The Comprehension of Adjective Metaphors Is Selectively Affected By Negative Meanings Associated With Adjectives As Vehicles

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Abstract

Previous metaphor studies have paid much attention to nominal metaphors and predicative metaphors and little attention has been given to adjective metaphors. The most adjective metaphor studies have only examined how the acceptability of adjective metaphors can be explained by the pairing of adjective modifier's and head noun's modalities. Sakamoto & Utsumi (2009) showed that adjective metaphors, especially those modified by color adjectives, tend to evoke negative meanings. Sumihisa et al (2011) examined whether evoking negative meanings is the unique feature of adjective metaphors through comparison among nominal metaphors and predicative metaphors for the Japanese language and revealed that meanings of metaphors are basically affected by meanings of vehicles, but when vehicles themselves had neutral meanings, negative meanings were evoked more frequently for adjective metaphors among the other types of metaphors. The purpose of this study, therefore, explores the reason why adjective metaphors evoke negative meanings more frequently than the other types of metaphors. For this purpose, we examined what kind of meanings associated with topics or vehicles affect the comprehension of metaphors. Our psychological experiments revealed that meanings associated from vehicles affect the comprehension of metaphors. And when metaphorical expressions have vehicles with positive or negative meanings, metaphorical expressions show the same meanings as the vehicles. On the other hand, when metaphorical expressions have vehicles with neutral meaning, only adjective metaphors evoke negative meanings. Our results suggest that the comprehension of adjective metaphors is selectively affected by the negative meanings associated with adjectives as vehicles.

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). 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. Glucksberg and his colleagues (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. 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.

Many studies focusing on adjective metaphors 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. His thesis of directionality 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. 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 German. 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.

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" and "dark – light". 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. All the mean values of vehicles and topics rated on the 15 SD scales were classified into T=V, T<V, T>V (T : topics, V : vehicles). 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. 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.

Table 1:Comparison between predicted 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.

Sumihisa et al. (2011) examined whether evoking negative meanings is the unique feature of adjective metaphors. In the experiments, Sumihisa et al. (2011) first selected nouns as topics to make Japanese metaphorical expressions. They selected four nouns (e.g. *smell* ('nioi'), *moment* ('genzai'), *footstep* ('ashioto'), and *pose* ('shisei')) with neutral meanings among 54 nouns by psychological experiment. They also conducted another psychological experiment in which participants were asked to rate meanings of vehicles only. Verbs, nouns and adjectives were selected respectively as vehicles with positive meanings, neutral meanings and negative meanings. They combined the topics and the vehicles and made metaphorical expressions.

Sumihisa et al. (2011) conducted a psychological experiment in which participants evaluate the meanings of metaphors. Participants were asked to rate the assigned expressions against 9 SD scales (7 SD scales given in Table 2 and additional scales "difficult – easy" and "unfamiliar – familiar"). The ratings were made on a 7-point scale ranging from -3 through 0 to +3. They regarded the value -3 as the negative semantic pole and the value +3 as the positive semantic pole.

Table 2: List of SD scales used for the experiment

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

Sumihisa et al. (2011) focused on the metaphorical meanings evoked by the semantic interaction between topics and vehicles. They 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. They 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.

As a result, when vehicles have positive or negative meanings, all types of metaphors tend to evoke positive or negative meanings. However, when vehicles have neutral meanings, although nominal metaphors tend to evoke neutral meanings, predicative metaphors and adjective metaphors tend to evoke negative meanings. Especially adjective metaphors tend to evoke negative meanings more frequently. They also classified the metaphors either into metaphors showing negative meanings or the others and compared among the three types of metaphors as shown as Table 3.

Table 3: 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

They revealed that adjective metaphors evoke 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.

Based on this result, Sumihisa et al. (2011) suggest that nominal metaphors and predicative metaphors basically tend to show neutral meanings, while adjective metaphors tend to show negative meanings.

This study explores the reason why adjective metaphors evoke negative meanings more frequently than the other types of metaphors. Utsumi & Sakamoto (2007) argue that the comprehension process of adjective metaphors can be explained as a two-stage categorization process. They speculate the comprehension process of "*red voice*" created from the neutral vehicle "*red*" as follows: 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 are understood by not be directly mapped onto the topics from ad hoc category of vehicles but mediating to an intermediate category. When meanings of adjective metaphors were 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.

In this study, therefore, we 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. We hypothesize that even if there were negative and positive exemplars in an intermediate category, exemplars with negative meanings tend to be selected to process meanings of adjective metaphors. As for nominal metaphors, on the other hand, prototypical exemplars associated with vehicles tend to be selected since the people understand nominal metaphors via the categorization process, namely by seeing the target concept as belonging to the superordinate metaphorical category exemplified by the source concept.

Pre-experiment

Topics and Vehicles

We decided to use 4 nouns as topics which were tested as having neutral meanings by Sumihisa et al. (2011); *smell* ("nioi"), *moment* ("genzai"), *footstep* ("ashioto"), and *pose* ("shisei").

Candidates of vehicles of nominal, predicative and adjective metaphors were selected from the Japanese thesaurus (yamaguchi, 2003). We selected 50 adjectives, 50 nouns and 50 verbs to be used as vehicles.

In order to see the meanings of vehicles we conducted a psychological experiment. In the experiment, 15 Japanese males and females, aged 20 – 25, were asked to rate 150 words (50 adjectives, 50 nouns and 50 verbs) against the 9 SD scales; dark-light, dislike-like, inelegant-elegant, sad-glad, ugly-beautiful, uncomfortable-comfortable, bad-good, difficult-easy and unfamiliar-familiar. These SD scales were selected by a psychological experiment (Sumihisa et al., 2011) in which 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.

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 words with neutral meanings. And the words which have significant difference between their mean value and value 0 were classified into either words with the positive meaning or those with the negative meaning.

We selected 5 vehicles with positive meaning, 5 vehicles with negative meaning and 5 vehicles with neutral meaning to make nominal, predicative and adjective metaphors respectively.

As for nominal metaphors, nouns such as *fortune* ("kouun"), *freedom* ("jiyuu"), *justice* ("seigi"), *life* ("inochi") and *dream* ("yume") were selected as vehicles with positive meaning. Nouns such as *faith* ("shinkou"), *joke* ("joudan"), *patience* ("nintai"), *transient* ("mujou") and *philosophy* ("tetsugaku") were selected as vehicles with neutral meaning. And nouns such as *evil* ("aku"), *hell* ("jigoku"), *dissatisfied* ("fuman"), *self-preservation* ("hoshin") and *downfall* ("metsubou") were selected as vehicles with negative meaning.

As for predicative metaphors, verbs such as *appear* ("arawareru"), *believe* ("shinjiru"), *flutter* ("tokimeku"), *clear* ("hareru") and *laugh* ("warau") were selected as vehicles with positive meaning. Verbs such as *make merry* ("ukareru"), *dry* ("kawaku"), *cut fine* ("kizamu") and *cry* ("naku") were selected as vehicles with neutral meaning. And verbs such as *be irritated* ("iradatsu"), *doubt* ("utagau"), *remain* ("todomaru"), *betray* ("negaeru") and *warp* ("yugamu") were selected as vehicles with negative meaning.

As for adjective metaphors, adjectives such as *new* ("atarashii"), *sweet* ("airashii"), *cool* ("kakkoii"), *white* ("shiroi") and *equal* ("hitoshii") were selected as vehicles with positive meaning. Adjectives such as *black* ("kuroi"), *hard* ("katai"), *fine* ("komakai"), *long* ("nagai") and *deep* ("fukai") were selected as vehicles with neutral meaning. And adjectives such as *stinking* ("kusai"), *dull* ("nibui"), *worn-out* ("boroi"), *shabby* ("misuborashii") and *disgraceful* ("mittomonai") were selected as vehicles with negative meaning.

Words associated from vehicles and topics

We examine what kind of meanings associated with topics or vehicles affect the comprehension of metaphors. In order to research the words associated from vehicles and topics, we conducted a pre-experiment. 30 Japanese males and females, aged 20 – 24, were asked to answer 3 or more words associated from 45 vehicles and 4 topics. We decided to use for the later experiment the words associated from vehicles and topics chosen by 2 or more participants. Then we conducted another pre-experiment to evaluate the meaning of the words associated from vehicles and topics. 60 Japanese males and females, aged 20 – 26, were classified into 2 groups. 107 or 108 words assigned to each group and participants were asked to rate the assigned words against 7 SD scales (in table 2). Based on the result of this experiment, we classified the words into the words with positive meaning, the words with negative meaning and the words with neutral meaning. 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 words with neutral meanings. And the words which have significant difference between their mean value and value 0 were classified into either words with the positive meaning or those with the negative meaning.

Experiment

Metaphorical expressions

We combined vehicles and topics which were selected by pre-experiments and made nominal, predicative and adjective metaphors. Then we conducted a psychological experiment in order to see what kind of meanings associated with topics or vehicles affect the comprehension of metaphors. In the experiment, 60 Japanese males and females, aged 20 - 26, were assigned to 180 metaphorical expressions and were asked to choose words which they believe to be related to the

meaning of each metaphorical expression among those associated from vehicles and topics. Participants were also asked to rate meanings of the 180 metaphorical expressions respectively against 9 SD scales (7 SD scales given in table 2 and additional scales "difficult – easy" and "unfamiliar – familiar").

Results and Discussion

Meanings evoked by metaphors

We classified metaphorical expressions into the metaphorical expressions which have vehicles with neutral meaning, positive meaning and negative meaning. Then, we analyzed the meaning of metaphorical expressions and the words associated from vehicles and topics. 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.

Metaphors using vehicles with neutral meanings

Table 4 shows the number of 3 types of metaphors which show the positive, negative or neutral meanings when vehicles are neutral.

Table 4: Number of metaphors showing positive, negative and neutral meanings when vehicles are neutral

	positive	negative	neutral	sum
nominal metaphors	1	1	18	20
predicative metaphors	4	9	7	20
adjective metaphors	2	11	7	20
sum	7	21	32	60

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 positive (+), negative (-), and neutral (0) meanings. As a result, there were significant differences between the number of nominal metaphors and that of predicative metaphors ($\chi^2(1, N=40)=8.533, p<.05$) and also between the number of nominal metaphors and that of adjective metaphors, ($\chi^2(1, N=40)=11.905, p<.05$). However, there was no significant difference between the number of predicative metaphors and that of adjective metaphors, ($\chi^2(1, N=40)=0.400, p>.05$).

As for nominal metaphors, the result of Chi-square tests showed that the metaphorical expressions with neutral meaning were significantly more than the other expressions, ($\chi^2(1)=15.211, p<.05$(+ vs. 0),$\chi^2(1)=15.211, p<.05$ (- vs. 0)). As for predicative metaphors, there was no significant difference among the number of metaphorical expressions which showed positive meaning, negative meaning and neutral meaning, ($\chi^2(1)=.181, p>.05$(+ vs. 0), $\chi^2(1)=.250, p>.05$(0 vs. -) , $\chi^2(1)=1.923, p>.05$(+ vs. -)). As for the adjective metaphors, there was significant difference among the number of metaphorical expressions which showed positive meanings and neutral meanings ($\chi^2(1)=2.778, p<.05$ (+ vs. 0)), and the number of metaphorical expressions which showed positive meanings and negative meanings, ($\chi^2(1)=6.231, p<.05$ (+ vs. -)). However, there was no significant difference between the number of metaphorical expressions which showed neutral meanings and negative meanings, ($\chi^2(1)=.889, p>.05$ (0 vs. -)).

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

Metaphors using vehicles with positive meanings

Table 5 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 positive (+), negative (-), and neutral (0) meanings. As a result, there was no significant difference between nominal metaphors, predicative metaphors and adjective metaphors, ($\chi^2(4, N=60)=4.034, p>.05$). The result shows that, as for vehicles with positive meanings, the three types of metaphors tend to show positive meanings.

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

	positive	negative	neutral	sum
nominal metaphors	20	0	0	20
predicative metaphors	19	1	0	20
adjective metaphors	19	0	1	20
sum	58	1	1	60

Metaphors using vehicles with negative meanings

Table 6 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, all the metaphors showed negative meanings.

Table 6: Number of metaphors showing positive, negative and neutral meanings when vehicles are negative

	positive	negative	neutral	sum
nominal metaphors	0	20	0	20
predicative metaphors	0	20	0	20
adjective metaphors	0	20	0	20
sum	0	60	0	60

Words associated with metaphors

The results described so far showed that negative meanings were evoked more frequently for adjective metaphors among the other types of metaphors when vehicles were neutral. This section discusses the results of the psychological experiment in which participants were asked to choose words related to meanings of metaphorical expressions among those associated from vehicles and topics. We want to see, even if negative and positive exemplars were associated with vehicles or topics, exemplars with negative meanings tend to be selected to process meanings of adjective metaphors.

Nominal metaphors

The second left column of Table 7 shows the total number of the words associated from vehicles or topics and the second right column the number of words which participants selected as those related to meanings of nominal metaphors.

Table 7: the number of the words which were associated from vehicles or topics

	all words	selected words	rate
vehicles	810	749	92.50%
topics	735	348	47.30%

A Chi-square test was conducted among the words which were associated from vehicles and topics. The result showed that words associated with vehicles were selected significantly more frequently than those with topics, (χ^2(1, N=1545)=381.063, p<.05).

We examined the frequency in which positive, neutral or negative words associated with vehicles or topics were selected by participants when they process the meanings of nominal metaphors created from vehicles with positive meaning. Table 8 shows the results. The result of Chi-square tests showed that the associative words with positive meaning were significantly more frequently selected than the others, (χ^2(1, N=436)=76.926,p<.05 (+ vs. 0), χ^2(1, N=431)=104.972,p<.05 (+ vs. -)).

Table 8: the number of the associative words when vehicles have positive meaning

	all words	selected words	rate
positive	336	284	84.50%
neutral	100	41	41.00%
negative	95	30	31.60%

Table 9 shows the frequency in which positive, neutral or negative words associated with vehicles or topics were selected by participants when they process meanings of nominal metaphors created from vehicles with neutral meaning.

Table 9: the number of the associative words when vehicles have neutral meaning

	all words	selected words	rate
positive	242	195	80.60%
neutral	119	90	75.60%
negative	130	87	66.90%

As for the number of the associative words when vehicles have neutral meaning, there was no significant difference among each number of the associative words with positive, neutral and negative meaning, (χ^2(1, N=361)=1.175,p>.05 (+ vs. 0), χ^2(1, N=249)=2.292,p>.05 (0 vs. -), χ^2(1, N=372)=8.598,p=.05 (+ vs. -)).

When the vehicles have negative meaning, table 10 shows the result of the number of the associative words. The results of Chi-square tests showed that the associative words with negative meaning were significantly more frequently selected than the others, (χ^2(1,N=348)=29.264,p<.05(0 vs. -), χ^2(1,N=392)=106.940, p<.05 (+ vs. -)).

Table 10: the number of the associative words when vehicles have negative meaning

	all words	selected words	rate
positive	167	73	43.70%
neutral	123	85	69.10%
negative	225	206	91.60%

The results so far suggest that the comprehension of nominal metaphors is basically affected by the prototypical exemplars associated with vehicles.

Predicative metaphors

The second left column of Table 11 shows the total number of the words associated from vehicles or topics and the second right column the number of words which participants selected as those related to meanings of predicative metaphors.

Table 11: the number of the words which were associated from vehicles or topics

	all words	selected words	rate
vehicles	715	644	90.10%
topics	735	403	54.80%

The result of Chi-square tests showed that words associated with vehicles were selected more frequently than those with topics. (χ^2(1, N=1450)=224.275, p<.05)

We examined the frequency in which positive, neutral or negative words associated with vehicles or topics were selected by participants in the same way as nominal metaphors. Table 12 shows that in the comprehension of predicative metaphors created from vehicles with positive meaning words with positive meanings were significantly more frequently selected than the others, (χ^2(1 , N=409)=44.675,p<.05 (+ vs. 0), χ^2(1 , N=412)=69.834,p<.05 (+ vs. -)).

Table 12: the number of the associative words when vehicles have positive meaning

	all words	selected words	rate
positive	318	272	85.50%
neutral	91	48	52.70%
negative	94	41	43.60%

Table 13 shows the frequency in which positive, neutral or negative words associated with vehicles or topics were selected by participants when they process meanings of predicative metaphors created from vehicles with neutral meaning. The results of Chi-square tests showed that there was no significant difference among each number of the associative words with positive, neutral and negative meaning,(χ^2(1,N=387)=.000,p>.05(+vs.0),χ^2(1,N=233)=.104,p>.05(0 vs.-),χ^2(1, N=384)=.131,p>.05 (+ vs. -)).

Table 13: the number of the associative words when vehicles have neutral meaning

	all words	selected words	rate
positive	269	194	72.10%
neutral	118	85	72.00%
negative	115	85	73.90%

Table 14 shows the frequency in which positive, neutral or negative words associated with vehicles or topics were selected by participants when they process meanings of predicative metaphors created from vehicles with negative meanings. The results of Chi-square tests showed that words with negative meaning were selected significantly more frequently than the others, (χ^2(1, N=245)=25.136,p<.05(0 vs. -),χ^2(1N=352)=40.022,p<.05 (+ vs. -)).

Table 14: the number of the associative words when vehicles have negative meaning

	all words	selected words	rate
positive	194	118	60.80%
neutral	87	56	64.40%
negative	158	143	90.50%

These results for predicative metaphors suggest that the

comprehension of predicative metaphors is basically affected by the exemplars associated with vehicles.

Adjective metaphors

Table 15 shows the total number of the words associated from vehicles or topics and the number of words which participants selected as those related to meanings of adjective metaphors.

Table 15: the number of the words which were associated from vehicles or topics

	all words	selected words	rate
vehicles	724	627	86.60%
topics	735	444	60.40%

The result of Chi-square tests showed that words associated with vehicles were selected more frequently than those with topics, ($\chi^2(1,N=1459)=128.193$, $p<.05$).

Table 16 shows the frequency in which positive, neutral or negative words associated with vehicles or topics were selected by participants when they process meanings of adjective metaphors created from vehicles with positive meanings. Chi-square tests showed that words with positive meaning were selected significantly more frequently than the others,($\chi^2(1,N=400)=32.967$,$p<.05$ (+ vs. 0), $\chi^2(1, N=408)=141.638$,$p<.05$ (+ vs. -)).

Table 16: the number of the associative words when vehicles have positive meaning

	all words	selected words	rate
positive	325	283	87.10%
neutral	75	44	58.70%
negative	83	19	22.90%

Table 17 shows the frequency in which positive, neutral or negative words associated with vehicles or topics were selected when participants process meanings of adjective metaphors created from vehicles with neutral meanings. Although vehicles were neutral, words with negative meaning were selected significantly more frequently than the others, ($\chi^2(1,N=262)=7.162$,$p<.05$(0 vs. -), $\chi^2(1, N=360)=9.089$,$p<.05$ (+ vs. -)).

Table 17: the number of the associative words when vehicles have neutral meaning

	all words	selected words	rate
positive	227	161	70.90%
neutral	129	92	71.30%
negative	133	113	85.00%

Table 18 shows the frequency in which positive, neutral or negative words associated with vehicles or topics were selected by participants when they process meanings of adjective metaphors created from vehicles with negative meanings. Chi-square tests showed that words with negative meaning were selected significantly more frequently than the others, ($\chi2(1, N=277)=27.380$, $p<.05$ (0 vs. -), $\chi2(1, N=378)=30.959$,$p<.05$ (+ vs. -)).

Chi-square tests showed that words with negative meaning were selected significantly more frequently than the others,($\chi2(1, N=277)=27.380$, $p<.05$ (0 vs. -), $\chi2(1, N=378)=30.959$,$p<.05$ (+ vs. -)).

These results suggest that adjective metaphors are different from nominal and predicative metaphors in the comprehension where words with negative meanings tend to be selected although vehicles themselves are neutral.

Table 18: the number of the associative words when vehicles have negative meaning

	all words	selected words	rate
positive	199	128	64.80%
neutral	98	61	62.20%
negative	179	159	88.80%

Conclusion

This study explored the reason why adjective metaphors evoke negative meanings more frequently than the other types of metaphors. The results showed that exemplars with negative meanings among various exemplars tend to be selected to process meanings of adjective metaphors, This result suggests that, unlike nominal metaphors processed by the categorization theory, adjective metaphors are processed by the two-stage categorization theory (Utsumi & Sakamoto, 2007), in which exemplars with negative meanings are selected among various exemplars belonging to the intermediate category evoked by adjectives as vehicles. We still do not know why exemplars with negative meanings are used to process meanings of adjective metaphors.

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