L2 Lexical Development Found in English Spatial Adjectives Learned by Japanese Learners

Minoru Tanaka

INTRODUCTION

This paper is a study on how Japanese learners of English acquire psychological inter-lexical meaning of a certain semantic domain, English spatial adjectives. As a way of researching on this topic, data were collected from a relatively large number of subjects, and subsequently they were analyzed by the statistical methods of Hierarchical Clustering Analysis and INDSCAL.

Quantificational Study

In learning words of a second language, not only their definitive meanings but also their associative psychological meanings are important since such meanings are directly related to their actual use. Hence, it is obviously meaningful to study such psychological meanings of words in SLA.

Such psychological meanings vary from one person to another to some extent. Thus, responses elicited from a large number of people are necessary for investigating such meanings. So far, various areas of lexicon have been studied based on this idea by Fillenbaum and Rapoport (1971). From a perspective of SLA, the studies of Ijaz (1986) and Strick (1986) are remarkable.

Choice of Spatial Adjectives

Spatial adjectives are basic (easy) words and are based on basic human perception. Therefore, they are suitable for researching their

acquisitional transition from early to later stages.

Investigation of Inter-Lexical Meanings

Since spatial adjectives are basic terms, they are rightly considered to have numerous associative and polysemous meanings. It is extremely difficult to deal with those meanings at one time. By asking subjects about inter-lexical meanings of spatial adjectives, that is, relations among those words, however, a context of physical space is assumed to be set, for only spatial terms are given and form a context to those subjects. Nevertheless, there still seem to remain psychological meanings about such inter-lexically related words. This sort of psychological inter-lexical meanings of spatial adjectives are what is investigated in the present study.

Tanaka's (1991) study, which was an attempt to verify the hypothesized persistent semantic transfer, analyzed the same group of words in the same methods as the present study. According to that study, there were differences as well as similarities about the understanding of the inter-lexical meanings of English spatial adjectives between the native speakers and the advanced Japanese learners of English, and many of those differences and similarities were analyzed and interpreted as supporting the hypothesis. Since that study was concerned with the degree to which *advanced* Japanese learners acquired inter-lexical meanings, what necessarily interests us now is a more developmental question of how much and what early-staged Japanese learners have acquired about the same domain compared with those advanced learners. Answering this question is a main topic of the present paper.

In this study, regarding the process and the degree of acquisition of a group of English spatial adjectives by Japanese learners, the following four aspects will be explored and analyzed.

Aspect 1. What is acquired at an early stage (i.e., by low-intermediate-level learners)?

Aspect 2. What is acquired at a later/an advanced stage (i.e., not

by low-intermediate learners but by advanced-level learners)?

Aspect 3. What is not (easily) acquired even at a later / an advanced stage (i.e., even not by advanced learners)?

Aspect 4. What explanation will be offered as to Aspects 1, 2, and 3 by examining the psychological inter-lexical relations found in Japanese spatial adjectives?

EXPERIMENT

Methods

The quantificational methods I employed in the experiment were INDSCAL (cf. Takane, Young, and de Leeuw, 1977, Kruskal and Wish, 1978, and Arabie, Carroll, and DeSarbo, 1987) and Hierarchical Cluster Analysis (HCA) (Johnson, 1967).

Materials

A group of English spatial adjectives and a group of Japanese spatial adjectives were investigated. They were respectively divided into two subgroups in terms of their polarity ; hence four subgroups. The members of each of the subgroups are as follows :

Table 1 English and Japanese Spatial Adjectives Investigated

English
9 positive-pole adjectives :
long, far, high, tall, deep, wide, large, thick, fat
7 negative-pole adjectives :
short, near, low, shallow, narrow, small, thin
Japanese
8 positive-pole adjectives :
nagai(long), tooi(far), takai(high/tall), fukai(deep), hiroi(wide), ookii(large), atsui(thick as in 'a thick wall'), futoi(thick as in 'a thick needle')
8 negative-pole adjectives :
mijikai(short), chikai(near), hikui(low), asai(shallow), semai(narrow), chiisai(small), usui(thin as in 'a thin wall'), hosoi(thin as in 'a thin needle')

Procedure

According to the above four subgroups of spatial adjectives, four different versions of questionnaires were prepared. In each questionnaire version, each one of the adjectives was chosen as a head term, against which subjects ranked the rest of them according to *similarity*. The English versions of questionnaires were given to three types of subjects: adult native speakers of English, Japanese advanced learners of English (senior high school English teachers and English major graduate students), and Japanese low-intermediate learners of English (senior high school students, freshmen and sophomores)[1]. The questionnaires of the Japanese versions were filled out by adult native speakers of Japanese. In terms of languages of adjectives, native languages of subjects, polarity of adjectives, and levels of learners of English, the following eight different sets (Table 2) were produced.

Results

The subgroup of English positive-pole adjectives consists of nine words and the subgroup of English negative-pole adjectives, seven words; hence, 36 and 21 pairs (e.g., *long-short*), i.e., variables respectively from the English subgroups were produced. Since there were eight words both in the Japanese subgroups, 28 variables from each of the subgroups were produced. Variation of each variable among

Table 2 Eight Different Subject Groups

	Language of Adjectives	Native Language	Polarity of Adjectives of Subjects	Level of Learners	No. of Subjects	Abbreviation
(a)	English	English	Positive-pole		52	(EEP)
(b)	English	English	Negative-pole		75	(EEN)
(c)	English	Japanese	Positive-pole	Advanced	52	(EJP-A)
(d)	English	Japanese	Negative-pole	Advanced	49	(EJN-A)
(e)	English	Japanese	Positive-pole	Low-Intermediate	55	(EJP-LI)
(f)	English	Japanese	Negative-pole	Low-Intermediate	60	(EJN-LI)
(g)	Japanese	Japanese	Positive-pole		54	(JJP)
(h)	Japanese	Japanese	Negative-pole		55	(JJN)

Table 3 Statistics about SDs of Variables of Each Set

	EEP	EEN	EJP-A	EJN-A
No. of Subjects	52	75	52	49
No. of Adjectives	9	7	9	7
No. of Variables (No. of SDs)	36	21	36	21
Mean of SDs	1.197	0.930	1.176	1.141
SD of SDs	0.275	0.222	0.098	0.082
Maximum of SDs	1.771	1.298	1.873	1.491
Minimum of SDs	0.508	0.380	0.382	0.804

	EJP-LI	EJN-LI	JJP	JJN
No. of Subjects	55	60	54	55
No. of Adjectives	9	7	8	8
No. of Variables (No. of SDs)	36	21	28	28
Mean of SDs	1.328	1.228	1.186	1.355
SD of SDs	0.059	0.028	0.182	0.172
Maximum of SDs	1.729	1.543	1.554	1.787
Minimum of SDs	0.802	0.970	0.805	1.022

the subjects was not very large ; statistics about SDs of variables of the eight sets is given at Table 3. The relatively small variations show that the subjects responded quite consistently to the task ; this result in turn indicates the meaningfulness of the present study.

In applying INDSCAL to the collected similarity data, three-

dimensional solutions were employed ; the dimensional axis I is most weighted and the dimensional axis III is least weighted (see Figures of the INDSCAL configurations). For the HCA analysis of the data, two types of HCA were used: 'maximum distance method' and 'minimum distance method' ('max' and 'min' for short, respectively). These two types of analyses produce slightly different results from the same data.

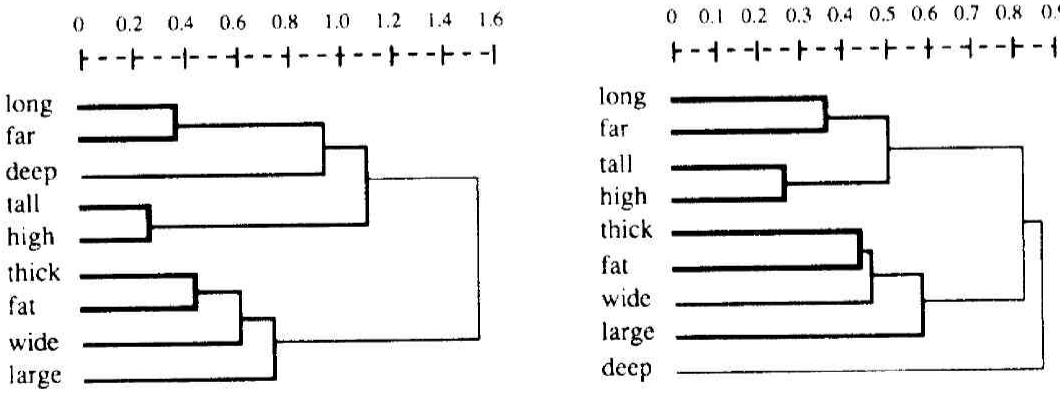
ANALYSIS

Acquisition of the Subgroup of Positive-pole Adjectives

Aspect 1. What is acquired at an early stage (i.e., by the LI-level learners)?

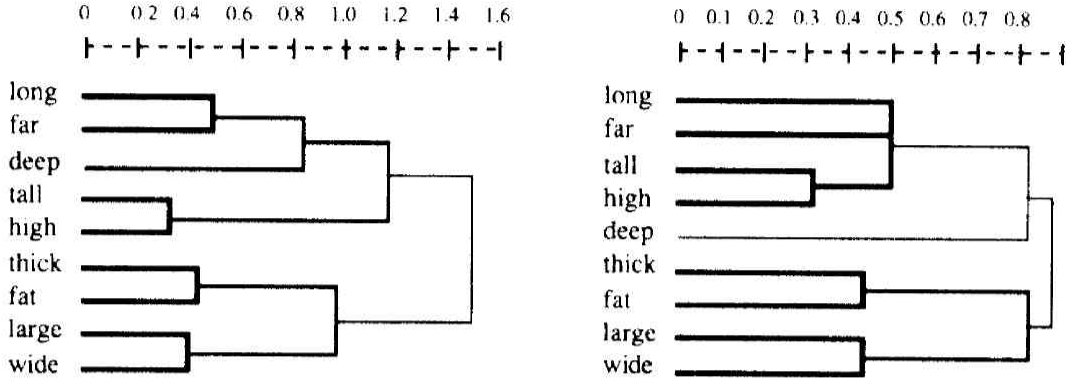
Comparison of EEP with EJP-LI.

Both types of HCA tree diagrams (Figures 1 and 2) show many common features (inter-lexical similarities and dissimilarities) between EEP and EJP-LI displayed below, which indicate acquisition by the learners. Below, '-' indicates 'closeness' or 'similarity' ; ⟷ indicates 'sharp contrast or dissimilarity'. Regarding 'possible interpretation' below, 〈Vertical〉 denotes 'verticality' ; 〈Volume〉 , 'vol-



'Maximum Distance Method' 'Minimum Distance Method'

Fig. 1 Hierarchical Clustering Analysis : EEP



'Maximum Distance Method' 'Minimum Distance Method'

Fig. 2 Hierarchical Clustering Analysis : EJP-LI

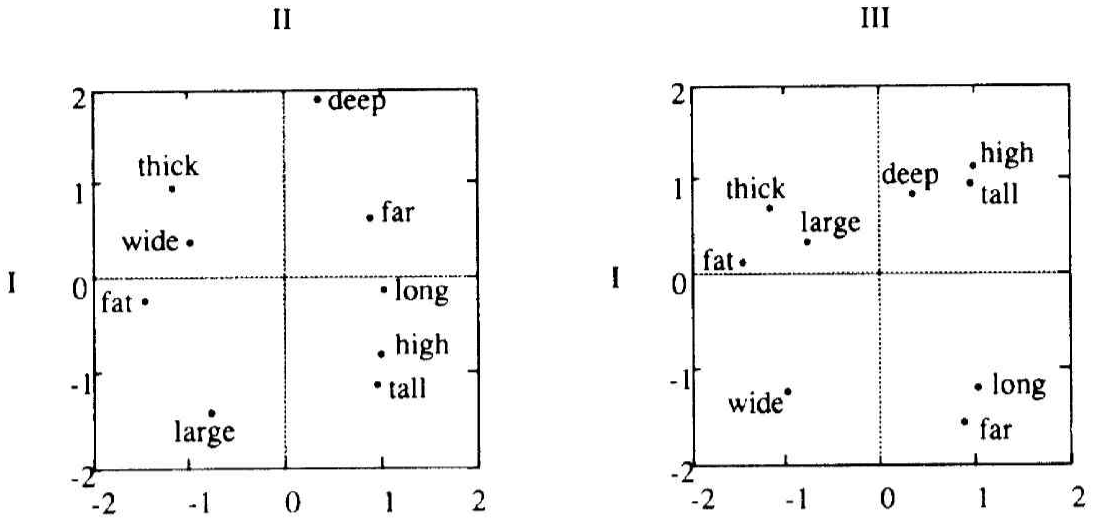
ume' ; 〈1 Dimension 〉or 〈1 Dim〉, 'one-dimensional applicability of an adjective' ; 〈Volume/Size〉, 'dominant two- to three-dimensional applicability of an adjective' (see details in Tanaka 1991, 1992).

Similarities and Dissimilarities	Possible Interpretation
In both 'max' and 'min' :	
(1) [*tall-high*]	〈+Vertical〉
(2) [*long-far*]	〈−Vertical〉
(3) [*thick-fat*]	〈Volume〉
(4) $\begin{bmatrix} long \\ far \end{bmatrix}$—$\begin{bmatrix} tall \\ high \end{bmatrix}$	〈1 Dimension〉
(5) $\begin{bmatrix} thick \\ fat \end{bmatrix}$—$\begin{bmatrix} large \\ wide \end{bmatrix}$	〈Volume/Size〉
(6) $\begin{bmatrix} long\text{-}far \\ tall\text{-}high \end{bmatrix} \longleftrightarrow \begin{bmatrix} thick\text{-}fat \\ wide,\ large \end{bmatrix}$	〈1Dim〉⟷〈Volume/Size〉

Some moderate matching is found along Dimension I of EEP and EJP-LI (7) and along Dimension II of EEP and Dimension III of EJP-LI (8).

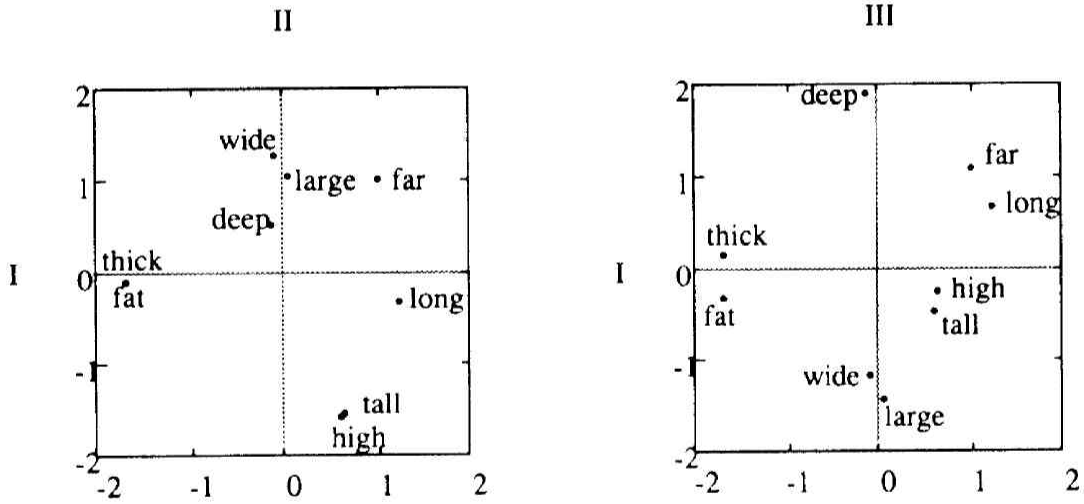
Dimension I (most weighted) :

Dimension I of EEP was interpreted as [〈1 Dim〉 vs. 〈Volume/



Averaged STRESS[2] = 0.154 ; Averaged RSQ[3] = 0.738
Overall Weights of Dimensional Axes : I = 0.527, II = 0.108, III = 0.103

Fig. 3 INDSCAL Configurations : EEP



Averaged STRESS = 0.186 ; Averaged RSQ = 0.663
Overall Weights of Dimensional Axes : I = 0.351, II = 0.179, III = 0.132

Fig. 4 INDSCAL Configurations : EJP-LI

Size〉] in Tanaka (1992).

EEP :

(7) $\begin{bmatrix} thick,\ fat \\ wide,\ large \end{bmatrix} \longleftrightarrow \begin{bmatrix} far\text{-}long \\ high\text{-}tall \end{bmatrix}$ 〈1Dim〉⟷〈Volume/Size〉

Dimension II (second most weighted):

The probable interpretation of Dimension II of EEP was [〈−Salient〉 ⟷ 〈+Salient〉] in Tanaka (1992).

EEP:

(8) [deep] ⟷[(high/tall) <large]

The overall INDSCAL configurations, nevertheless, present no clear acquisition.

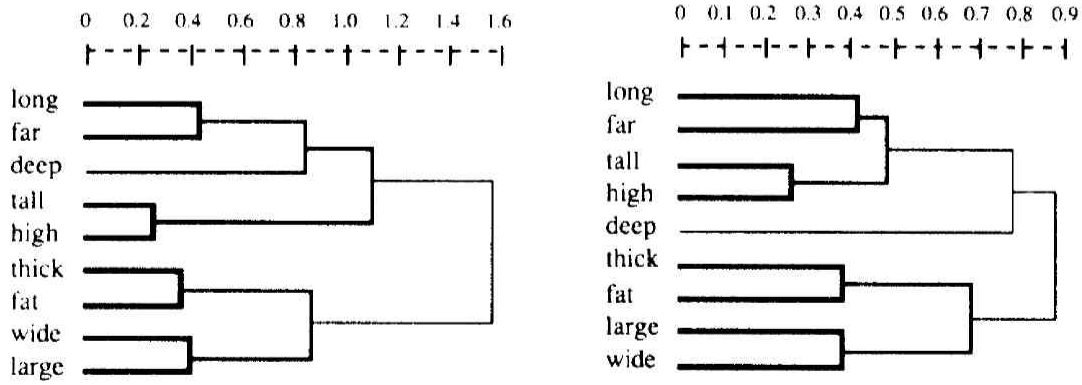
Aspect 2. What is acquired at a later / an advanced stage (i, e., not by the LI-level learners but by the A-level learners)?

Comparison of EEP and EJP-A with EJP-LI.

The HCA tree diagrams show that while there is a complete correspondence in classification between EJP-LI and EJP-A, such a classification does not completely fit that of EEP.

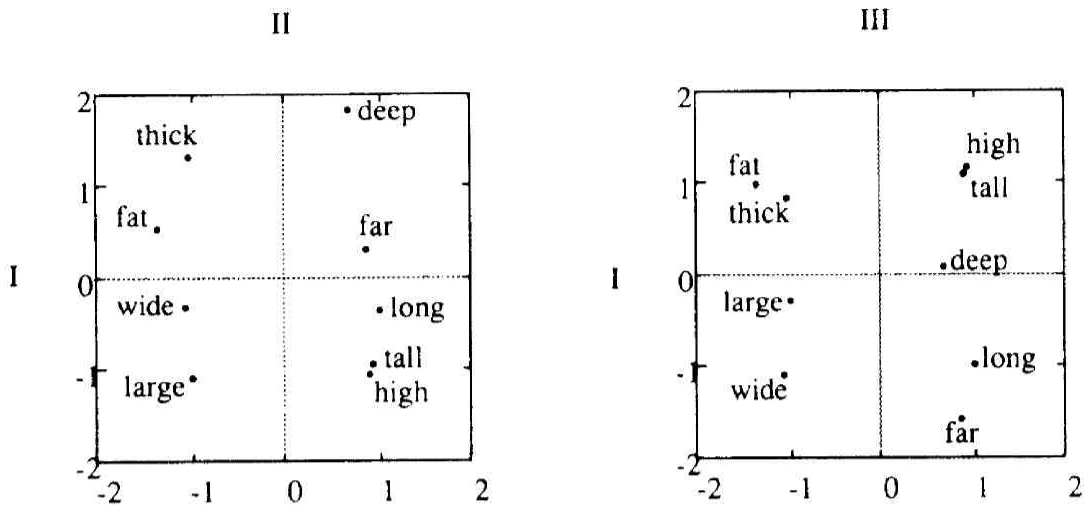
The features of (7) and (8) are acquired more accurately at this stage.

The INDSCAL configurations display the following common feature between EEP and EJP-A on Dimension III, which is not found in



'Maximum Distance Method' 'Minimum Distance Method'

Fig. 5 Hierarchical Clustering Analysis : EJP-A



Averaged STRESS=0.152 ; Averaged RSQ=0.755
Overall Weights of Dimensional Axes: I =0.467, II=0.144, III=0.144

Fig. 6 INDSCAL Configurations: EJP-A

any of the weighted dimensions of the configurations of EJP-LI:

Dimension III (least weighted):

The probable interpretation of Dimension III of EEP was [〈Object〉 ⟷ 〈Space〉] in Tanaka (1992). 〈Object〉 indicates a label of something about the description of a concrete mass object; 〈Space〉 is a label of positional description in space.

EEP :

(9) $\begin{bmatrix} high,\ tall \\ deep,\ thick \\ large,\ fat \end{bmatrix} \longleftrightarrow \begin{bmatrix} far,\ wide \\ long \end{bmatrix}$

EJP-A :

(10) $\begin{bmatrix} high,\ tall \\ fat,\ thick \\ (deep) \end{bmatrix} \longleftrightarrow \begin{bmatrix} far \\ wide \\ long \\ (large) \end{bmatrix}$

Aspect 3. What is not (easily) acquired even at a later / an advanced stage (i. e., even not by the A-level learners)?

Comparison of EEP with EJP-A and EJP-LI.

In both types of HCA tree diagrams, the following similarity and dissimilarity found in EEP are found neither in EJP- LI nor EJP-A:

(11) *EEP:* *wide* is similar to *thick-fat*
wide is relatively dissimilar to *large*

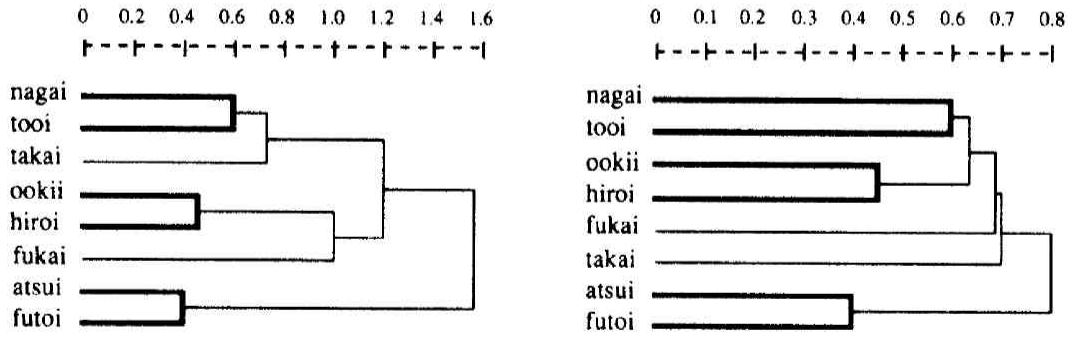
(12) *EJP-LI & EJP-A:* *wide* is (relatively) dissimilar to *thick-fat*
wide is similar to *large* (*wide-large* is a primary group)

The INDSCAL solutions show similar inter-lexical structures between EEP and EJP-A. This result of the INDSCAL solutions, however, does not conflict with the result of the above similarity and dissimilarity. For, since the relation of *wide* to *thick-fat* and *large* in the INDSCAL configurations is a local one, it is not appropriate even to consider it (see Kruskal and Wish, 1978).

Aspect 4. What explanation will be offered as to Aspects 1, 2, and 3 by examining the psychological inter-lexical relations found in JJP?

HCA:

Correspondences between JJP and EJP-LI	Correspondence with EEP
(13) [*takai*] = [*tall-high*] (*for*(1))	Yes
(14) [*tooi-nagai*] = [*far-long*] (*for*(2))	Yes



'Maximum Distance Method' 'Minimum Distance Method'

Fig. 7 Hierarchical Clustering Analysis : JJP

(15) [*atui-futoi*] = [*thick-fat*] (*for*(3)) Yes

(16) [*hiroi-ookii*] = [*wide-large*] Yes and No

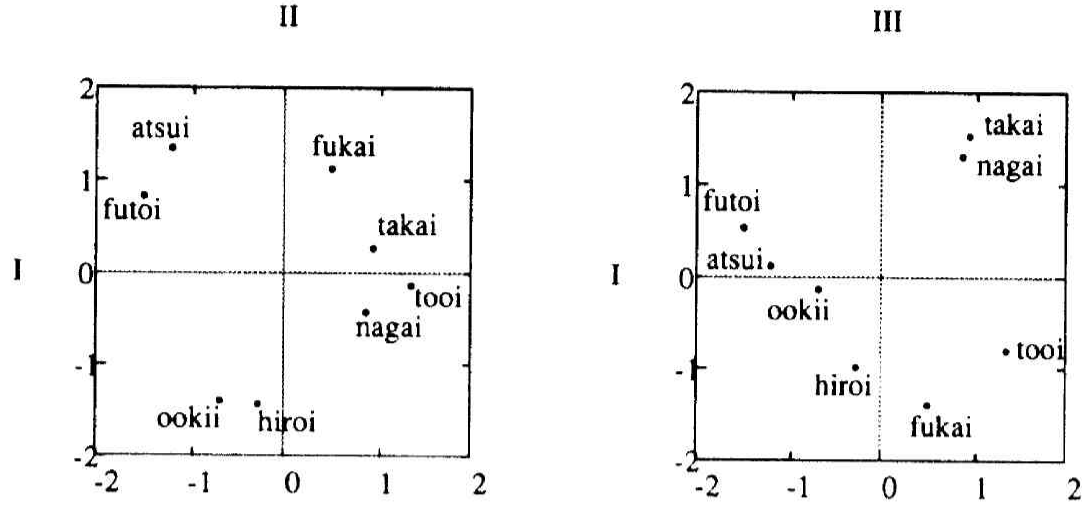
(11) and (12) indicate that it is more important to note that (16) is probably a case of more of negative transfer than of positive transfer.

Differences between JJP and EJP-LI

	JJP	EJP-LI	Correspondence of EJP-LI with EEP
(17)	$\begin{bmatrix} atsui \\ futoi \end{bmatrix} \longleftrightarrow \begin{bmatrix} ookii \\ hiroi \end{bmatrix}$	$\neq \begin{bmatrix} thick \\ fat \end{bmatrix} - \begin{bmatrix} large \\ wide \end{bmatrix}$ (for(5))	Yes
(19)	[*fukai*] - [*hiroi-ookii*]	$\neq$ [*deep*] $\longleftrightarrow$ [*wide-large*]	Yes

Indecisive

	JJP	EJP-LI	Correspondence of EJP-LI with EEP
(19)	In 'max':		
	$\begin{bmatrix} nagai \\ tooi \end{bmatrix}$ - [*takai*]	$= \begin{bmatrix} long \\ far \end{bmatrix} - \begin{bmatrix} tall \\ high \end{bmatrix}$ (for(4))	Yes
(20)	In 'min':		
	$\begin{bmatrix} nagai \\ tooi \end{bmatrix} \longleftrightarrow$ [*takai*]	$\neq \begin{bmatrix} long \\ far \end{bmatrix} - \begin{bmatrix} tall \\ high \end{bmatrix}$ (for(4))	Yes
(21)	In 'max':		
	(for(6))		
	$\begin{bmatrix} nagai \\ tooi \\ takai \end{bmatrix} \longleftrightarrow \begin{bmatrix} atsui \\ futoi \\ hiroi \\ ookii \end{bmatrix}$	$= \begin{bmatrix} long\text{-}far \\ tall\text{-}high \end{bmatrix} \longleftrightarrow \begin{bmatrix} thick\text{-}fat \\ wide\text{-}large \end{bmatrix}$	Yes
(22)	In'min':		
	(for(6))		
	$\begin{bmatrix} nagai \\ tooi \\ ookii \\ hiroi \\ (takai) \end{bmatrix} \longleftrightarrow \begin{bmatrix} atsui \\ futoi \end{bmatrix}$	$\neq \begin{bmatrix} long\text{-}far \\ tall\text{-}high \end{bmatrix} \longleftrightarrow \begin{bmatrix} thick\text{-}fat \\ wide\text{-}large \end{bmatrix}$	Yes



Averaged STRESS=0.182 ; Averaged RSQ=0.589
Overall Weights of Dimensional Axes: I =0.333, II=0.134, III=0.122

Fig. 8 INDSCAL Configurations : JJP

(17), (18), (20) and (22) imply the acquisition not based on the learners' native language, Japanese.

INDSCAL:

Matching of JJP with the features of (7), (8), and (9) of EEP is as follows.

	Matching of JJP with EEP	EJP-LI	EJP-A	Features of EEP
(23)	Fairly good(II)	Moderate(I)	Acquired(I)	(7)
(24)	Almost No	Moderate(III)	Acquired(II)	(8)
(25)	No	No	Acquired(III)(10)	(9)

Note that the feature of (7) has a strong salience (seen on the most weighted dimension) and is easily understood. The features of (8), (9), and (10), on the other hand, are hard to perceive; thus, the difficulty of their acquisition is well understandable.

The following correspondences between JJP and EJP-LI are noticeable.

Correspondences between JJP and EJP-LI

	JJP	EJP-LI	Correspondence of EJP-LI with EEP
(26)	[*atsui* / *futoi*] ⟷ [*nagai* / *takai* / *tooi*] = [*thick* / *fat*] ⟷ [*long* / *tall* / *far* / *long*]		Yes
	(Dimension I)	(Dimension I)	
(27)	[*fukai*] ⟷ [*hiroi* / *ookii*] = [deep] ⟷ [*wide* / *large*]		Not clear
	(Dimension II)	(Dimension III)	

Since the behavior of *deep* is very odd (see also its behavior in the HCA tree diagrams), we will not consider it seriously here.

(28)	[*fukai* / *hiroi* / *tooi* / *ookii*] ⟷ [*nagai* / *takai*] = [*wide* / *large* / *far* / *deep*] ⟷ [(*long*) / *tall* / *high*]		No
	(Dimension III)	(Dimension II)	
(29)	[*atsui* / *fukai*] ⟷ [*ookii* / *hiroi*] = [*thick* / *deep*] ⟷ [*large* / *wide*]		No
	(Dimension II)	(Dimension III)	

(28) and (29) probably disclose cases of negative transfer.

Acquisition of the Subgroup of Negative-Pole Adjectives

Meaningful structures are hard to find either in HCA or INDSCAL.

Aspect 1. What is acquired at an early stage (i. e., by the LI-level learners)?

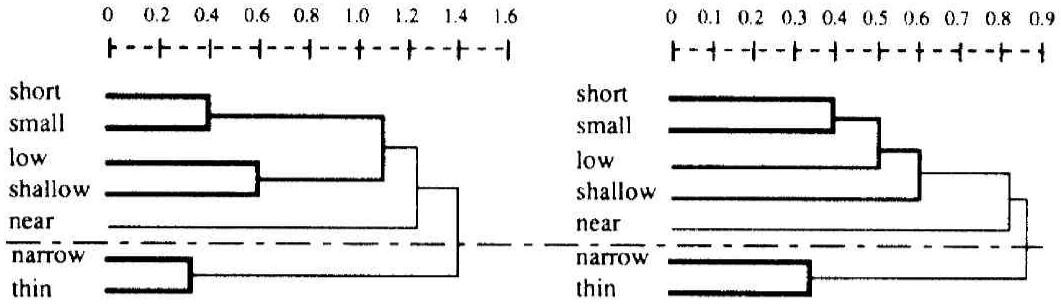
Comparison of EEN with EJN-LI.

HCA:

The following inter-lexical similarities and dissimilarities are observed in the HCA tree diagrams.

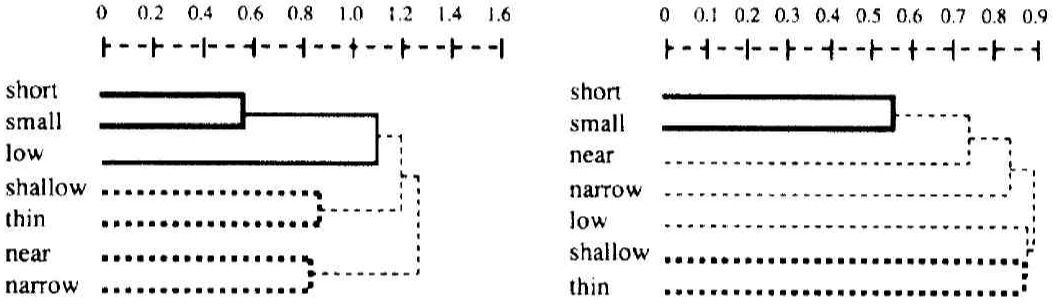
In the HCA tree diagrams both of 'max' and 'min':

(30) [*short-small*]



'Maximum Distance Method' 'Minimum Distance Method'

Fig. 9 Hierarchical Clustering Analysis : EEN



'Maximum Distance Method' 'Minimum Distance Method'

Fig. 10 Hierarchical Clustering Analysis : EJN-LI

(31) [*short-small*] ⟷ [*narrow*]

(32) [*short-small*] ⟷ [*thin*]

Note that *narrow* and *thin* are not clustered in the tree diagrams of EJN-LI. In the HCA tree diagrams of 'max':

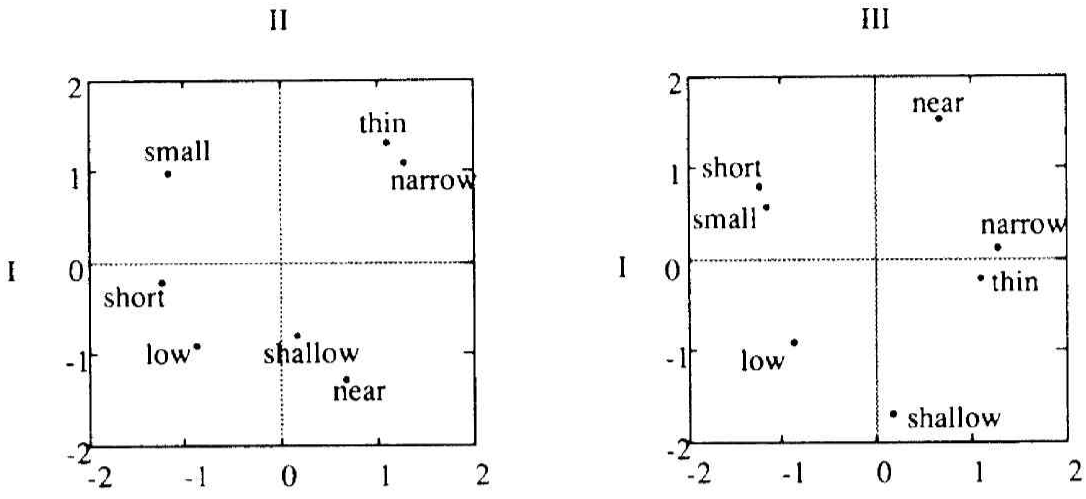
(33) [*short-small*] - [*low*]

Unlike the case of EEN, however, *low* is not clustered to *shallow* in EJN-LI.

INDSCAL:

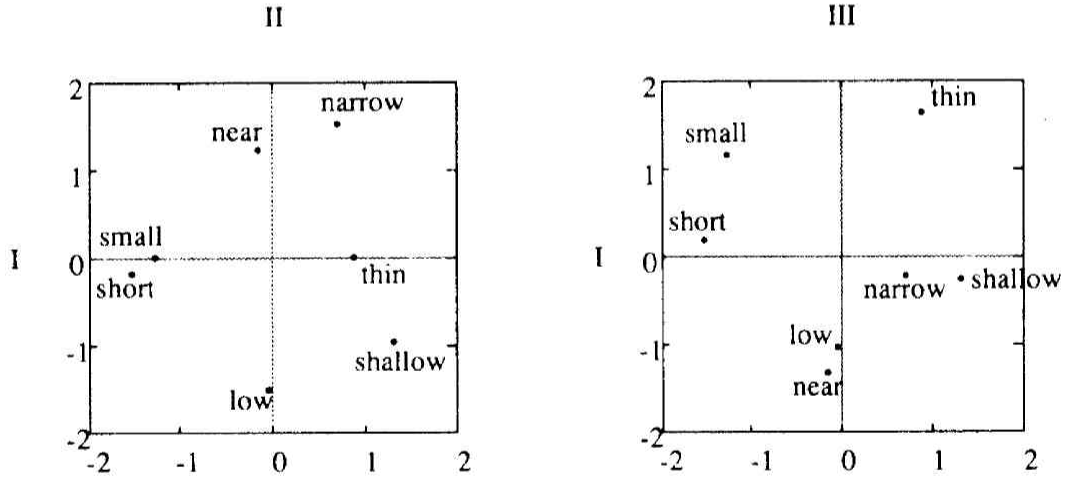
Dimension I (EEN) and Dimension I (EJN-LI):

The probable interpretation of Dimension I (EEN) was [<+



Averaged STRESS=0.137; Averaged RSQ=0.770
Overall Weights of Dimensional Axes: I =0.328, II=0.266, III=0.177

Fig. 11 INDSCAL Configurations : EEN



Averaged STRESS=0.180; Averaged RSQ=0.393
Overall Weights of Dimensional Axes: I =0.137, II=0.133, III=0.123

Fig. 12 INDSCAL Configurations : EJN-LI

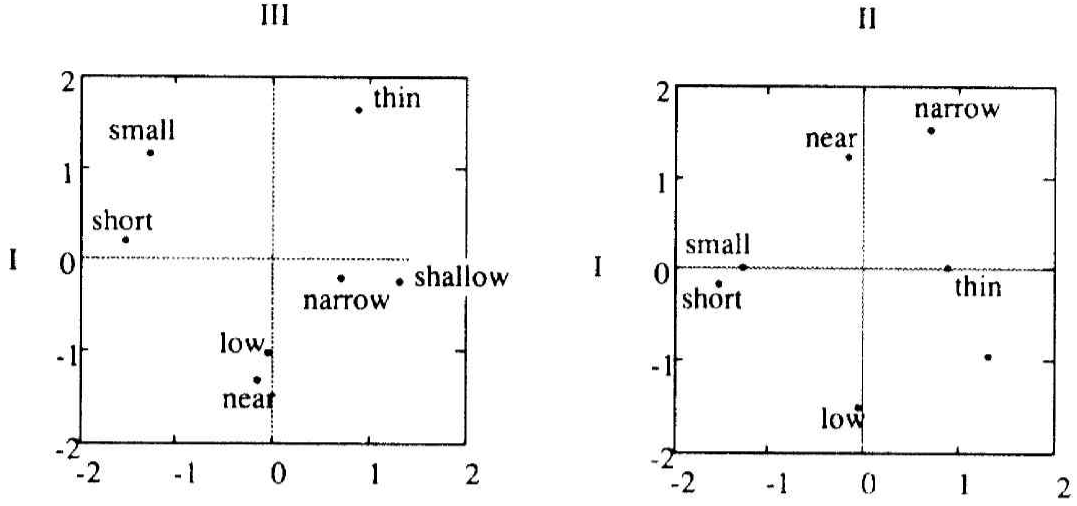


Fig. 13 INDSCAL Configurations : EJN-LI

salient〉 ⟷ 〈−salient〉] in Tanaka (1992). This interpretation has some correspondence along Dimension I in EJN-LI.

(34) [*small, short*] ⟷ [*thin, narrow, shallow*]

Dimension II (EEN) and Dimension III (EJN-LI) :

The possible interpretation of Dimension II (EEN) was [〈Volume/Size〉 ⟷ 〈1 Dim〉] in Tanaka (1992).

(35) [*thin, small*] ⟷ [*near, low, shallow*]

Dimension III (EEN) and Dimension II (EJN-LI) :

(36) [*near*] ⟷ [*low, shallow*]

In fact, if Dimension II and III of the EJN-LI configurations are reverted, then the configurations of EEN and EJN-LI are fairly alike (see Figure 13).

Aspect 2. What is acquried at a later/an advanced stage (i.e., not by the LI-level learners but by the A-level learners)?

Comparison of EEN and EJN-A with EJN-LI.

HCA :

Similarity in both 'max' and 'min' between EEN and EJN-A :

(37) [*narrow-thin*]

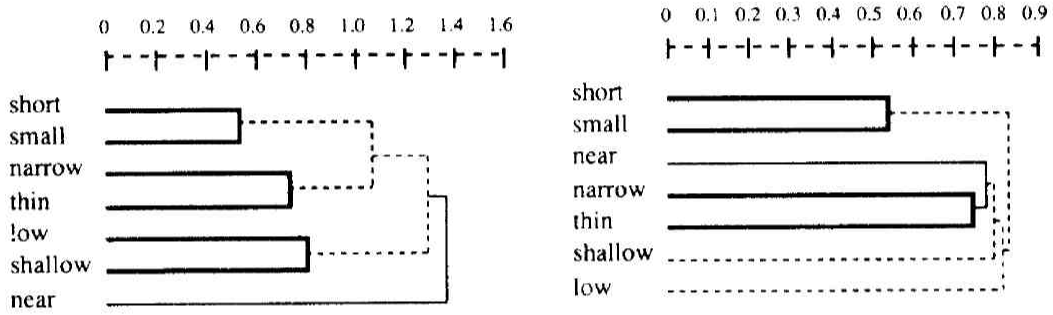
The HCA tree diagrams of EJN-LI do not have such a cluster.

Similarity in both 'max' and 'min' of EEN and in 'max' of EJN-A : (38) [*low-shallow*]

However, neither of the tree diagrams of EJN-LI has its clear counterpart.

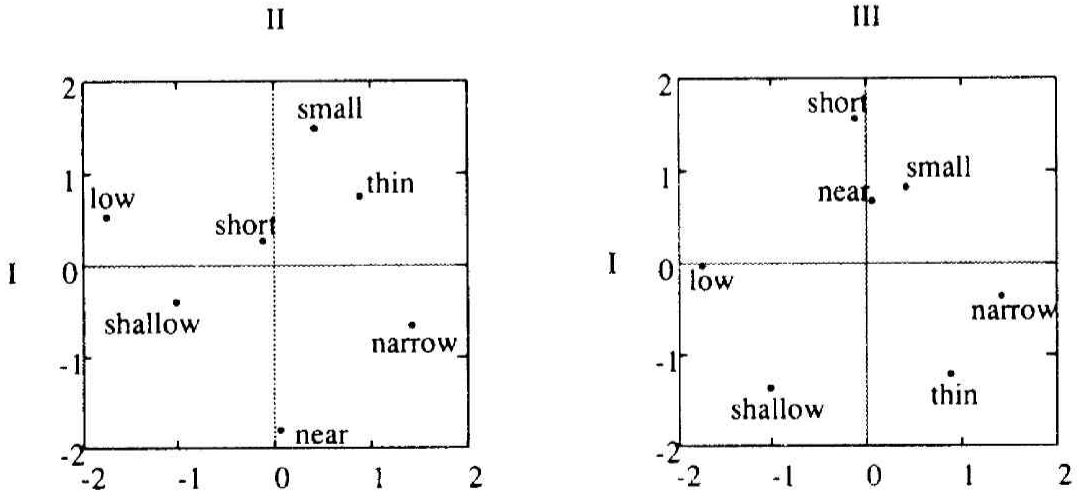
INDSCAL :

It is very hard ot find an overall similarity between the configurations of EEN and EJN-A (see Tanaka (1991)). Only the contrasting feature (34) seen along Dimension I (most weighted) of both EEN



'Maxinum Distance Method' 'Minimum Distance Method'

Fig. 14 Hierarchical Clustering Analysis : EJN-A



Averaged STRESS=0.146 ; Averaged RSQ=0.518
Overall Weights of Dimensional Axes : I =0.180, II =0.172, III=0.168

Fig. 15 INDSCAL Configurations : EJN-A

and EJN-LI is observed along the least weighted Dimension III of EJN-A, and besides this is a deformed type of (34), which is found to be already acquired in EJN-LI. We can find neither (35) nor (36), nor any other newly acquired features. This result is now puzzling since the acquisition process is backward here.

Aspect 3. What is not (easily) acquired even at a later/ an advanced stage (i.e., even not by the A-level learners) ?

Comparison of EEN with EJN-A and EJN-LI.

HCA :

The following contrast in EEN can be observed neither in EJN-A nor EJN-LI.

(39) [*short-small, low-shallow, near*] ⟷ [*narrow-thin*]

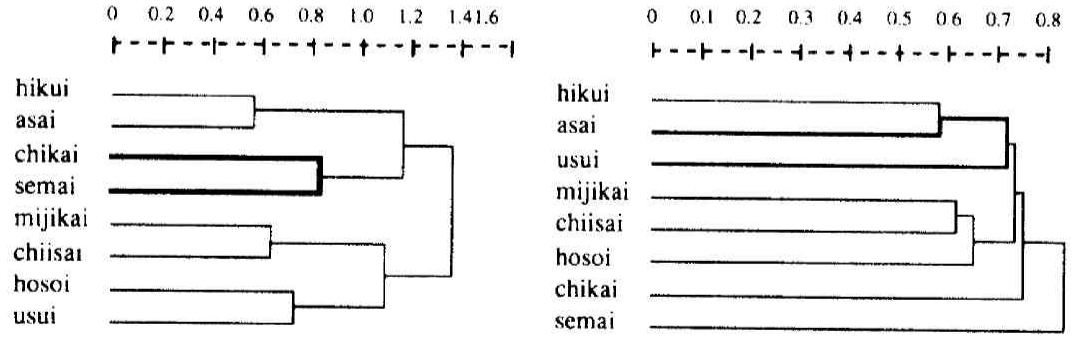
INDSCAL :

The some puzzling regression from EJN-LI to EJN-A that we have seen in Aspect 2 gives us no findings concerning the present exploration.

Aspect 4. What explanation will be offered as to Aspects 1, 2, and 3 by examining the psychological inter-lexical relations found in JJN ?

HCA :

Similarities between JJN and EJN-LI Correspondence with EEN



'Maximum Distance Method' 'Minimum Distance Method'

Fig. 16 Hierarchical Clustering Analysis : JJN

(40) [*mijikai-chiisai*] = [*short-small*] (for(30)) Yes

(41) $\left[\begin{bmatrix} mijikai \\ chiisai \end{bmatrix} \longleftrightarrow [semai]\right] = \left[\begin{bmatrix} short \\ small \end{bmatrix} \longleftrightarrow [narrow]\right]$ (for(31)) Yes

The feature of (40), or (30), is probably psychologically easy to process. The dissimilarity (41) may be distinct to the learners.

(42) In 'max' :
[*chikai-semai*] = [*near-narrow*] No

(43) And probably in 'min' :
[*asai-usui*] = [*shallow-thin*] No

(44) $\left[[semai] \longleftrightarrow \begin{matrix}[usui] \\ [hosoi]\end{matrix}\right] = \left[[narrow] \longleftrightarrow [thin]\right]$ No

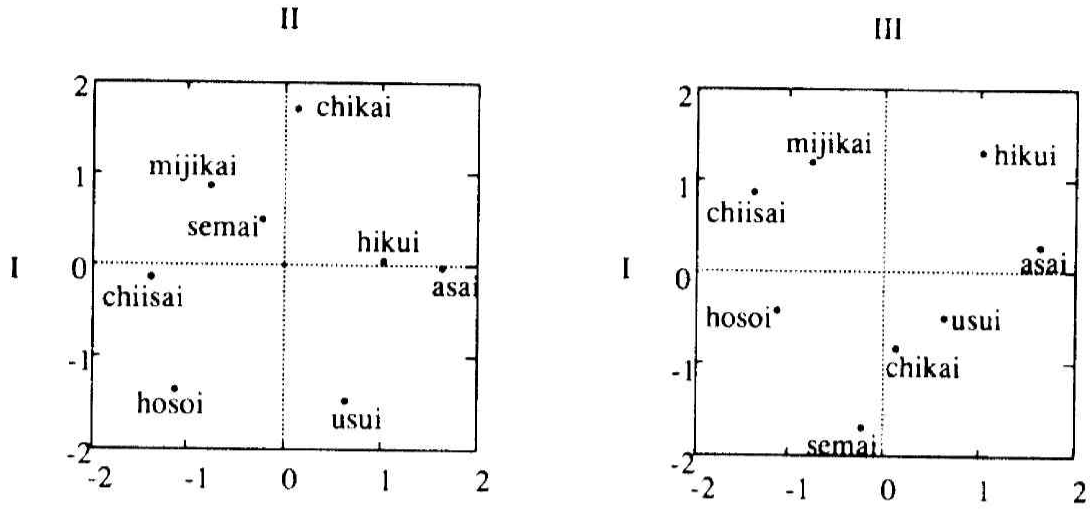
(42), (43), and (44) show the possibility of negative transfer. The cluster of [*narrow-thin*] (37) is acquired at the later stage EJN-A, and the similarity between *near* and *narrow* and between *shallow* and *thin* are also reduced in EJN-A.

Differences between JJN and EJN-LI

	JJN	EJN-LI	Correspondence of EJN-LI with EEN
(45)	$\begin{bmatrix} mijikai \\ chiisai \end{bmatrix} - \begin{bmatrix} hosoi \\ usui \end{bmatrix}$	$\neq \begin{bmatrix} short \\ small \end{bmatrix} \longleftrightarrow [thin]$ (for (32))	Yes
(46)	$\begin{bmatrix} mijikai \\ chiisai \end{bmatrix} \longleftrightarrow [hikui]$	$\neq \begin{bmatrix} short \\ small \end{bmatrix} - [low]$ (for(33))	Yes
(47)	[*hikui*] − [*asai*]	≠ [*low*] ⟷ [*shallow*]	No

(45) and (46) probably denote the acquisition not based on the learners' native language. Regarding (47), the clustered [*low-shallow*] in EEN is acquired fairly well in EJN-A (see (38)). This fact tells that even though there already exists the corresponding cluster of [*hikui-asai*] in Japanese, its English counterpart is acquired later.

Finally, the unacquired global contrast [*short-small, low-shallow, near*] ⟷ [*narrow-thin*] of EEN (39) does not find any equiva-



Averaged STRESS=0.173; Averaged RSQ=0.478
Overall Weights of Dimensional Axes: I =0.176, II =0.167, III =0.135

Fig. 17 INDSCAL Configurations: JJN

lent contrast in JJN. This global structural difference between EEN and JJN must be responsible for the lack of acquisition of the English contrast (39).

INDSCAL :

Almost no corresponding contrasting features of (34), (35), and (36) are detected in the configurations of JJN.

Correspondence with acquisition of JJN	Acquired in EJN-LI	Correspondence with EJN-A
(48) Moderate	Contrast(34)	Yes*
(49) Yes and No**	Contrast(35)	No***
(50) No Correspondence	Contrast(36)	No****

*The contrast (34) is more moderate on Dimension III (least weighted) of EJN-A. Thus,the acquisition of (34) is better in EJN-LI than EJN-A, indicating *regression* (see Aspect 2).

**On Dimension I of JJN, if *thin* is assumed as *hosoi*, then 'yes'; if, on the other hand, *thin* is assumed as *usui* or both of them, then 'no' (Cf. Aspect 2).

***Whether or not (35) has a correspondence in JJN, it is lost in JJN-A. *Regression* is observed. (See Aspect 2).

****Again, *regression* is found here (see Aspect 2).

Between EJN-LI and JJN, it is hard to find any other similar structures along any of the three dimensional axes, except (34).

SUMMARY OF ANALYSIS

Semantic development about the English spatial adjectives learned by the Japanese learners is summarized from the analysis above as follows.

Aspect 1

Positive-Pole Adjectives:

The fundamental correspondence between the HCA diagrams of EEP and EJP-LI illustrate that basic denotative meaning of each adjective have been acquired at the early stage with an exception of the denotative meaning of *wide* (see Aspect 3). Only moderate resemblance of the INDSCAL configurations between EEP and EJP-LI indicates that the acquisition of psychological inter-lexical relations of the words is not satisfactory.

Negative-Pole Adjectives:

Unlike the above case, much better, and fairly good, acquisition is found in the INDSCAL results. The HCA diagrams, on the other hand, show that only some partial acquisition has occurred. The latter results are extremely poor compared with the acquisition found in the HCA results above.

Aspect 2

Positive-Pole Adjectives:

More precise inter-lexical relations of words have been acquired later (see the analysis of the INDSCAL configurations).

Negative-Pole Adjectives:

Not much progress has been made in acquisition from EJN-LI to EJN-A. The feature about (37) is the only newly acquired feature that is found here. Surprisingly, even regression is revealed in the analysis of the INDSCAL result.

Aspect 3

Positive-Pole Adjectives:

Sitll, certain inter-lexical relations of words have not been acquired even at the later stage; namely, the relations of *wide* to *thick-fat* and *large*.

Negative-Pole Adjectives:

No further acquisition has not taken place. Rather, it seems that some of what was acquired at the early stage has been lost.

Aspect 4

Positive-Pole Adjectives:

(13), (14), (15), (19), (21), (7) and (23), and (26) illustrate the possibility of positive transfer. However, we cannot simply decide that they were its cases since it seems that they are also cognitively (or perceptually) easily processed. There were features that had seemingly been acquired early independently of the learners' LI. They are the feafures about (17), (18), (20), (22), and (8) (see (24)). The possibility of negative transfer at the early stage is indicated by (28) (29), and partly (16). Actually, the effect of such negative transfer appears to persist more or less even at the later stage (see (12) for (16), and Dimension III ane Dimension II of the INDSCAL configuration of EJP-A respectively for (28) and (29)). The feature of (9), acquired only at the later stage (10), has almost no equivalents in the learners' L1 (see (25)). Indeed, its contrasting characteristic does not seem to be understood easily.

Negative-Pole Adjectives:

(40) and (41) are possibly the cases of 'positive transfer' *These are probably psychologically easy to process, especially (40)*. The characteristics of (34), (35), and (36) were acquired at the early stage, probably without depending upon the learners' L1. (45) and (46) also illustrate such learning may have taken place. (42), (43), and (44), and the lack of acquisition of (39)

may express negative transfer. These negative transfer cases seem to be more or less limited to the early learning, except (39). The influence of (44) is completely corrected at the advanced stage (see (37)), and the influence of (42) and (43) is also weakened at this stage. The global contrast (39), however, is not learned at all even at this advanced stage. As mentioned before, the similarity of [*low-shallow*] acquired fairly well only later (see (38)) does have its clear counterpart in JJN (see (47) and its explanation).

CONCLUSION AND DISCUSSION

Concerning the first exploring questions, specific inter-lexical features acquired and not acquired are revealed above. Taking those features into consideration along the learners' levels of the language leads us to the impression that generally the inter-lexical features of the English spatial adjectives are acquired by the learners the more easily, the easier they are to psychologically process and the better correspondences they have in the learners' native language. This impression is not surprising.

Many of the unacquired features are very likely to have their causes in the learners' L1 ; that is, they are considered to be caused by negative transfer. Some of those are acquired later, but others persist. The persistent features are ones about (16), (28), (29), and (39). Among these, the case of (16) is probably induced by the difference in denotative meaning between *hiroi* and *wide*, each of which is the other's translation counterpart. Denotatively, *hiroi* denotes a two-dimensional extension or expansion, whereas *wide* requires a further specification, that is, a feature of 'border-to-border' distance. With respect to the cases of (28), (29), and (39), we can only speculate that their psychological meanings are transferred to their English counterparts. At any rate, their negative transfer

is considered to be caused by still persisting translation strategy by the learners (Tanaka, 1991).

We now need to mention the significant difference in the degree of acquisition by the Japanese learners of English between the positive-pole and the negative-pole spatial adjectives of English. The general progress of acquisition of the words by the Japanese learners from the low-intermediate to the advanced stages obviously favors the positive-pole adjectives. Particularly, far better acquisition of the positive-pole words than the negative counterparts at the advanced stage is strikingly clear. This eventual difficulty with the negative-pole terms is probably related to their difficulty itself. Unlike the case of the positive-pole terms, the dimensional meanings that distinguish each of the negative-pole terms from the others are hard to grasp; as a result, their inter-lexical structures are hardly interpretable (Tanaka, 1992).

Finally, the process of acquiring the English negative-pole adjectives by the learners is mysterious. Neither of matchings between EEP and JJP and between EEN and JJN is very good, while the meanings of the positive-pole terms are much clearer for the reason above. Nevertheless, the INDSCAL results observed in EJN-LI (at the early stage, not at the advanced stage) revealed good acquisition while their positive counterparts exhibited rather poor acquisition. Furthermore, this good acquisition by the learners at the early stage is lost at the advanced stage. It seems hard to give an adequate explanation about this backward process at this moment. Further research will probably be necessary.

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1 The last type of subjects had not been considered in Tanaka (1991)
2 STRESS values are Kruskal's STRESS Formula 1.
3 RSQ valucs are the proportion of variance of the scaled data (disparities) in the partition (row, matrix, or entire data) which is accounted for by their corresponding distances.

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