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Effects of conceptual differences on the semantic memory retrieval*

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Baik, Jiseon and Haeil Park. 2018. Effects of conceptual differences on the semantic memory retrieval. *Linguistic Research* 35(2), 395-412. The present study aims to investigate whether there are any effects of conceptual distinctions on semantic memory retrieval, and if so, how different concepts play out in cued-recall. Semantic memory is one of the core features characterizing humans, and includes all acquired knowledge about the world. We conducted a semantic memory cued-recall study comparing action-associated and literal sentences with non-action and metaphoric ones. Here, we report that action-related sentences are better recalled than their non-action counterparts. This result is attributable to more sensory-motor activation of action-related utterances leading to a better maintenance in memory, which is in support of the Grounded Cognition (henceforth, GC) theory. In addition, we observed a literal sentence advantage during the same task, given that literal sentences are remembered to a greater extent than metaphoric sentences. This finding is also accounted for by the GC model in a way that the more concrete a concept is, the more activation in the sensory-motor cortex it will engage during comprehension, thereby inducing a more effective recall. **(Kyung Hee University)**

Keywords semantic memory, cued-recall, action-related sentence, literal sentence, metaphoric sentence, Grounded Cognition, Amodal theory

1. Introduction

Concept representations in cognition have traditionally been believed to be amodal and symbolic, processed independently of the brain's modal systems for

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perception and action. According to this theory (known as Amodal theory), the core conceptual knowledge is separate from the brain's modal systems for perception and action and are couched in a modular semantic feature system (Fodor 1975; Fodor 1983; Tulving 1983; Pylyshyn 1984). One has no access to sensory-motor systems after acquiring a concept from sensory-motor experiences, since the conceptual knowledge system is an independent module of purely symbolic nature (Desai et al. 2013). On the other hand, grounded or embodied cognition (henceforth, GC) model argues that central conceptual representations are not independent of modality-specific action/perception systems; instead, they are grounded in the environment, the body and the simulations in the modal systems of the brain (Allport 1985; Barsalou et al. 2003; Farah and McClelland 1991; Pulvermüller 1999; Smith 1978). Even abstract concepts are argued to be grounded in embodiment according to some versions of GC theories (e.g., Gibbs 1994; Lakoff and Johnson 1999).

Currently, GC model has gained empirical support and demonstrations from diverse disciplines and experiments (e.g., Barsalou 2008; Boulenger et al. 2006; Gibbs 2006; Glenberg and Kaschak 2002, 2003; Sato et al. 2008). For instance, Glenberg and Kaschak (2002) had participants judge whether sentences are sensible by requiring them to make button responses toward or away from the body. When the sentences implied action toward the body (e.g., "open the drawer"), they had difficulty in performing the response away from the body and vice versa. This finding is interpreted to support their hypothesis that at least some language comprehension is grounded in an action-based system.

As a result, the claim that grounding is involved in higher cognition has increasingly been accepted. There has also been an increased interest in grasping how these demonstrations implicate GC theories. Two possible theoretical implications have been suggested. The first one is that grounding mechanisms play peripheral or epiphenomenal roles in higher cognition; that is, these mechanisms perhaps are secondary to classic symbolic mechanisms that play a causal role in processing. The alternative one is that grounding mechanisms, as opposed to symbolic ones, play causal roles, which has recently been experimentally supported. For example, Transcranial Magnetic Stimulation (TMS) studies have proved that stimulation on the sensory-motor areas affects higher cognition (Buccino et al. 2005; Pulvermüller et al. 2005). Buccino et al. (2005), for instance, found that single-pulse TMS[1] stimulation on the hand area of the motor cortex made subjects respond with the hand more slowly to Italian hand-action related sentences whereas that on the foot area made them respond with the foot more slowly to Italian sentences linked to foot action. This was argued to show that action and language utilize overlapping neural systems of the brain. In addition, Pulvermüller et al. (2005) revealed that application of TMS to leg and arm areas in the motor cortex led to faster reaction times of English words related to leg actions (e.g., *kick*) and arm actions (e.g., *pick*), respectively, which is interpreted to support the GC theory that the two systems interact to process meanings of action-related words rather than modular theories of language and motor functions in cognition. All these neurocognitive findings do not determine whether and if so, how conceptual knowledge is linked to semantic memory retrieval.

Indeed, GC theory has the potential to integrate perception, action, and cognition, which has long been elusive, given that its basic tenet is that cognition makes use of mechanisms for action and perception. Most of all, neuroimaging research has provided evidence in support of the GC model, since modal (i.e., sensory-motor) areas are active while participants perform tasks on cognition including memory, language, knowledge, and thought. These results suggest that cognition is grounded in modal systems of the brain.

Despite this extensive research on conceptual knowledge processing, little is known about the relationship between conceptual processing and semantic memory. As one of the two types of declarative memories (memories of facts or events that are stored and retrievable), semantic memory has been regarded as one of our most defining human characteristics (Binder and Desai 2011), referring to general knowledge that we accumulate about the world. The general knowledge includes facts, concepts, and meaning.

Here, we conducted a semantic memory cued-recall[2] study comparing

1 TMS is a non-invasive technique that stimulates a specific brain region underneath the coil, thereby modulating cognitive brain activity. Single-pulse TMS is known to suppress or inhibit neural activity of the stimulated area (e.g., Corthout et al. 2000), whereas repetitive TMS (rTMS) is capable of resulting in long-lasting neuronal changes (Huang et al. 2005).

2 Cued-recall is similar to free recall except that subjects are provided with hints (cues) at the time of recall. The cues are expected to help the subject remember the memorized items. Cued-recall was selected in the current study due to the fact that the items to be studies are sentences, not

action-associated and literal concepts with non-action and metaphoric ones to explore the effect of distinct concepts on semantic memory. The rationale behind the inclusion of the comparison between literal and metaphoric items in this study is that exploring the effects of literal vs. metaphoric concepts on cued-recall accuracy can be a good testbed for determining whether the dependence on sensory-motor system is modulated by the abstractness of meaning.

One possibility is that consistent with the GC theory, action-associated ones will be recalled better than their non-action counterparts, since the former have been found to engage modality-specific regions of the brain (e.g., Pulvermüller et al. 2001; Pulvermüller et al. 2005), which will in turn give rise to a more effective recall. Literal ones will also have an advantage in cued-recall, given that the former items are more concrete concepts than the latter ones and are grounded in a greater sensory-motor region; therefore, accessing literal concepts will place a more lasting impression on the memory system.

An alternative is that there will be no significant differences in the number of hits between action and non-action as well as between literal and metaphoric conditions in that since concepts are composed only of amodal, abstract, and symbolic feature bundles that are stored in a separate brain, there are no reasons why some concepts will be significantly more advantageous in recall probability than others.

2. Methodology

2.1 Subjects

Participants in the experiment were 27 healthy native speakers of Korean (15 women, average age 26.9±7.26, range 20-35) with no history of reading impairment. Informed consent was obtained from each participant prior to the experiment. Participants were paid for participation.

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words, thereby leading to the difficulty of recall.

2.2 Stimuli

100 Korean sentences were divided into 4 conditions: Literal Action (LA), Literal Non-action (LN), Metaphoric Action (MA), and Metaphoric Non-action (MN), as shown in Table 1. The stimuli were visually-presented sentences of the form "<verb> <noun>" (e.g., medal-ul kemecwiessta '(I) grabbed a medal'). Literal Action and Metaphoric Action conditions used a hand/arm or foot action verb (e.g., kemecwiessta 'grab'; ketechata 'kick') while their corresponding Non-action conditions used a verb primarily visual in nature (e.g., chyetapota 'look at'; thamdokhata 'peruse'). On the other hand, Metaphoric conditions made use of action/non-action verbs as in the Literal conditions, but in a figurative, but not conventionalized manner, such that little physical action was delineated. Additionally, 20 nonsense sentences were constructed as Filler sentences by combining action/non-action verbs with inappropriate object nouns to generate sentences that are not easily interpretable. They were excluded from the analysis.

The LA, LN, MA, and MN sentence sets were matched on frequency (from Korean frequency list compiled by the National Institute of the Korean Language), and number of phonemes and syllables.

Table 1. Example Stimuli (See Appendix I for the sample list of stimuli; We used Yale Romanization system for Korean words)

Condition	Example
Literal Action	*kwacalul tencyessta.* '(I) threw a cookie.'
Literal Non-action	*soseolul thamdokhayssta.* '(I) perused a novel.'
Metaphoric Action	*maumul hwumchyessta.* '(I) stole one's heart.'
Metaphoric Non-action	*hulumul kwanchalhayssta.* '(I) observed the flow.'
Nonsense (Filler)	*khepul caypayhayssta.* '(I) cultivated a cup.'

2.3 Stimulus norming

One of our primary aims was to equate the four main conditions with regard to processing difficulty since there can be a possible confound between metaphoricity and difficulty, so the stimuli were normed in a rating by 30 native Korean adults (mean age 29.8±8.7) who did not participate in the experiment of the current study. The raters judged whether each sentence is sensible on a scale of 1 ("does not make sense") to 5 ("makes sense") on a questionnaire. Consistent with previous studies, literal sentences resulted in a higher meaningfulness rating than metaphoric ones. Sentences were then modified to reduce these differences (e.g., by using a more frequent verb-object combination to reduce the difficulty of a metaphoric sentence, or by using a less frequent verb-object combination to increase the difficulty of a literal sentence). In modifying the sentences, we also minimized differences in word frequencies. The modified set of stimuli were then tested in the meaningfulness judgment, familiarity, and action association questionnaires to ensure that all nuisance variables are controlled for and that action and non-action sentences are statistically different from each other in action association.

Meaningfulness judgment

The raters performed a meaningfulness judgment task in which they were asked to assess the extent to which each sentence makes sense. The ratings were made on a 1 to 5 scale (1 = does not make sense to 5 = strongly makes sense). As shown in Table 2, there were no significant differences between the four conditions ($t(60) = 1.292$, $p = 0.201$), which indicates that there is no complexity difference between the two conditions. But the Nonsense condition had lower rating than all of the other conditions (all $p < 0.001$).

Familiarity rating

The familiarity of sentences can influence the speed and accuracy in which they are processed. We collected familiarity ratings to assess familiarity effects more directly. The raters judged each sentence on a scale of 1 (not familiar at all) to 5 (very familiar). To control for familiarity factor, we included only sentences whose rating is higher than 4 points. There were no significant differences among all four conditions.

Action association rating

We intentionally selected verbs that were clearly associated with actions for the LA and MA conditions, whereas verbs used in the corresponding two non-action conditions were less associated with actions, given that we attempted to ascertain the existence (or lack thereof) of the Action effect (Table 2). The ratings were collected to assess whether non-action verbs were indeed less associated with actions than their action counterparts, given that some of the visual verbs such as yetpota ('peep') and kyethnwuncilhata ('squint') involve the movement of eyeballs. The raters were asked to conduct action ratings using a five-point Likert scale (1 = least associated with action to 5 = strongly associated with action). As illustrated in Table 2, there were significant differences between action stimuli and their non-action counterparts. This proves that our stimulus sentences are properly categorized as Action (LA and MA) and Non-action (LN and MN) conditions.

Overall summary statistics for the sentences in each condition are given in Table 2 below.

Table 2. The mean (standard deviation [SD]) of frequency, meaningfulness, action-relatedness, and familiarity for sentences in the conditions of interest

Condition	n	Frequency	Meaningfulness	Action	Familiarity
Literal Action	20	249.15	4.09 (0.59)	*4.26 (0.39)	3.54 (0.82)
Literal Non-action	20	1140.65	4.18 (0.60)	2.56 (0.38)	3.72 (0.76)
Metaphoric Action	20	795.30	3.95 (0.32)	*3.20 (0.33)	3.14 (0.54)
Metaphoric Non-action	20	775.65	4.06 (0.40)	2.63 (0.47)	3.53 (0.64)

For the variable Frequency, the value represents the summation of both the noun frequency and the verb frequency. Significant differences ($p < 0.05$) between all four conditions are indicated. * indicates a significant difference from the corresponding Non-action condition.

2.4 Procedure

All experiments were conducted individually in an empty classroom or study room setting with the lowest possible noise. As in previous cued-recall tests, no practice session was given. To examine the effects of conceptual differences (action/non-action and literal/metaphoric) on memory recall, the whole experiment was optimized into 2 parts: an encoding/study phase and a cued-recall test. Participants were instructed that they would see a series of Korean sentences during the encoding phase. They were asked to make an overt meaningfulness decision by pressing one of two buttons (1 = makes sense, 2 = does not make sense) on a response pad.

The 100 stimuli (20 sentences per condition) were presented every 5 s in a randomly intermixed order with respect to condition by E-prime software (Psychology Software Tools, Inc) so that participants have enough time to make a meaningfulness judgment. The participants were also informed that they would be given a cued-recall test on the study list later in the experiment with the nature of the memory test unspecified. Each stimulus sentence was presented horizontally in the center.

After the participants finished the encoding phase, they performed a Sudoku distractor task for 10 minutes so as to prevent ceiling effects on the subsequent memory test. The 10-min delay was selected, based on pilot data of performance levels. After the filled delay, all participants were presented with a cued-recall task which consists of forty studied sentences with ten sentences per each condition (See Appendix II for the sample of the cued-recall test). For the cued-recall task, each participant was given a spreadsheet in which the verb portions of stimuli sentences were left blank, with the rest given. Participants were asked to fill in as many verbs as possible for 20 minutes, so the whole experiment took approximately 40 minutes.

3. Results

Two-way paired samples ANOVAs were conducted for the cued-recall test results. There was a significant effect of Action on hits, $F(1, 25) = 11.34$, $MSE = 2.95$, $p < 0.01$. Participants tended to recall Action items significantly better than Non-action items (Table 3; Figure 1). Also, a significant effect was observed in the within-subjects variable Inference (Literal or Metaphoric) on hits, $F(1, 25) = 21.07$, $MSE = 2.57$, $p < 0.01$, with hits for literal items significantly higher than those for metaphoric items (Table 3; Figure 2).

Table 3. The mean (standard deviation [SD]) of hits (i.e., number of items correctly recalled) in each condition

Condition	Mean	SD
Literal Action	4.88	2.23
Literal Non-action	3.31	2.26
Metaphoric Action	3.23	1.90
Metaphoric Non-action	2.35	1.85

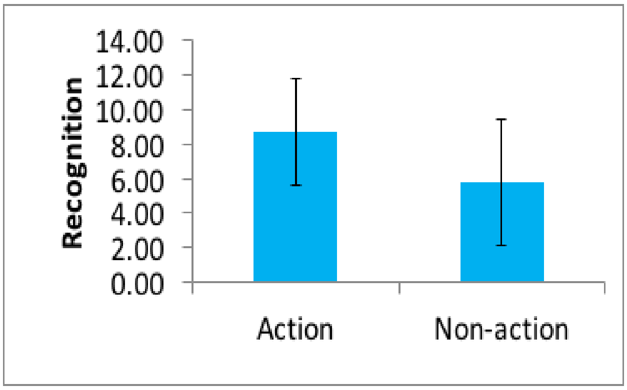

Figure 1. Recall accuracy (number of hits, i.e., items correctly recalled) as a function of action association, with a 20-min delay following meaningfulness judgment at encoding

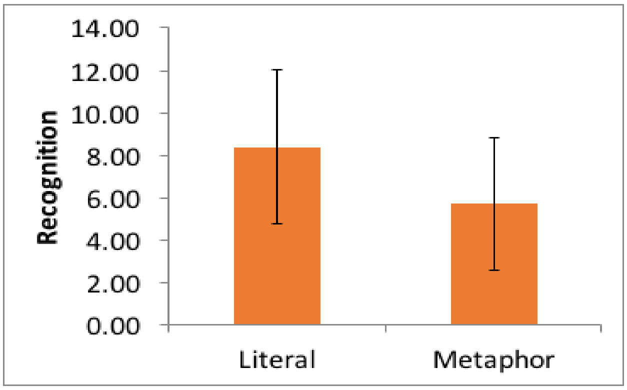

Figure 2. Recall accuracy (number of hits i.e., items correctly recalled) as a function of Inference, with a 20-min delay following meaningfulness judgment at encoding

No significant interaction effect, however, was found between the Action factor and the Inference factor, $F(1, 25) = 1.84$, $MSE = 1.63$, $p = .360$, which indicates that the action items were remembered better than the corresponding non-action sentences for both types of Inference pattern (Figure 3). Overall, native Korean speakers exhibited a strong tendency to maintain Action and Literal condition stimuli than their Non-action and Metaphoric counterparts in their memory to a greater degree.

4. Discussion

During the last three decades, grounded cognition has been increasingly developing in the areas of cognitive neuroscience and robotics as well as philosophy, perception, cognitive linguistics, cognitive neuropsychology and neurolinguistics. In cognitive linguistics, for instance, Lakoff and Johnson (1980) proposed in his conceptual metaphor theory that abstract concepts are grounded in bodily experience. In cognitive neuropsychology, it was argued that modal systems play a significant role in the representation of knowledge, based on the fact that lesions in the brain's modal systems lead to deficits in category knowledge (Warrington and Shallice 1984), even though the lines of research did not have much impact on the dominant amodal theories of the time.

Currently, however, grounded cognition, also known as embodied cognition, has been receiving widespread acceptance throughout those fields (e.g., Gallese and Lakoff 2005; Kwon and Roh 2018). Notwithstanding, it is not clear whether grounded mechanisms are secondary to classic symbolic systems or play a primary role in cognition. Moreover, although grounded cognition has been inundated by experimental support (e.g., Kiefer and Pulvermüller 2011), little is known about how conceptual distinctions are linked to semantic memory.

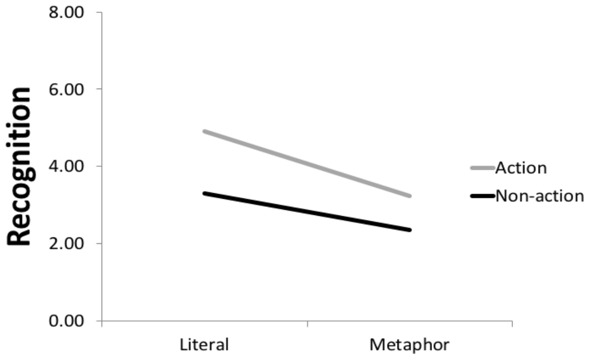

Figure 3. Recall accuracy (number of hits) by each condition (Literal Action, Literal Non-action, Metaphoric Action, Metaphoric Non-action)

Thus, we sought to investigate how processing different concepts have an effect on the probability of semantic memory retrieval by presenting native Korean subjects with Korean action/non-action-related sentences and literal/metaphoric sentences and then having them perform cued-recall tasks. The action sentences are involved with action of hand/arm or foot while the non-action ones are associated with less degree of action.

The literal sentences, however, described physical actions or perceptions, but the metaphoric action sentences used action verbs in a figurative sense, while the metaphoric non-action ones used the non-action verbs that are primarily visual in nature metaphorically, in a familiar but unconventional way.

We have found significant benefits of action items in cued-recall. This effect was found for items encoded while participants made a meaningfulness judgement task. These patterns are in support of the GC model in that per the theory, sentences with stronger action association should engender greater simulation of relevant action in the sensory-motor neural system during their encoding process, thereby leading to a more lasting impression.

On the other hand, the Amodal hypothesis that concepts are stored independently of relevant sensory-motor system is not supported by the findings of the present study because it predicts that there will be no difference in hits (i.e., memory recall) between Action and Non-action utterances during the same task.

We also found a literal sentence advantage, which is expected from the GC theory. That is due to the fact that if the GC is valid, the more concrete a concept can be, the more simulation of the sensory-motor cortex it will engage, and it should in turn lead to a more effective recall. Since a literal sentence is more concrete, it should engage more activation in the cortex during the encoding phase, which will induce a greater possibility of memory retrieval in the recall task. Again, this is inconsistent with the Amodal theory predicting that there will be no significant distinctions in the hits measure between the two types due to their abstract and symbolic nature of representation and storage.

One might also say the results may be due to differences in emotional valences among the conditions, since emotionally more charged items are known to be better remembered than less charged ones. But when we obtained valence ratings for the stimuli from subjects, non-action and metaphoric ones were generally higher in the measure. So the current result cannot be interpreted to be the ramification of the emotional valence effect.

Alternative interpretation of this study may be perceptual salience effect; i.e., the more perceptually salient an item is, the better recalled it will be. Perceptual salience such as visual salience of worldly objects and acoustic prominence of speech sounds has been found to affect language processing (e.g., Simoens et al. 2018; Toro et al. 2009; Yantis 2005). Visual salience refers to the state or quality by which an object or a person stands out from its background. Since action items can be deemed more visually salient than non-action ones due to its dynamic or moving nature, they will be more paid attention to, so this may have caused a more efficient recall. This possibility can be assessed by an eye-tracking study testing whether action and literal items involve more duration of eye gaze.

One limitation of the study, however, stems from the fact that we did not include sentences with abstract verbs that do not have any spatio-temporal framework but describe mostly abstract concepts. Thus, we cannot determine whether the involvement of sensory-motor information during the comprehension of concepts is obligatory or context-dependent (i.e., modulated by factors such as familiarity, context, and task demands). The latter view is known as a graded model of conceptual embodiment (Binder and Desai 2011). Comparing abstract sentences with the action and perception-associated ones used in the study in terms of advantage in cued-recall can help us evaluate the context-dependent, flexible nature of the conceptual or semantic system, which needs to be addressed in the future study.

5. Conclusion

We aimed to investigate the effects of differential concepts on semantic memory retrieval probability by comparing action vs. non-action utterances as well as literal vs. metaphoric ones through a cued-recall test. We found that when the study materials were matched for frequency, familiarity and meaningfulness, action-related and literal sentences had an advantage in cued-recall for native Korean subjects. The former finding of enhanced memory can be explained by GC hypothesis that concepts are anchored in sensory-motor representations in that understanding action-associated concepts will require activation of the relevant motor and sensory areas, which in turn should increases the possibility of a more effective recall. The latter result appears also to be consistent with the GC model, given that the perception of literal sentences is predicted to engage more of motor and sensory experience in the brain due to its relatively more concrete nature.

One implication of this paper is that more action-associated and literal sentences are to be utilized in advertisement and classroom situations if one wants viewers and students to better the recall probability of the advertised or taught content. It turns out that advertisements and political slogans have indeed been capitalizing on such utterances more often, presumably, to obtain this benefit.

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Appendix I. List of sample stimuli

Condition	Example
Literal Action	kwacalul tencyessta. ‘(I) threw a cookie.’
	meytalul kemecwiessta. ‘(I) grabbed a medal.’
	mosul pakassta. ‘(I) nailed it.’
	ekkaylul cispalpassta. ‘(I) trampled the shoulder.’
	khameylalul pwuswessta. ‘(I) broke a camera.’
	kkangthongul ketechassta. ‘(I) kicked a can.’
	pyekul chilhayssta. ‘(I) painted a wall.’
	changmwunul twutulyessta. ‘(I) knocked the window.’
	pawilul pwuswessta. ‘(I) broke a rock.’
	pwungtaylul kamassta. ‘(I) wrapped a bandage.’
Literal Non-action	posekul sangsanghayssta. ‘(I) imagined a jewel.’
	swupakul kwanchalhayssta. ‘(I) observed a watermelon.’
	pheyicilul cwusihayssta. ‘(I) watched a page.’
	ttwukkengul ungsihayssta. ‘(I) stared at the lid.’
	pyekul cwumokhayssta. ‘(I) paid attention to the wall.’
	uycalul palapoassta. ‘(I) looked at the chair.’
	cyekul cengtokhayssta. ‘(I) perused a book.’
	soselul thamtokhayssta. ‘(I) perused a novel.’
	sikyeylul poassta. ‘(I) watched the clock.’
	sinpalul kemsahayssta. ‘(I) inspected the shoe.’
Metaphoric Action	sikanul pwuthcapassta. ‘(I) grasped time.’
	maumul hwumchyessta. ‘(I) stole one’s heart.‘
	phyenkyenul kkayttulyessta. ‘(I) broke prejudice.’
	omyengul pesessta. ‘(I) took off a stigma.’
	cheymyenul kwukyessta. ‘(I) had a face.’
	cinsimul ketechassta. ‘(I) kicked one’s heart.‘
	uymilul nohchyessta. ‘(I) missed the meaning.’
	wucengul ssahassta. ‘(I) built a friendship.’
	hwalul eknwullessta. ‘(I) contained my anger.’
	kothongul cisnwullessta. ‘(I) weighed down pain.’
Metaphoric Non-action	sengcangul kwanchalhayssta. ‘(I) observed one’s growth.‘
	pwunnolul mokkyekhayssta. ‘(I) witnessed the anger.’
	sathaylul nwunyekyepwassta. ‘(I) looked over the situation.’
	milaylul sangsanghayssta. ‘(I) imagined the future.’
	kwucolul salphyepoassta. ‘(I) looked upon the structure.’
	kkimsaylul alachalyessta. ‘(I) sensed the secret.’
	cayulul nukkyessta. ‘(I) enjoyed freedom.’
	soknaylul yestulessta. ‘(I) overheard one’s mind.‘

	cengcheylul alachalyessta. '(I) recognized the identity.' hayngtongul kwanchalhayssta. '(I) observed the behavior.'
Nonsense (Filler)	ciphangilul heyemchyessta. '(I) swam a stick.' cungkelul twutulyessta. '(I) knocked evidence.' kongul salhayhayssta. '(I) murdered a ball.' iikul cengtokhayssta. '(I) perused profit.'

Appendix II. Sample of cued-recall test

직전 의미성 판단 과제에서 본 다음의 문장을 동사를 기입하여 완성하시오.
'Please complete the following sentences you saw in the previous meaningfulness judgment test by filling in verbs.'

화를 (hwalul) _______ '_______ anger.'	방을 (pangul) _______ '_______ a room.'
분위기를 (pwunwikilul) _______ '_______ atmosphere.'	풍경을 (phwungkyengul) _______ '_______ scenery.'
못을 (mosul) _______ '_______ a nail.'	역사를 (yeksalul) _______ '_______ history.'
분노를 (pwunnolul) _______ '_______ the fury.'	메달을 (meytalul) _______ '_______ a medal.'
진심을 (cinsimul) _______ '_______ one's heart.'	수박을 (swupakul) _______ '_______ a watermelon.'
카메라를 (khameylalul) _______ '_______ a camera.'	가죽을 (kacwukul) _______ '_______ leather.'
편견을 (phyenkyenul) _______ '_______ prejudice.'	뚜껑을 (ttwukkengul) _______ '_______ the lid.'
필요를 (philyolul) _______ '_______ the need.'	흐름을 (hulumul) _______ '_____ the flow.'
책상을 (chayksangul) _______ '_______ a desk.'	의자를 (uycalul) _______ '_______ the chair.'
붕대를 (pwungtaylul) _______ '_______ a bandage.'	책을 (chaykul) _______ '_______ a book.'
사태를 (sathaylul) _______ '_______ a situation.'	자유를 (cayulul) _______ '_______ freedom.'
변화를 (pyenhwalul) _______ '_______ a change.'	흙을 (hulkul) _______ '_______ the dirt.'
시계를 (sikyeylul) _______ '_______ the clock.'	감정을 (kamcengul) _______ '_______ an emotion.'

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