『中国地区英語教育学会研究紀要』No.20 (1990.10.1)
〈第15回全国英語教育学会自由研究発表〉

Morphological Information in Word Recognition

Sanyo Women's Junior College Junko Yamashita

0. Introduction

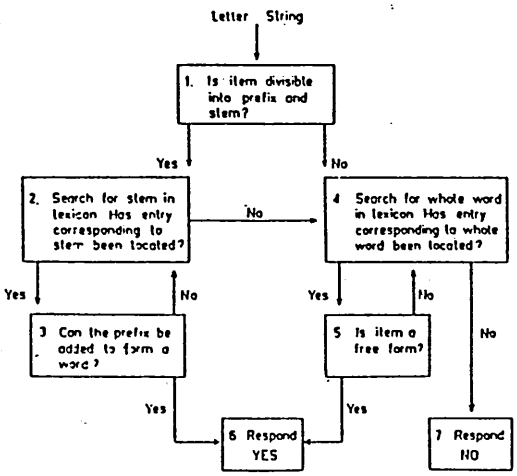
It is not too much to say that vocabulary size could determine the success of English language learning. It is therefore of great importance to expand the size of one's lexicon. But how can this be achieved ? This is the old question that researchers and teachers have been struggling with. There have been a lot of methods offered and the use of word parts is no doubt one of them (e.g. Allen, 1985, Gairns and Redman, 1986,). This paper deals with this aspect of vocabulary acquisition, the learning of derivational morphemes in English language. This paper first explores issue of how English native speakers use morphemes in the recognition of derived words, focusing on the notion of decomposition, then turns to the acquisition side of the derivational morpheme. Thirdly it reports on a survey carried out in order to see the knowledge of English morphemes of Japanese learners and finally concludes by suggesting the importance of considering the morphological information in vocabulary teaching.

1. Morphological decomposition

Attempts to figure out the organization of our mental lexicon --- an abstract dictionary in our head on which our recognition of words is supposed to be based --- have yielded a lot of studies on the role of morphemic structure in word recognition. Among those studies, the first explicit model that dealt with the recognition of morphologically complex words was presented by Taft and Forster (1975). Their model presupposes obligatory lexical decomposition of derivatives into a stem [1] and an affix. According to this model, when we see a word we first ask ourselves whether the item is divisible into a stem and an affix. If so, we 'strip off' the affix and begin to search for the stem in our mental lexicon. After finding the stem, we attach the affix again and then finally recognize the derivative. This operation is necessary, according to the model, because our mental lexicon is organized so that derivatives are stored under the entry of stem form. For example, 'unlucky' is stored in conjunction with 'luck' along with 'lucky', 'luckily', 'luckless' and so on. Of course, such an operation is performed so quickly and automatically that we hardly notice what is going on in our recognition mechanism.

Using the lexical decision task (to decide whether the presented word is a real word or a pseudoword) in the paradigm of reaction time measure (to use the length of reaction time for the proof or disproof of the theory), Taft and Forster (1975) and Taft (1976, 1979, 1981) presented experimental evidence to support the model of decomposition. How do you interpret the fact that

'juvenate' takes longer than 'pertoire' to be judged as a nonword ? Both can be a real word by attaching a prefix. re-; 'rejuvenate' and 'repertoire'. But 'repertoire' is not a derivative, while 'rejuvenate' is [2]. Therefore, 'pertoire' has no entry in the mental lexicon and is quickly rejected. However, as 'juvenate' forms an entry under which 'rejuvenate' is located, our searching mechamism stops for a while at the sight of 'juvenate' before rejecting it as a nonword. This process slows down the reaction time.[3] Another phenomenon whereby a nonword made by combining a prefix and a stem (e.g. dejuvenate) takes longer to be rejected than a word containing a prefix and a nonstem (e.g. depertoire) is also accountable in this model. Here the prefix 'de-' is strippedoff and the search begins with the stem (regardless of whether it is a real stemor a pseudostem). In the case of 'dejuvenate', we can find 'juvenate' and proceed to the third stage, 'Can the prefix be added to form a word ?'. The answer is 'No', then we proceed to the process of searching for the whole word and finally reach the rejection of 'dejuvenate'. While in the case of 'depertoire', 'pertoire' can't be found, so we soon go to the search for 'depertoire' and finally come up with the rejection of 'depertoire'. Therefore, 'dejuvenate' takes the road 1-2-3-4-7, while 'depertoire' 1-2-4-7 in their model. It is this difference that is reflected in the delay of reaction time.



Taft and Forster's model (1975)

Their model, which takes a strong decomposition veiw and bases its theory on the linear operation that copies our behavior of consulting a dictionay, has motivated various critical arguments. Robin et al.(1979), for example, raised the problem of task effect, saying that the task Taft and Forster used forced the subjects to use decomposition. There should be the process that decomposition doesn't take place, or decomposition may be more the exception than the rule for word recognition. Because obligatory decomposition means we never fail to decompose a word even if we can recognize it as a whole word without decomposition. It is an inefficient effort. They proposed the strategic view of decomposition --- decomposition is an optional operation that can be adopted according to the kind of task required. Hendersen (1985), posed a question especially concerning stage 3. Why, he asks, we can judge whether 'unlucky', for example, is a real word or not in spite of the supposition that there is no representation of 'unlucky' in our head. Hendersen claims that Taft and Forster do not give any explanation about what kind of operation allows us to judge the possibility of a particular concatenation of a prefix and a stem. Also the discussion of morphological decomopsition is basically formed on the

ground of prefixed words (Givvanni,1988). Therefore it is not clear whether the decomposition process is operative regardless of whether it is a prefix or a suffix[4]. As these discussions show, decomposition has not been accepted as a general process of word recognition. The model of obligatory decomposition, although it has had a great impact on the research of morphologically complex words, cannot be accepted in its full form. But the fact that English native speakers reacted in a different way to the morphologically different materials as was shown in Taft and Forster's or Taft's studies is the evidence that our mental lexicon contains some kind of different representation for derivatives and we are reacting to such kinds of information in our processing. Therefore, even if it is counter intuitive to accept the view that decomposition is obligatory, it does not mean decomposition is an unnecessary process. Now the agreement seems to be coming to the view that it is the process which is optional and strategic in nature (Aitchison, 1987).

Given the strategic nature of decomposition, it could be implied that if a person cannot manipulate morphological decomposition, his/her verbal operation would be retarded compared with those who possess high command of morphological manipulation. In the next section, we will turn our attention to the learning side and see how the ability to use derivational morphemes is related to the learning of vocabulary.

2. Acquisition of derivational morpheme

As a pioneering work on the acquisition of derivational morphemes, Berko (1958) asked children from four to seven ages (and adults as a control group) to supply the appropriate derivatives given a nonsense stem plus a sentence context and a picture describing the situation. In this experiment, adults unanimously said that a man who *zibs is a *zibber, but only 11% of the children used this agentive suffix -er. Other suffixes included, -y adjectives and dimimutives, were not used by children. This study presented a picture that children at this age prefer compounding (a zibbing man or a zibman) and stress pattern to derivation.

Using the same technique, Derwing (1976) obtained a general developmental trend of acquisition of some derivational morphemes (-er, -y, -ly, etc.) from children through adolescents to adults. His data confirmed Berko's result in that the difference among the subject groups was small in compounding, which is because children use compounding earlier than derivation. This study also revealed the difference in acquisition of different meanings of the same morpheme. For example, the agentive meaning is more associated with -er than the instrumental meaning.

There are more extensive surveys on the acquisition of derivational morphology. Kaye and Steinberg (1982) tested a total of 108 secondary and college level students. They presented 85 low frequency words that contain common Latin prefixes and stems and instructed the subjects to select the correct definition of the word from among several partially correct options. For example, for a definition of 'exsect', the following options were given,(a)to

cut out (totally correct), (b) to throw out (prefix only correct), (c) to cut against (stem only correct) and (d) to throw against (totally incorrect). Their result indicated that many younger students couldn't use word parts appropriately to derive meaning and even the performance of some university students was not quite satisfactory. Those descriptive studies tell us that acquisition of derivational morphemes is more difficult than inflectional morphemes or other processes of word formation such as compounding and made some educators claim the necessity of teaching derivational morphemes at school (Graves, 1987).

Compared with the descriptive studies, experimental studies of the acquisition of derivational morphemes are small in number, two of which will be considered here.

Freyd and Baron (1982) investigated the difference of ability of analysing words into a stem and a suffix between good learners (high ability fifth grade students) and average learners (average ability eighth grade students). They used paired-associate learning task where students were asked to remember the meaning of nonsense word pairs and then were tested for recall. Half the pairs were morphologically related by derivational rules (e.g. Prod=high/Prociness=top) and other half were unrelated (e.g. Yord=glad/Slomness=joy). There was no difference in the performance of average ability students between related pairs and unrelated pairs, while good learners performed better on related words than unrelated words. This allows the conclusion that good learners use morphological information better than average learners. They also reported the effect of suffix instruction. After giving suffix training, they tested how much the subjects improved the score on derived words and simple words. The trained group improved the score in derived words after training but not in simple words, while the control group didn't improve their score in either group of words. This positive result is quite encouraging for teachers, even if the nonsignificant difference between the improvement of derived words and that of simple words in the trained group made researchers conclude the training effect was only tentative in that case.

Wysocki and Jenkins(1987) posed the question whether children of grade four, six, and eight use morphological information to guess unfamiliar word meanings. Students were first trained by stimulus words (e.g. transgression), then tested to infer the meaning of transfer words (transgress) and control words (e.g. clandestine) in a sentence context. The score of transfer words was better than control words across all grade levels. The older students' score was higher than younger ones. Here also the result implies that morphological information is used by children and the ability develops gradually.

The number of surveys on the acquisition of derivational morphemes is comparatively small and seems to be suffering from the lack of methodology for investigation. However, taken together the studies cited above give us some evidence that the ability to use morphological information develops gradually and contributes to vocabulary expansion. But it is also shown that learning derivational morphemes is rather difficult and even some common affixes are not

acquired as much as the teachers expect. The study which is reported in the next section examines how much Japanese learners recognize the function of some English derivational morphemes, focusing on suffixes.

3. The study

The purpose of this survey was to obtain a picture of the understanding of some common English suffixes by Japanese learners. Using the property of suffixes that deterimines the grammatical role of the word, the study examined whether learners can correctly infer the grammatical role of words through suffixes.

3.1. Subjects

Three levels of learners were included in this study. 45 freshmen and 40 sophomores at senior high school, and 53 sophomores at university. Both the high school and the university are located in Hiroshima city [5] .

3.2. Material and procedure

Pseudowords were made by replacing one or two consonants of an original word (e.g. tacancy from vacancy). Six noun suffixes, -cy, -ity, -ment, -ion, -ness, -ist, six adjective suffixes, -able, -ous, -ive, -ic, -al, -ful, three verb suffixes, -en, -ize, -ify, and three adverb suffixes -ly, -wise, -ward plus some filler items were included in this study. Although some suffixes create other grammatical roles (e.g. mouthful, wooden, or friendly), the above general categorization was adopted as a criterion for analysis. These words were randomised and printed on a sheet of paper.

Before the start of the test, training was given to make sure the subjects understood the concept of grammatical role, in which the subjects were to group the words of the same grammatical function from among some familiar words, such as girl, sing, small, always etc., presented in sentence contexts. After the training the subjects were asked to choose grammatical function for each test item from noun, verb, adjective, and adverb. They were told that those words were pseudowords therefore there was not any one correct answer and were encouraged to guess as much as they could. They were also instructed to write the reason of their choice.

3.3. Result and discussion

The introspection data confirmed that the subjects more or less used decomposition to perform this task. The percentage of the subjects that mentioned the use of word parts was over 85% even among the youngest subjects. A closer look at the introspections brings up a picture of development. The oldest group seems to know the function of suffix as metalinguistic knowledge. Most of their answers were like "-ly is the suffix that makes an adverb" or " -(t)ions the suffix that makes a noun". While, such answers were obtained much less from the younger subjects. Answers from the younger subjects seem to show the process of deduction from words they happened to recall. Many answers

gave concrete examples as a basis for their answers, for example, "This is a noun because it resembles 'pianist'" "This is an adjective because it resembles 'beautiful'". This change of introspection seems to represent the common process of learning i.e. learners make inferences based ontheir experience and then gradually formulate rules and internalize them. Therefore, for the filler words included for which metalinguistic knowledge cannot work, even advanced subjects used inferencing based on words that they happened to recall. For example,the following words were used by advanced learners, 'dream' for 'attaream', 'shape' and 'hope' for 'shacrape', or 'comb' for 'frumb'. But this kind of inferencing is very subject to inappropriate makeshift recall, for example, 'often' for -en, 'five' for -ive.

A table of the percentages of the choice of each grammatical role by three subject groups appears in appendix. ? means blank answer. H1, H2 mean the first year and the second year students at high school, U2 the second year students at university. Significance of choice preference was examined by a X^2 test.

University students' choices were consistent with the expected answer pattern, with the only exception of '-wise', which forms an adverb like 'clockwise'. Probablly students were not faimliar with such a word. Many of them judged the word an adjective because there was 'wise' in it. Without this exception, however, advanced learners knowledge of suffix is highly developed. Compared with the advanced subjects, the younger subjects' judgments varied and, although the answer pattern of the second year students was closer to the expectation, the progress from the first year to the second year was not so obvious as there were cases such as -able or -full where the first year students got higher marks. One outstnding tendency of the secondary school subjects was that they judged a -y ending as an adjective whether it was -cy, -ity, -ify, -ly. This brings up the difficulty of appropriate decomposition. Although it was revealed that learners use decomposition based on their familiarity with the orthographic unit, what leads them to the appropriate decomposition is a hard question to answer. Even some uniersity students decomposed -wise as -ise. As Wheeler and Schumsky (1980) claimed, the boundary of decomposition may be determined in the interaction ofvarious sources of information like orthography or phonology. Those who failed in the appropriate deomposition haven't reached the stage of full accounting of various cues. But the fact that advanced students can correctly pick up the most likely unit indicates that the amount of learning contributes to such manipulation. Although this survey is limited in terms of the items and subjects examined, we could at least take a glance at an aspect of our learners' morphological knowledge.

4. Conclusion

The use of the internal morphological context of a word itself as a means of vocabulary expansion is a common method in language teaching. However, the effectiveness of this method is not qualified at all. This is one of the fields that relies on teachers' experiential intuition. Probably part of the reason that makes it difficult to teach these component is their difficulty in

linguistic description. The teaching of derivation includes not only the affixes themselves but also the variation of stress, meaning, and spelling etc. In quite a few cases the complex nature of derivation forces learners not to rely on rules but to remember each word one by one. Derivational morpheme is not always helpful for teaching and learning. However, taking into consideraton Nagy and Anderson's extensive survey which has shown that the semantic predictability and productiveness of derivational morphemes becomes higher when we go down the scale of word frequency (Nagy and Anderson, 1984), it can be said that the knowledge of derivational morphemes is more useful when learners become independent and come across more low frequent words. Teachers should help learners to acquire this kind of morphological knowledge.

The present survey provides some information on our students' understanding of some English morphemes. And it was shown that learners gradually learn to manipulate morphological information correctly. The developmental trend of the knowledge of morphemes allows the inference, just as the study of Freyd and Baron (1982) has shown, that good learners will use such information more appropriately than poor learners. However this does not tell us how well and how much they do in the process of vocabulary acquisition nor how teaching helps learners. According to Pressley (1987) a large scale survey is under progress to explore the effect of the use of derivational morpheme in vocabulary instruction. Not only are the useful suggestions from such an extensive survey awaited, but more research will also be needed to examine the effect of this kind of traditional methodology.

Notes

1) The term 'stem' is used in this paper, following the style of the articles dealing with word recognition, although 'base' may be a better term in this case (Bauer, 1983 : 20-21).

2) The criteria of determining whether the word is a derivative or not are (1) whether the prefix contributes to the meaning of the entire word, (2) whether there is a description as a prefix in the Shorter Oxford Dictionary. So their theory admits even a nonword as an entry if these criteria were met. As Hendersen(1985) mentions, however, this criteria seems the only operational one.

3) This interpretation is derived from the tacit assumption that the word is recognized when it has a corresponding representation in our mental lexicon. Therefore the word form which has no representation in our head is quickly rejected.

4) Cole et al. (1989) reported the experimental result indicating different processing operations between a prefix and a suffix.

5) The author acknowledges her gratitude to the teachers at the high school and the university for their cooperation in this research.

References

Aitchison, J. (1987). Words in the Mind. Basil Blackwell.

Allan, V.F. (1983). Techniques in Teaching Vocabulary. Oxfor University Press.

Bauer, L. (1983). English Word-formation. Cambridge University Press.
Berko,J. (1958). The Child's Learning of English Morphology. Word. 14. 150-177.
Cole,P., C. Beauvillain, and J. Segui. (1989). On the Representation and Processing of Prefixed and Suffixed Derived Words: A Differential Frequency Effect. Journal of Memory and Language. 28. 1-13.
Derwing, B. L. (1976). Morpheme Recognition and the Learning of Rules for Derivational Morphology. Canadian Journal of Linguistics. 21.1.38-66.
Freyd, P. and J. Baron. (1982). Individual Differences in Acquisition of Derivational Morphology. JVLVB. 21. 282-295.
Gairns, R. and S. Redman.(1986). Working with Words. Cambridge University Press.
Giovanni B. Flores d'Arcais. (1988). Language Perception. in Newmeyer, F.J.(ed.) Linguistics: The Cambridgee Survey. Camblidge University Press
Graves, M.F.(1987). The Roles of Instruction in Fostering Vocabulary. In McKeown, M.G. and M.E. Curtis, (eds.) The Nature of Vacabulary Acquisition. LEA. London.
Hendersen, L. (1985). Toward a Psychology of Morphemes. in A. W. Ellis.(ed.) Progress in the Psychology of Language. London. Erlbaum.
Kaye, D. B., and R. J. Sternberg. (1983) The develoment of lexical decomposition ability. cited in Sternberg,R.J. and J.S. Powell.(1983). Comprehending Verbal Comprehension. American Psychologist. 878-893.
Nagy, W. and R.C. Anderson. (1984). How many Words are there in Printed School Enlgish? RRQ. 14. 3. 304-330.
Pressley, M., J.R.Leven, and M.A. McDaniel. (1987). Remembering versus Inferring What a Word Means: Mnemonic and contextual approaches. in McKeown, M.G. and M.E. Curtis. (eds.) The Nature of Vocabulary Acquisition. LEA. London.
Rubin, G., C. A. Becler. and R. H. Freeman. (1979). Morphological Structure and its Effect on Visual Word Recognition. JVLVB. 18. 757-767.
Taft, M. and K. I. Forster. (1975). Lexical storage and Retrieval of Prefixed Words. JVLVB. 14. 638-647.
———— (1979). rrecogintion of affixed words and the word frequency effect. Memory and cognition. 7. 4. 263-272.
———— (1981). Prefis stripping revisited. JVLVB. 20. 289-297.
Wheeler, C., and D. Shumsky. (1980). The morpheme boundaries of some English derivational suffixes. Glossa. 14. 3-34.

Appendix 1 : Test material

tacancy, kotality, alvancement, multislication, lardiness, bevolutionist, yampen, jotalize, tersonify,
zearable, nutwitious, mecorative, framatic, aclimental, mertiful, trofessedly, spantiwise, fownward,

Appendix 2 : Percentage of the answers

		N	V	Adj.	Adv.	?
- cy	H1	17.8	2.2	57.8*	11.1	11.1
	H2	25.0	10.0	47.5*	7.5	10.0
	U2	90.6*	0.0	1.9	0.0	7.5
- ity	H1	4.4	0.0	88.9*	6.7	0.0
	H2	27.5	2.5	50.0*	15.0	5.0
	U2	92.5*	0.0	1.9	3.8	1.9
- ment	H1	64.4*	17.8	11.1	6.7	0.0
	H2	62.5*	7.5	20.0	5.0	5.0
	U2	94.3*	0.0	3.8	0.0	1.9
- ion	H1	60.0*	6.7	26.7	4.4	2.2
	H2	82.5*	2.5	12.5	0.0	2.5
	U2	100.0*	0.0	0.0	0.0	0.0
- ness	H1	64.4*	2.2	17.8	11.1	4.4
	H2	72.5*	2.5	15.0	10.0	0.0
	U2	100.0*	0.0	0.0	0.0	0.0
- ist	H1	46.7*	4.4	22.2	8.9	17.8
	H2	67.5*	2.5	17.5	2.5	10.0
	U2	96.2*	0.0	0.0	0.0	3.8
- en	H1	13.3	62.2 *	6.7	11.1	6.7
	H2	27.5	50.0 *	10.0	7.5	5.0
	U2	1.9	84.9 *	5.7	1.9	5.7
- ize	H1	37.8*	31.1	11.1	6.7	13.3
	H2	30.0	50.0 *	7.5	2.5	10.0
	U2	0.0	96.2 *	3.8	0.0	0.0
- ify	H1	17.8	2.2	44.4 *	17.8	17.8
	H2	10.0	10.0	52.5 *	12.5	15.0
	U2	0.0	88.7 *	7.5	0.0	3.8

		N	V	Adj.	Adv.	?
- able	H1	15.5	22.2	37.8	13.3	11.1
	H2	25.0	27.5	20.0	15.0	12.5
	U2	0.0	0.0	100.0*	0.0	0.0
- ous	H1	35.6*	2.2	26.7	8.9	26.7
	H2	25.0	15.0	35.0	10.0	15.0
	U2	0.0	0.0	100.0*	0.0	0.0
- ive	H1	15.6	53.3 *	13.3	6.7	11.1
	H2	15.0	17.5	47.5*	12.5	7.5
	U2	0.0	0.0	98.1*	0.0	1.9
- ic	H1	62.2*	4.4	20.0	8.9	4.4
	H2	32.5	12.5	42.5*	5.0	7.5
	U2	0.0	0.0	100.0*	0.0	0.0
- al	H1	44.4*	2.2.	28.9	11.1	13.3
	H2	32.5	0.0	60.0*	2.5	5.0
	U2	0.0	0.0	100.0*	0.0	0.0
- ful	H1	4.4	0.0	80.0*	15.6	0.0
	H2	2.5	0.0	77.5*	15.0	5.0
	U2	0.0	0.0	98.1*	0.0	1.9
- ly	H1	4.4	0.0	57.8*	24.4	13.3
	H2	2.5	0.0	67.5*	27.5	2.5
	U2	0.0	0.0	0.0	100.0 *	0.0
- wise	H1	42.2*	26.7	13.3	6.7	11.1
	H2	25.0	20.0	25.0	10.0	20.0
	U2	5.7	24.5	39.6 *	13.2	17.0
- ward	H1	26.7	42.2 *	2.2	17.8	11.1
	H2	27.5	35.0	5.0	20.0	12.5
	U2	1.9	1.9	3.8	83.0 *	9.4

* p < .01