Is Evoking Negative Meanings the Unique Feature of Adjective Metaphors?

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Abstract

Previous metaphor studies have paid much attention to nominal and predicative metaphors and little attention has been given to adjective metaphors. Although some studies have focused on adjective metaphors, they have only examined how the acceptability of adjective metaphors can be explained by the pairing of adjective modifier's and head noun's modalities and little attention has been given to meanings evoked by adjective metaphors. Sakamoto & Utsumi (2009) showed that adjective metaphors, especially those modified by color adjectives, tend to evoke negative meanings. Thus, our study examines whether evoking negative meanings is the unique feature of adjective metaphors through the comparison with nominal and predicative metaphors for the Japanese language. Our psychological experiments revealed that meanings of metaphors are basically affected by meanings of vehicles. However, when a vehicle itself has the neutral meaning, negative meanings are evoked more frequently for adjective metaphors among the other types of metaphors.

Keywords: adjective metaphors; nominal metaphors; predicative metaphors; Japanese language; negative meanings.

Introduction

Metaphor studies in the domain of cognitive science have paid much attention to nominal metaphors such as "*My job is a jail*" (e.g., Bowdle & Gentner, 2005; Glucksberg, 2001) and predicative metaphors such as "He *shot down* all of my arguments" (e.g., Lakoff & Johnson, 1980; Martin, 1992). Previous metaphor studies, however, have paid little attention to adjective metaphors such as "*sweet touch*" and how they are comprehended. Some models have been proposed to explain the mechanism of metaphor comprehension in cognitive science. One theory that can explain the mechanism of metaphor comprehension would be the comparison theory proposed by Bowdle & Gentner (2005). This theory argues that metaphors are processed via a comparison process consisting of an initial alignment process between the source and the target concepts followed by a process of projection of aligned features into the target concept. On the other hand, Glucksberg and his colleagues (Glucksberg, 2001; Glucksberg & Keysar, 1990) propose categorization theory. This theory addresses mainly nominal metaphors and argues that people understand nominal metaphors by seeing the target concept as belonging to the superordinate metaphorical category exemplified by the source concept. These two theories target nominal metaphors and predicative metaphors. As for the mechanism of adjective metaphors, Utsumi & Sakamoto (2007) propose a two-stage categorization theory and argue that the comprehension process of adjective metaphors could be explained as a two-stage categorization process. The intuitive idea behind two-stage categorization is that correspondences between the properties literally expressed by the adjective and the properties to be mapped onto the noun would be indirect, mediated by an intermediate category, rather than direct as predicted by the categorization theory.

Our study focuses on adjective metaphors and compares their semantic features with those of nominal and predicative metaphors.

Many studies focusing on adjective metaphors; including Werning, Fleischhauer, & Beşeoğlu (2006), have examined how the acceptability of adjective metaphors can be explained by the pairing of adjective modifier's and head noun's modalities. Ullmann (1951), in a very early study on adjective metaphors, proposes a certain hierarchy of lower and higher perceptual modalities. He claims that qualities of lower senses should preferentially occur in the source domain, while qualities of higher senses should be preferred in target domain. His thesis of directionality thus asserts that a metaphor with a source domain lower in the hierarchy of sense modalities than the target domain should tend to be cognitively more accessible than a metaphor with the reverse direction of domains. After Ullmann, Williams (1976) makes a more differentiated claim of directionality, in which a similar order of sense modalities is proposed. Recently, Yu (2003) highlights cross-linguistic differences, when he makes different directionality claims for different languages (English as compared to Chinese). Werning, Fleischhauer, & Beşeoğlu (2006) explore the factors that enhance the cognitive accessibility of adjective metaphors for the German language. Very few studies, however, have attempted to explore meanings evoked by adjective metaphors.

Sakamoto & Utsumi (2009) is one of the few studies which have explored meanings evoked by adjective metaphors. They compare the actual semantic changes

observed through their psychological experiments with the semantic changes predicted by Abstract Performance Grammar (APG) model. APG proposed by Osgood (1980) states the crucial rules to evoke semantic changes through fine semantic interactions in the processing of linguistic expressions.

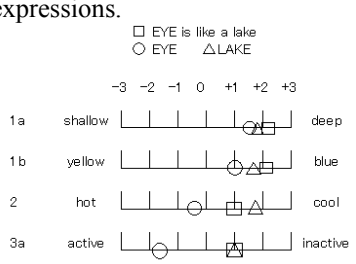

Figure 1: Profile of semantic differential of metaphor constituents: topic:○, vehicle:△, and metaphor topic:□.

As for the metaphorical expression in Figure 1, certain properties of "EYE" as a topic are characterized by "a lake" as a vehicle. As a result, certain meanings of metaphorical expressions are evoked.

158 Japanese adjective metaphors were used for their psychological experiment. Participants were asked to rate the assigned expressions against 15 SD scales such as "uncomfortable – comfortable", "dark – light", "ugly – beautiful", "dull – sharp", and "coarse – delicate". The ratings were made on a 7-point scale ranging from -3 through 0 to +3. The value -3 was regarded as the negative semantic pole and the value +3 as the positive semantic pole. For example, "comfortable" is positive semantic pole and "uncomfortable" is negative semantic pole. All the mean values of vehicles and topics rated on the 15 SD scales were classified into T=V, T<V, T>V. Using t-test (two-tailed, the alpha level .05), the cases which have no significant difference between the mean value of T and V were regarded as T=V.

The other codes such as T<V and T>V fall to the cases which have significant differences between the mean values of T and V. The total number falling under each classification is given as 'sum' in the far right column of Table 1. In order to compare the actual semantic changes resulting from their experiment with the semantic changes predicted by APG model, Sakamoto & Utsumi (2009) classified the actual semantic changes resulting from their experiment as show in Table 1. Using t-test (two-tailed, the alpha level .05), they regarded the cases which have no significant difference between the mean values of T and metaphors as 'no change' (0) and the cases which have significant differences between them as changes either to the negative pole (-) or to the positive pole (+). Table 1 shows the comparison between the predicted semantic changes and the actual semantic changes observed through their experiment.

Table1:Comparison between predicative semantic changes and actual semantic changes

semantic intensity	predicted change	actual change			Sum
		0	+	-	
T=V	0	331	17	261	609
T<V	+	366	230	76	672
T>V	-	119	9	961	1089
Sum		816	256	1298	2370

numbers = cases of SD scales

In order to see the tendency for adjective metaphors to evoke positive or negative meanings, Sakamoto & Utsumi (2009) classified all the cases showing different changes from the APG prediction either into positive meaning or negative meaning. The cases showing no change as against the prediction of changing to - were regarded as evoking a weakly positive meaning, and were classified into the positive meaning category in the same way as those which changed to + against the prediction of changing to -. The cases showing no change against the prediction of changing to + were regarded as evoking weakly negative meaning, and were classified into the negative meaning category in the same way as those which changed to – against the prediction of changing to +. As a result, 848 cases which showed changes different from the APG prediction were classified into 145 positive meanings and 703 negative meanings. A Chi-square test showed that the cases showing negative meanings were significantly more frequent than those showing positive meanings, χ^2 (1, N=848) = 367.175, $p < .001$. Based on this result, Sakamoto & Utsumi (2009) suggest that adjective metaphors tend to evoke negative meanings.

In addition, Sakamoto & Utsumi (2009) analyze the tendency of evoking negative meanings among the types of adjective metaphors. They classified the number of cases either into positive meaning or negative meaning. Table 2 shows comparison among the 5 types of adjective metaphors.

Table 2: Comparison among the 5 types of adjective metaphors

	positive effect	negative effect	sum
Color	4	312	316
Touch	47	84	131
Sound	41	64	105
Taste	19	145	164
Smell	34	98	132
Sum	145	703	848

numbers = cases of SD scales

Chi-square tests with Bonferroni correction (the alpha level .05) were conducted among five types of adjective metaphors. The results showed that adjective metaphors created from adjectives denoting 'color' evoked the most negative meaning and they evoked significantly more negative meanings than the other four types of adjective metaphors.

Although their results are interesting, Sakamoto & Utsumi (2009) did not analyze whether evoking negative meanings is the unique feature of adjective metaphors. Thus, in this paper we compare adjective metaphors with nominal metaphors and predicative metaphors.

Pre-experiment

SD scales

Since we aim to examine whether evoking negative meanings is the unique feature of adjective metaphors, first we attempted to find appropriate scales to see whether metaphorical expressions evoke negative meanings. We conducted a pre-experiment using the following 32 SD scales, which are frequently used for psychological experiments.

SD scales:"dislike – like", "uncomfortable – comfortable", "ugly – beautiful", "dark – light", "sad – glad", "bad – good", inelegant – elegant", "not interesting – interesting", "unclear – clear", "not appropriate – appropriate", "dull – sharp", "persistent – tidy", "low – high", coarse – delicate", "not bright – bright", "unnecessary – necessary", "small – big", "heavy – light", "not salient –

salient", "moist – dry", "shallow – deep", "temporary – eternal", "big-little", "square – circular", "demonstrative – cover", "not mysterious – mysterious" "moveless – moving", "relieved - anxious", "fearful - benign", "low - high", "free - constrained", and "new-old".

10 Japanese males and females, aged 21 – 35, participated for the pre-experiment. Participants were asked to choose SD scales for which they can easily see one of semantic pole as positive and the other semantic pole as negative. As a result, we decided to use 7 SD scales, chosen by nine or more participants.

Table3 : List of SD scales used for the experiment

dark–light	*dislike–like*	*inelegant–elegant*
sad–glad	*ugly–beautiful*	*uncomfortable–comfortable*
bad–good		

Topics with neutral meanings

We selected topics and vehicles to make Japanese metaphorical expressions. Topics were selected from nouns which were categorized in the highly abstract semantic level in a Japanese thesaurus (yamaguchi, 2003). From those nouns, we selected nouns with high familiarity (Amano & Kondo (1999)). In this study we want to see how semantic interactions between topics and vehicles of three types of metaphors function to shift the meanings of nouns as topics to the positive pole or negative pole. Thus, we selected nouns with neutral meanings to be used as topics. We conducted another pre-experiment to find nouns with neutral meanings. Participants in the pre-experiment rated the meanings of the following 54 nouns;

Table 4 : List of Nouns used for the pre-experiment

gloss ("tuya")	*sound* ("saundo")	*abnormal odor* ("ishuu")
shine ("hikari")	*high note* ("kouon")	*body smell* ("taishuu")
illumination ("shoumei")	*bass* ("teion")	*bromopnea* ("koushuu")
light ("akari")	*buzz* ("souon")	*touch* (1) ("kanshoku")
color (1) ("iro")	*bell* ("beru")	*touch* (2) ("tezawari")
coloring ("iroai")	*gunshot* ("juusei")	*touch* (3) ("tacchi")
color (2) ("irodori")	*detonating sound* ("bakuon")	*touch* (4) ("shokkaku")
taste (1) ("aji")	*call* ("nakigoe")	*past* ("kako")
taste (2) ("mikaku")	*quiet* ("seijaku")	*yesterday* ("kinou")
after taste ("atoaji")	*silence* ("chinmoku")	*last year* ("kyonen")
body ("koku")	*flavor* ("kaori")	*moment* ("genzai")
taste (3) ("teisto")	*smell* ("nioi")	*today* ("kyou")
noise ("oto")	*fragrance* ("houkou")	*current year* ("kotoshi")
voice ("koe")	*stink* ("akushuu")	*future* ("mirai")
tomorrow ("ashita")	*heart* ("kokoro")	*footstep* ("ashioto")
next year ("rainen")	*real opinion* ("honne")	*season* ("kisetu")
time ("toki")	*idea* ("kangae")	*spirit* ("seishin")
dream ("yume")	*pose ("shisei")*	*thought* ("omoi")

In the pre-experiment, 15 Japanese males and females, aged 20 – 24, were asked to rate 54 words against 7 SD scales. The ratings were made on a 7-point scale ranging from -3 through 0 to +3. We regarded the value -3 as the negative semantic pole and the value +3 as the positive semantic pole.

We conducted t-tests (two-tailed, the alpha level .05) and regarded the words which have no significant difference between the mean semantic values of the words and "0" as topics with neutral meanings. As a result, the following 4 nouns were selected as topics to be used for our experiment; *smell* ('nioi'), *moment* ('genzai'), *footstep* ('ashioto'), and *pose* ('shisei').

Vehicles

Vehicles of three types of metaphors were also selected from the Japanese thesaurus (yamaguchi, 2003). We selected adjectives, nouns and verbs which were easily combined with topics selected above and made metaphorical expressions. We selected the following vehicles.

Adjectives: *shallow* ("asai"), *light* ("karui"), *far* ("tooi"), *deep* ("hukai"), *much* ("ooi"), *circular* ("marui"), *big* ("ookii"), *small* ("chiisai"), *heavy* ("omoi"), *long* ("nagai"), *short* ("mijikai"), *white* ("shiroi"), *red* ("akai"), *black* ("kuroi"), *blue* ("aoi"), *large* ("hiroi"), *narrow* ("semai"), *near* ("chikai"), *minor* ("sukunai").

Nouns: *life*(1) ("jinsei"), *music* ("ongaku"), *world* ("sekai"), *life*(2) ("inochi"), *adventure* ("bouken"), *destiny* ("unmei"), *legend* ("densetu"), *dream* ("yume"), *joke* ("joudan"), *literature* ("bungaku"), *philosophy* ("tetugaku"), *rusticity* ("soboku"), *heart* ("kokoro"), *image* ("ime-ji"), *intuition* ("chokkan").

Verbs: *float* ("ukabu"), *flow* ("nagareru"), *drift* ("tadayou"), *circle* ("mawaru"), *roll* ("korogaru"), *tower* ("sobieru"), *quake* ("hurueru"), *swell* ("takamaru"), *flip* ("hikkurikaeru"), *fly around* ("tobimawaru"), *break away* ("kakedasu"), *shake* ("yureru"), *swirl* ("uzumaku"), *wave* ("namiutu").

Experiment

Metaphorical expressions

We explore whether evoking negative meanings is the unique feature of adjective metaphors through the comparison with nominal metaphors and predicative metaphors. Therefore, we conducted a psychological experiment in which participants evaluate the meaning of metaphors (e.g. nominal metaphors: *smell of dream* ("yume no nioi"), predicative metaphors: *rolling smell* ("korogaru nioi"), adjective metaphors: *white smell* ("shiroi nioi")). These metaphors were made by combining topics and 3 types of vehicles, namely nouns, verbs, and adjectives, which were selected through the pre-experiment. Based on the results of the experiment we analyze whether the semantic interaction between vehicles and topics (the topics with neutral meanings were selected through the pre-experiment) causes the neutral meanings of topics to change to the negative meaning or positive meaning. In the psychological experiment, participants were asked to evaluate the meaning of metaphorical expressions. In the experiment, 60 Japanese males and females, aged 20 – 28, were classified into 2 groups. 90 metaphorical expressions were assigned to each group. Participants were asked to rate the assigned expressions against 9 SD scales (7 SD scales given in Table 3 and additional scales 'difficult – easy' and 'unfamiliar - familiar'). The ratings were made on a 7-point scale ranging from -3 through 0 to +3. We regarded the value -3 as the negative semantic pole and the value +3 as the positive semantic pole.

Vehicles

In our study, we focus on the metaphorical meanings evoked by the semantic interaction between topics and vehicles. The topics with neutral meanings were given by the pre-experiment and meanings of the metaphorical expressions were given by the experiment explained above. We also need meanings of vehicles of their own which were used to make metaphorical expressions above. Thus we conducted another psychological experiment in which participants were asked to rate meanings of vehicles only. We used the 7 SD scales given in Table 3. In the experiment, 30 Japanese males and females, aged 20 – 24, were asked to rate 49 words against the 7 SD scales. The ratings were made on a 7-point scale ranging from -3 through 0 to +3. We regarded the value -3 as the negative semantic pole and the value +3 as the positive semantic pole.

Result

Classification of vehicles and metaphors

We regarded mean values in 7 SD scales (Table 3) as meaning evaluation values of metaphorical expressions and vehicles. First, we made sure whether the metaphors used in the experiments were not incomprehensible and unusual as well as not too much conventional. We confirmed all the metaphors were from -2.0 to +2.0 in accessibility scale and conventionality scale.

After this procedure, we classified metaphorical expressions into the cases showing no semantic change, those showing the change to the positive semantic pole, or those showing the change to the negative semantic pole. We conducted t-test (two-tailed, the alpha level .05) to see semantic changes evoked by the semantic interaction between topics and vehicles. Since only the topics with neutral meanings were selected through the pre-experiment, metaphorical expressions which have no significant difference between their mean value and value 0 were regarded as metaphors showing no semantic change (0). And metaphorical expressions which have significant difference between their mean values and value 0 were classified into either metaphors showing the change to the positive semantic pole or those showing the change to the negative semantic pole.

We also classified vehicles into those with neutral meanings, those with positive meanings, or those with negative meanings. Using t-tests (two-tailed, the alpha level .05), vehicles which have no significant difference between their mean value and value 0 were regarded as vehicles with the neutral meaning (0). And vehicles which have significant difference between their mean value and value 0 were classified into either vehicles with the positive meaning or those with the negative meaning.

We assume that meanings of metaphors result from the semantic interaction between vehicles and topics. Since meanings of the topics in our study are neutral, we classify all the metaphorical expressions into those using vehicles with neutral meanings, those using vehicles with positive meanings or those using vehicles with negative meanings.

Metaphors using vehicles with neutral meanings

Table 5 shows the number of metaphors which show the positive, negative or neutral meanings when vehicles are neutral.

Table 5: Number of metaphors showing positive, negative and neutral meanings when vehicles are neutral

	+	-	0	sum
nominal metaphors	1	7	18	26
predicative metaphors	1	8	18	27
adjective metaphors	1	17	10	28
Sum	3	32	46	81

As for the metaphors in which vehicles of their own have neutral meanings, the proportion of the metaphors showing the neutral meanings was the highest. As for the total number, a chi-square test was conducted among the expressions showing +, -, and neutral (0) meanings. As a result, metaphorical expressions showing neutral meanings (0) were observed significantly more frequently than the metaphorical expressions showing positive meanings (+), $\chi^2 = (1, N = 49) = 37.735$, $p < .01$ (0 vs. +). However, there was no significant difference between the number of metaphorical expressions (0) and that of (-), $\chi^2 = (1, N = 78) = 2.513$, $p > .05$ (0 vs. -).

As for nominal metaphors, the proportion of the metaphors showing the neutral meaning was the highest. The result of Chi-square tests showed that the metaphorical expressions (0) were significantly more than the other expressions, $\chi^2 = (1, N = 19) = 15.211$, $p < .01$ (0 vs. +); $\chi^2 = (1, N = 25) = 4.840$, $p < .05$ (0 vs. -).

As for predicative metaphors, the proportion of the metaphors showing the neutral meaning was the highest. The result of Chi-square tests showed that the metaphorical expressions (0) were significantly more than the metaphorical expressions (+), $\chi^2 = (1, N = 19) = 0.154$, $p < .01$ (0 vs. +), and there was slightly significant difference between the number of metaphorical expressions (0) and that of (-), $\chi^2 = (1, N = 26) = 3.846$, $p = .05$ (0 vs. -).

As for adjective metaphors, on the other hand, the proportion of the metaphors showing the negative meaning was the highest. The result of Chi-square tests showed that the metaphorical expressions (-) were significantly more than the metaphorical expressions (+), $\chi^2 = (1, N = 18) = 14.222$, $p < .01$ (- vs. +). However, there was no significant difference between the number of expressions (0) and that of (-), $\chi^2 = (1, N = 27) = 1.815$, $p > .05$ (0 vs. -).

These results show that nominal metaphors and predicative metaphors are basically affected by the meaning of vehicles and tend to show neutral meanings, while adjective metaphors show negative meanings.

The purpose of our study is to explore whether evoking negative meanings is unique to adjective metaphors through the comparison with nominal metaphors and predicative metaphors. Thus we classified the metaphors either into metaphors showing negative meanings or the others and compared among the three types of metaphors, as shown in Table 6.

Table 6: Number of expressions showing negative meanings and the other meanings

	-	+ or 0	sum
nominal metaphors	7	19	26
predicative metaphors	8	19	27
adjective metaphors	17	11	28
sum	32	49	81

Chi-square tests were conducted among the three types of metaphors. The result showed that adjective metaphors showed significantly more frequently negative meanings than the other two types of metaphors, $\chi^2 = (1, N = 54) = 6.234$, $p < .05$ for adjective metaphors vs. nominal metaphors; $\chi^2 = (1, N = 55) = 5.357$, $p < .05$ for adjective metaphors vs. predicative metaphors.

The analyses of metaphors using vehicles with neutral meanings showed that nominal metaphors and predicative metaphors basically tend to show neutral meanings, while adjective metaphors tend to show negative meanings. The tendency that adjective metaphors show negative meanings was clearly noticed by the Chi-square tests among the three types of metaphors. Therefore, the results of our analyses suggest that, unlike predicative and nominal metaphors, adjective metaphors evoke negative meanings when vehicles of their own have neutral meanings.

Metaphors using vehicles with positive meanings

Table 7 shows the number of metaphors which show the positive, negative and neutral meanings when vehicles are positive.

As for the metaphors in which vehicles of their own

have positive meanings, the proportion of the metaphors showing positive meanings was the highest. As for the total number, chi-square tests were conducted among the expressions showing +, -, and neutral (0) meanings. As a result, metaphorical expressions showing positive meanings (+) were observed significantly more frequently than the other metaphorical expressions, $\chi^2 = (1, N = 46) = 28.174$, $p < .01$ (+ vs. -); $\chi^2 = (1, N = 60) = 8.067$, $p < .01$ (+ vs. 0)

Table 7: Number of metaphors showing positive, negative and neutral meanings when vehicles are positive

	+	-	0	Sum
nominal metaphors	25	1	8	34
predicative metaphors	8	1	5	14
adjective metaphors	8	3	6	17
Sum	41	5	19	65

As for nominal metaphors, the proportion of the metaphors showing the positive meaning was the highest. The result of Chi-square tests showed that the positive metaphorical expressions (+) were significantly more than the other expressions, $\chi^2 = (1, N = 26) = 22.154$, $p < .01$ (+ vs. -); $\chi^2 = (1, N = 33) = 8.758$, $p < .01$ (+ vs. 0).

As for predicative metaphors, the proportion of the metaphors showing the positive meaning was the highest. However, there were no significant difference among the other types of metaphors, $\chi^2 = (1, N = 14) = 5.286$, $p > .05$.

As for adjective metaphors, the proportion of the metaphors showing the positive meaning was the highest. However, there was no significant difference among the other metaphors, $\chi^2 = (1, N = 17) = 2.235$, $p > .05$.

Furthermore, we classified all the metaphors either into metaphors showing positive meanings or the others and compared among the three types of metaphors, as shown in Table 8.

Table 8: Number of expressions showing positive meanings and the other meanings

	+	- or 0	Sum
nominal metaphors	25	9	34
predicative metaphors	8	6	14
adjective metaphors	8	9	17
Sum	41	24	65

Although the proportion of nominal metaphors showing positive meanings was the highest, Chi-square tests showed that there was no significant difference among nominal metaphors and the other metaphors, $\chi^2 = (1, N = 58) = 1.239$, $p > .05$ for nominal metaphors vs. predicative metaphors; $\chi^2 = (1, N = 51) = 3.477$, $p > .05$ for nominal metaphors vs. adjective metaphors.

The results show that, as for vehicles with positive meanings, the three types of metaphors tend to show positive meanings. This result suggests that metaphors using vehicles with positive meanings tend to be affected by the meaning of vehicles. This tendency is consistent with nominal and predicative metaphors using vehicles with neutral meanings.

Metaphors using vehicles with negative meanings

Table 9 shows the number of metaphors which show the positive, negative and neutral meanings when vehicles are negative.

As for the metaphors in which vehicles of their own have negative meanings, the proportion of the metaphors showing negative meanings was the highest. As for the total number, Chi-square test were conducted among the expressions showing +, -, and neutral (0) meanings. As a result, metaphorical expressions showing negative meanings (-) were observed significantly more frequently than the other metaphorical expressions, $\chi^2 = (1, N = 27) = 23.148$, $p < .01$ (- vs. +); $\chi^2 = (1, N = 33) = 10.939$, $p < .01$ (- vs. 0).

Table 9: Number of metaphors showing positive, negative and neutral meanings when vehicles are negative

	+	-	0	sum
nominal metaphors	0	0	0	0
predicative metaphors	1	14	4	19
adjective metaphors	0	12	3	15
sum	1	26	7	34

As for nominal metaphors, we couldn't find metaphors using vehicles which were rated negative by the participants of the experiment.

As for predicative metaphors, the proportion of the metaphors showing the negative meaning was the highest. The result of Chi-square tests showed that the negative metaphorical expressions (-) were significantly more than the other expressions, $\chi^2 = (1, N = 15) = 11.267$, $p < .01$ (- vs. +); $\chi^2 = (1, N = 18) = 5.556$, $p < .05$ (- vs. 0).

As for adjective metaphors, the proportion of the metaphors showing the negative meaning was the highest. The result of Chi-square tests showed that the negative metaphorical expressions (-) were significantly more than the other expressions, $\chi^2 = (1, N = 15) = 5.400$, $p < .05$ (- vs. 0).

We further classified all the metaphors either into metaphors showing negative meanings or the others and compared between predicative metaphors and adjective metaphors, as shown in Table10.

Table 10: Number of expressions showing negative meanings and the other meanings

	-	+ or 0	sum
nominal metaphors	0	0	0
predicative metaphors	14	5	19
adjective metaphors	12	3	15
sum	26	8	34

The result of a Chi-square test showed that there was no significant difference between predicative metaphors and adjective metaphors, $\chi^2 = (1, N = 34) = .186$, $p > .05$.

This result suggests that metaphors using vehicles with negative meanings tend to be affected by the meaning of vehicles. This tendency is the same with nominal and predicative metaphors using vehicles with neutral meanings and all the metaphors using vehicles with positive meanings.

Discussion

In the study we analyzed whether evoking negative meanings is the unique feature of adjective metaphors through the comparison with nominal metaphors and predicative metaphors. We revealed that meanings of metaphors are basically affected by meanings of vehicles and all types of metaphors using vehicles with positive meanings tend to evoke positive meaning and all types of metaphors using vehicles with negative meanings tend to evoke negative meanings. However, as for the metaphors in which vehicles of their own have neutral meaning, adjective metaphors evoked negative meaning

significantly more frequently than nominal metaphors and predicative metaphors. Thus, our result was consistent with Sakamoto & Utsumi (2009).

Furthermore, the result of our experiment indicates that nominal metaphors tend to evoke meanings of vehicles of their own more easily than the other metaphors. When nominal metaphors evoke neutral meanings,, it may difficult to judge whether vehicles influence the meanings of the nominal metaphors. However, when vehicles have positive or negative meanings, nominal metaphors tend to evoke respective meanings. Therefore, we believe that nominal metaphor tend to be influenced by the meanings of vehicles rather than topics.

We suggest that those differences among the three types of metaphors come from different comprehension processes of the three types of metaphors. Glucksberg and his colleagues (Glucksberg, 2001; Glucksberg & Keysar, 1990) argue people comprehend nominal metaphors via a categorization process. In the categorization process, people understand nominal metaphors by seeing the target concept as belonging to the superordinate metaphorical category exemplified by the source concept. Supposing that nominal metaphors are understood via a categorization process, our result that nominal metaphors tend to evoke meanings of vehicles of their own seems to be reasonable, because in the categorization process metaphorical meanings belong to the category exemplified by meanings of vehicles. In other words, in nominal metaphors using vehicles with neutral meaning, metaphorical expressions evoke neutral meanings because topics belong to category that was created by vehicles.

On the other hand, as for the mechanism of adjective metaphors and predicative metaphors, Utsumi & Sakamoto (2007) argue that the comprehension process of adjective metaphors and predicative metaphors can be explained as a two-stage categorization process. In the case of "*red voice*" created from the neutral vehicle "red", for example, the adjective "*red*" first evokes an intermediate category "*red things*" to which "*blood*", "*fire*", "*passion*", "*apple*" and "*danger*" typically belong. Then exemplars relevant to the noun "*voice*" are selected and they evoke a final abstract category of property like "*scary*", "*screaming*" and "*dangerous*". In this way, adjective metaphors and predicative metaphors are understood by not be directly mapped onto the topics from ad hoc category of vehicles but mediating to an intermediate category. Therefore, supposing that adjective metaphors and predicative metaphors are comprehended in the two-stage categorization process, it seems to be reasonable that, meanings of vehicles of those metaphors do not directly affect meanings of metaphors and these two metaphors, unlike nominal metaphors, have more chances to evoke different meanings from meanings of vehicles of their own.

However, the question why only adjective metaphors tend to evoke negative meanings when meanings of vehicles of their own have neutral meanings is left unsolved. When meanings of adjective metaphors are processed in the two-stage categorization process, exemplars with negative meanings might be selected among various exemplars belonging to the intermediate category evoked by adjectives as vehicles.

Tsukurimichi, Sakamoto, Utsumi, & Nakamura (2010), conducted a psychological experiment in which participants were asked to choose words related to meanings of adjective metaphors among those associated from vehicles and topics. The result showed that words selected as those related to meanings of metaphors tend to have negative meanings. Therefore, their result suggests that, even if there are negative and positive exemplars in an intermediate category, exemplars with negative meanings tend to be selected to process meanings of adjective metaphors.

We still do not know why exemplars with negative meanings are used to process meanings of adjective metaphors. It is more mysterious that adjective metaphors created from adjectives denoting 'color' evoke the most negative meaning, which was shown by Sakamoto & Utsumi (2009).

Conclusion

In this paper, we analyzed whether evoking negative meanings is the unique feature of adjective metaphors through the comparison with nominal metaphors and predicative metaphors. We revealed that meanings of metaphors were basically affected by meanings of vehicle. However, as for the metaphors created from vehicles with neutral meaning, adjective metaphors evoked negative meaning significantly more frequently than nominal metaphors and predicative metaphors. Our research raised an interesting question why only adjective metaphors, especially color metaphors, evoke negative meanings.

References

Amano, S., & Kondo, T. (1999). *NTT database series Nihongo-no Goi-Tokusei* (*Lexical properties of Japanese) Vol. 1*, Tokyo: Sanseido. (in Japanese).

Bowdle, B., & Gentner, D. (2005). The career of metaphor. *Psychogical Review*, 112(1), 193-216.

Glucksberg, S. (2001). *Understanding figurative language: From metaphors to idioms*. Oxford: Oxford University Press.

Glucksberg, S., & Keysar, B. (1990). Understanding metaphorical comparisons: Beyond similarity. *Psychogical Review*, 97, 3-18.

Lakoff, G. & Johnson, M. (1980). *Metaphors we live by*. Chicago: The University of Chicago Press.

Martin, J. (1992). Computer understanding of conventional metaphoric language. *Cognitive Science*, 16, 233-270.

Osgood, C. E. (1980). The cognitive dynamics of synesthesia and metaphor. In R. P. Honeck & R. R. Hoffman (Eds.), *Cognition and figurative language* (pp. 203-238). Lawrence Erlbaum Associates.

Sakamoto, M., & Utsumi, A. (2009). Cognitive effects of synesthetic metaphors evoked by the semantic interaction. In *Proceeding of the 31st Annual Meeting of the Cognitive Science Society*, 1593-1598.

Tsukurimichi, H., Sakamoto, M., Utsumi, A., Nakamura, T. (2010). Experimental investigation of reasons why synesthtic metaphors evoke negative meanings. In *Proceedings of the 27th Annual Meeting of the Japanese Cognitive Science Society*, 502-507.

Ullmann, S. (1951). *The principles of semantics*. Oxford: Blackwell.

Utsumi, A., Sakamoto, M. (2007). Computational evidence for two-stage categorization as a process of adjective metaphor comprehension. In *Proceeding of the 2nd European Cognitive Science Conference*, 77-82.

Werning, M., Fleischhauer, J., & Beşeoğlu, H. (2006). The cognitive accessibility of synaesthetic metaphors. In *Proceedings of the 28th Annual Conference of the Cognitive Science Society, 2365-2370*.

Williams, J. M. (1976). Synesthetic adjectives: A possible law of semantic change. *Language*, 52(2), 461-478.

Yamaguchi, T. (2003). *Nihongo Dai-Thesaurus* (*Japanese Thesaurus)*, Tokyo: Taishukan Shoten. (in Japanese).

Yu, N. (2003). Synesthetic metaphor: A cognitive perspective. *Journal of Literary Semantics*, 32(1), 19-34.