15	豬仔 (唔好唔) 食 蘋果 Pig (mustn't not) eat apple				
16	熊仔 (唔好唔) 食 啤梨 Bear (mustn't not) eat pear				
17	兔仔 (唔好唔) 食 啤梨 Rabbit (mustn't not) eat pear				
18	豬仔 (唔好唔) 食 啤梨 Pig (mustn't not) eat pear				

Data table for Figure 2-13. Appendix 6

	Ages: 5;6	6;6	8,0	9;6	10;6				
Figure 2:									
S(+)O	80%	87.5%	100%	99 2%	99.2%				
S(-)O	81.7%	88.3%	95%	95.8%	99.2%				
S(- -)O	1.7%	35 8%	73 3%	82 5%	96.7%				
Figure 3:									
S(+)A	100%	100%	100%	100%	100%				
S(-)A	99.2%	100%	100%	100%	100%				
S(- -)A	1.7%	38.3%	76.6%	85.8%	99.2%				
Figure 4:						Mean:			
S(+)R	80%	87 5%	100%	99.2%	99.2%	93.2%			
S(-)R	80.8%	88.3%	95%	95 8%	99.2%	91.8%			
S(- -)R	71.7%	83.3%	94.2%	91 7%	98.3%	87.8%			
Figure 7:						Mean:			
S(+)C	99.2%	93.3%	95.8%	98.3%	100%	97.3%			
S(-)C	96.7%	97.5%	94.2%	94.2%	95%	95.5%			
S(- -)C	84.2%	60%	47.5%	74.2%	75%	68.2%			
Figure 8:	Stage 1:	Stage 2:	Stage 3:	Mean:					
S(+)C	97.7%	92.9	99%	96.5%					
S(-)C	96%	96.8	94.7%	95.8%					
S(- -)C	83.9%	46.8	68%	66.2%					
Figure 9:	Age: 5;6	6;6	8;0	9;6	10;6				
S(+)T1	3	3	3	3	3				
S(-)T1	2.95	3	3	3	3				
S(- -)T1	0	1.65	2.4	3	3				
Figure 10: Measuring :	S(+)A	S(-)A	S(- -)A	S(+)R	S(-)R	S(- -)R	S(+)C	S(-)C	S(- -)C
Active	3	2.99	2.01	3	2.96	2.86	2.96	2.93	2.95
Passive	3	3	1.66	2.5	2.5	2.4	2.88	2.7	1.84
Figure 11:	Age: 5;6	6;6	8;0	9;6	10;6				
S(+)T2	3	3	3	3	3				
S(-)T2	3	3	3	3	3				
S(- -)T2	0.15	0.75	2.2	2.15	2.95				
Figure 12:	Age: 4;6	5;6	6;6						
S(+)	100%	100%	100%						
S(-)	90%	100%	100%						
S(- -)	21.7%	55%	85%						
Figure 13:	Stage 1:	Stage 2:	Stage 3:						
S(- -)T1	0.10	2.33	2.98						
S(- -)T2	0.21	0.67	2.92						