

DEVELOPMENT AND VALIDATION OF THE DICHOTOMOUS THINKING INVENTORY

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The Dichotomous Thinking Inventory (DTI) was developed for this study as a self-report measure used to assess a black-and-white cognitive thinking style or worldview. Validation of the DTI was explored with regard to the relationships among dichotomous thinking, borderline personality, narcissism, self-esteem, undervaluing others, intolerance for ambiguity, perfectionism, and the Big Five; and relationships between dichotomous thinking and peer ratings of traits and attitudes. Factor analysis of the DTI revealed 3 components: preference for dichotomy, dichotomous beliefs, and profit-and-loss thinking. Internal consistency and test-retest reliability of the DTI were at a sufficient level. Correlations among self-measures supported the convergent and discriminant validity of the DTI. Participants who scored highly on the DTI were rated as being articulate and straightforward by their friends. These results generally supported the reliability and validity of the DTI.

Keywords: dichotomous thinking, scale development, validity, reliability, Dichotomous Thinking Inventory.

“You’re either with us or against us.” – George W. Bush

“I want to clearly ask all the people through the election whether they are for or against postal privatization.” – Junichiro Koizumi

“There are two kinds of people in the world: those who divide people into two types and those who don’t.” – Edward A. Murphy, Jr.

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Dichotomous thinking relates to the propensity to think of things in terms of binary opposition: “black or white”, “good or bad”, or “all or nothing”. This thinking style is useful for quick comprehension and decision making. Moreover, dichotomous outcomes are commonly used in everyday society. In the political realm, the vote is either for or against proposed bills. In the criminal court system, defendants are either guilty or not guilty. Such clear outcomes bring immediate closure to debates or problems and expedite arriving at conclusions. However, this black-and-white thinking style can potentially lead to a gross misunderstanding between people who have incompatible opinions.

While it may have advantages for quick decision making, dichotomous thinking has also been related to negative psychological outcomes. For example, dichotomous thinking has been related to some cluster B and C personality disorders (Beck, Freeman, & Davis, 1990). In their model of clinical perfectionism, Shafran, Cooper, and Fairburn (2002) linked dichotomous thinking and perfectionism, indicating that dichotomous thinking is a central factor that maintains perfectionism.

Dichotomous thinking has also been linked to negative psychological outcomes in specific contexts such as attitudes towards food and food intake. Byrne, Cooper, and Fairburn (2004) developed the Dichotomous Thinking in Eating Disorder Scale (DTEDS) using a sample of 126 obese women. It is a 16-item scale that consists of two subscales: six items pertaining specifically to food, eating, dieting, and weight; and 10 items pertaining to more general issues. Egan, Piek, Dyck, and Rees (2007) reported relationships between this scale and negative perfectionism. In relation to this, Byrne, Allen, Dove, Watt, and Nathan (2008) explored factor structure using confirmatory factor analysis, internal consistencies, and validation by observing relationships among the DTEDS and eating disorder symptoms, depression, and perfectionism. However, because this scale is focused on eating disorders, it may be inappropriate for other psychological symptoms.

Researchers have previously investigated the nature of constructs related to the concept of dichotomous thinking such as *intolerance of uncertainty* (Dugas, Freeston, & Ladouceur, 1997; Dugas, Gagnon, Ladouceur, & Freeston, 1998) and *intolerance of ambiguity* (Budner, 1962; Frenkel-Brunswik, 1949). Both concepts are defined as *an individual tendency to perceive or interpret a situation (environment) as a threat or a source of discomfort, anxiety, and disagreement* in studies involving ambiguity and uncertainty (Grenier, Barrette, & Ladouceur, 2005). And in both cases, individuals respond to this perceived threatening situation with a set of cognitive, emotional, and behavioral reactions. The differences between these concepts relate to time-orientation (Grenier et al.). Individuals who are intolerant of ambiguity are unable to tolerate a “here and now” situation whereas those who are intolerant of uncertainty will not

be able to accept that a future and negative event may occur, however small the probability of its occurrence (Dugas, Gosselin, & Ladouceur, 2001). Thus, intolerance of ambiguity and intolerance of uncertainty contain not only a dichotomous-thinking cognitive style but also emotional and behavioral reactions to ambiguous and uncertain situations.

Splitting is one of the defense mechanisms from psychoanalytic theory and this is also closely related to dichotomous thinking style. Splitting leads to value judgments of everything being either “good” or “bad” while dichotomous thinking affects a wider range of judgment than does splitting. While splitting is generally regarded as an unconscious defense that plays a necessary role in psychic development, it is also an identified symptom of both Borderline and Narcissistic Personality Disorder (Jacobson, 1954; Volkan, 1988). In recent advances in cognitive therapy, some researchers proposed another meaning of splitting as relating to the cognitive domain. The central schema of splitting is to see oneself and others as “all good” or “all bad”. According to Benjamin and Friedrich (1991) and Horowitz (1977), any one component of a schema can activate the entire schema, evoking its power to influence current events. Because the dominant schema determines what is noticed, how it is processed, the meaning that is assigned, and the emotions that are evoked, schemas that are anchored in “all good” or “all bad” spheres perpetuate the abrupt oscillations (Siegel, 2006). In this way, splitting relates not only to cognitive processes but also to processing of emotions and memory.

The purpose of the present study was to develop a new inventory of dichotomous thinking for general use in psychological studies, and to explore its reliability and validity. In particular, this study focuses on three aspects of validation. First, the correlations between the Dichotomous Thinking Inventory (DTI) and some self-report measures to explore convergent validity was examined. Based on prior research it was hypothesized that dichotomous thinking would show positive correlations with Borderline Personality Disorder, narcissism, tendency to undervalue others, intolerance for ambiguity, and perfectionism. Second, correlations between the DTI and the unrelated construct of self-esteem were examined to confirm discriminant validity. Third, participants’ attitudes and behaviors as rated by their friends were examined. If people think dichotomously, this thinking style is thought to reflect their observable behaviors and attitudes. Dichotomous thinking should be associated with straightforward and simple behavioral patterns. Consequently, individuals who gain high scores on the DTI would be expected to be rated as unambiguous people by their friends.

METHOD

OVERVIEW

This study was conducted in five steps. The first consisted of completing three self-measures: the Dichotomous Thinking Inventory (DTI), Borderline Personality Tendency, and five adjectives to investigate the validity of the DTI. In the second step some of the participants completed a survey form, consisting of the same adjectives, as a self-rating exercise. Each participant also asked one of their close friends to complete the form; they returned the form in the following week. For the third step, five weeks after the first round of data collection, a follow-up survey, consisting of the DTI, a narcissism measure, and a perfectionism measure, was completed. In the fourth step, the data from the third step were matched to the data from the first step. Finally, another set of participants completed the DTI along with inventories assessing their levels of self-esteem, intolerance for ambiguity, and the degree to which they undervalued others. A description of all the steps used in the present study is presented in Table 1.

TABLE 1
RESEARCH STEPS AND NUMBER OF PARTICIPANTS

Step	<i>n</i>	Overview
1st	352 (149 males and 203 females)	Japanese undergraduates
2nd	121 (69 males and 52 females)	Friends of participants from group 1
3rd	384 (173 males and 211 females)	Five weeks after 1st step
4th	219 (82 males and 137 females)	Matched data from 1st and 3rd steps
5th	166 (100 males and 66 females)	A new group of Japanese undergraduates

PARTICIPANTS

A total of 352 Japanese undergraduates (149 males and 203 females) participated in the first step, and their average age was 19.4 years ($SD = 1.2$). A total of 121 friends of the participants (69 males and 52 females) completed the peer-rating survey form. Their mean age was 19.6 years ($SD = 0.9$) and the mean length of time they had been friends was 21.1 months ($SD = 20.8$). In the second step of the study, 384 Japanese undergraduates (173 males and 211 females) participated. Matched data were available from both rounds of collection for 219 participants (82 males and 137 females). The participants who took part in the third step consisted of 166 undergraduates (100 males and 66 females; mean age 19.1 years, $SD = 1.3$).

MATERIALS

The Dichotomous Thinking Inventory (DTI) This scale was designed by the

author to assess an individual's dichotomous thinking style in a general setting by measuring the degree of positive view of dichotomy, such as dichotomous thinking being better than other thinking styles and dichotomy being consequent, deserved, and worthy. Twenty items reflecting these attitudes and beliefs were collected. The DTI was scored on a 6-point scale (ranging from 1 = *disagree strongly* to 6 = *agree strongly*). The 6-point scale was thought to be appropriate for measuring dichotomy because there is no middle point, meaning participants must have an opinion. Fifteen of these items are shown in Appendix 1. This inventory was administered in all five steps of the present study.

Borderline Personality Tendency The Millon Clinical Multiaxial Inventory-2 Borderline Scale, Japanese Short Version (MCMIBS-II; Izawa, Ohno, Asai, & Okonogi, 1995) consists of 17 items and each item is answered with either "yes" or "no". Izawa et al. (1995) compiled a collection of the items on the basis of the diagnostic standards of Borderline Personality Disorder by the International Personality Disorder Examination. The Cronbach's alpha of this scale was .73 ($n = 352$). This scale was administered in the first step.

Five Adjectives Five adjectives are scored on a 7-point scale ranging from 1 = *strongly disagree* to 7 = *strongly disagree*, to assess participants' attitudes regarding dichotomous-thinking style. The items were as follows: ambiguous, articulate, fussy, straightforward, and assertive. These adjectives were administered in both the first step and the friend-reported survey.

Narcissism The Narcissistic Personality Inventory Short Version (NPI-S; Oshio, 1999) is scored on a 5-point scale (ranging from 1 = *disagree strongly* to 5 = *agree strongly*). The NPI-S consists of 30 items based on items from the Narcissistic Personality Inventory (Raskin & Hall, 1979). In Japan, the NPI-S has become a frequently used scale to measure the degree of Narcissistic Personality Disorder, along with the NPI. The Cronbach's alpha for this scale was .92 ($n = 294$). A total of 294 participants in the third step completed the NPI-S.

Perfectionism The Multidimensional Perfectionism Cognition Inventory (MPCI; Kobori & Tanno, 2004) is scored on a 4-point scale ranging from 1 = *not at all* to 4 = *always*. The MPCI consists of three subscales: personal standards, pursuit of perfectionism, and concern over mistakes. Each subscale has five items. The Cronbach's alphas for each subscale were as follows: .89 for personal standards, .87 for pursuit of perfectionism, and .89 for concern over mistakes ($n = 384$). This scale was administered in the third step.

Self-Esteem Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965) is scored on a 5-point scale ranging from 1 = *disagree strongly* to 5 = *agree strongly*. This scale consists of 10 items. The Cronbach's alpha from this scale was .82 ($n = 166$). This scale was administered in the fifth step.

Intolerance for Ambiguity The Short Version of Intolerance for Ambiguity Scale (Uemura, 2001) is scored on a 7-point scale (ranging from 1 = *definitely*

no to 7 = *definitely yes*), with a higher score indicating the participant has greater intolerance for ambiguity. This scale consists of 10 items. The Cronbach's alpha of this scale was .80 ($n = 166$). This scale was administered in the fifth step.

Undervaluing Others The Assumed-Competence Scale revised version (ACS-2; Hayamizu, Kino, Takagi, & Tan, 2004; Hayamizu & Kodaira, 2006) was administered to assess individual differences in undervaluation of others. This scale consists of 11 items, scored on a 5-point scale ranging from 1 = *disagree strongly* to 5 = *agree strongly*. Examples of items are as follows: "There are a lot of insensitive people around me." "Looking at the way others work, I feel that they are inefficient." "I think that there are many people who talk nonsense during meetings." The Cronbach's alpha of this scale was .78 ($n = 166$). This scale was administered in the fifth step.

RESULTS

TABLE 2
FACTOR LOADINGS AND INTERFACTOR CORRELATIONS OF DTI

	I	II	III
Preference for dichotomy			
All things work out better when likes and dislikes are clear.	.73	-.03	-.07
It works out best when even ambiguous things are made clear-cut.	.70	.01	.00
I dislike ambiguous attitudes.	.67	.01	-.08
I want to clarify whether things are "good" or "bad."	.57	.00	.21
I prefer it when boundaries are clear for all things.	.56	.02	.20
Dichotomous belief			
There are only "winners" and "losers" in this world.	-.19	.82	.07
I think all people can be divided into "winners" or "losers."	-.15	.69	.11
People can clearly be distinguished as being "good" or "bad."	.10	.65	-.08
All questions have either a right answer or a wrong answer.	.17	.51	-.19
I think of everyone as being either my friend or my enemy.	.22	.40	-.10
Profit-and-loss thinking			
I want to clearly distinguish what is safe and what is dangerous.	-.12	-.18	.86
Information should be defined as either true or false.	.02	-.09	.66
I want to clarify whether things are beneficial to me or not.	.08	.23	.53
I prefer to classify information as being useful or useless for me.	.09	.14	.50
It is best when competitions have clear outcomes.	.19	.06	.37
Interfactor Correlations			
I	-	.36	.49
II		-	.47
III			-

FACTOR ANALYSIS OF DTI

An exploratory maximum likelihood factor analysis with Promax rotation was

conducted for the 20 items of the DTI. Five of these items were not used for the subsequent analysis because of their low factor loadings. Again, an exploratory maximum likelihood factor analysis with Promax rotation revealed three factors: preference for dichotomy, dichotomous belief, and profit-and-loss thinking. Table 2 shows the final factor loadings and interfactor correlations of the DTI.

The first factor, named *preference for dichotomy*, refers to a thinking style that leads to preferring distinctness, clarity, and conciseness as opposed to ambiguity, obscurity, and vagueness. The second factor, named *dichotomous belief*, refers to thinking that anything in the world can be divided into two categories such as “black or white”, “good or bad”, or “winner or loser”. The third factor, named *profit-and-loss thinking*, refers to thinking of how to get access to the benefits in a situation for oneself and how to avoid the disadvantages.

RELIABILITY OF THE DTI

Correlations among the subscale scores of the DTI, means, standard deviations, and reliability coefficients are presented in Table 3. The three subscales of DTI showed low to moderate correlations with each other.

TABLE 3
CORRELATIONS AMONG SCORES, MEAN, SD, AND RELIABILITY OF THE DTI

	Dichotomous Thinking				<i>M</i>	<i>SD</i>	Cronbach's alpha	Test-retest reliability
	Total	Preference	Belief	Profit-and-loss				
Total	-	.80***	.72***	.80***	51.05	11.01	.84	.81
Preference		-	.31***	.49***	18.24	5.14	.81	.74
Belief			-	.39***	11.80	4.48	.74	.67
Profit-and-loss				-	21.01	4.60	.75	.69

*** $p < .001$

Correlations and Cronbach's alpha: $n = 352$, Test-retest reliability: $n = 219$.

Test-retest reliabilities are also presented in Table 3. These results indicated that DTI has sufficient reliability in terms of both internal consistency and test-retest reliability.

CORRELATIONS AMONG SELF-MEASURES

Correlations among the DTI and other self-measures are shown in Table 4. The total score of the DTI showed significant positive correlations with borderline ($r = .14, p < .01$), narcissism ($r = .27, p < .001$), undervaluing others ($r = .27, p < .001$), intolerance of ambiguity ($r = .43, p < .001$), personal standards ($r = .21, p < .001$), pursuit of perfectionism ($r = .35, p < .001$), and concern over mistakes ($r = .20, p < .001$).

TABLE 4
CORRELATIONS AMONG THE DTI AND OTHER SELF-MEASURES

	Dichotomous Thinking			<i>n</i>	
	Total	Preference	Belief		
Borderline tendency	.14**	.04	.17**	.13*	352
Narcissism	.27***	.34***	.06	.21***	294
Self-esteem	.03	.06	.03	-.03	166
Undervaluing others	.27***	.20*	.34***	.09	166
Intolerance for ambiguity	.43***	.36***	.23**	.46***	166
Perfectionism					
Personal standards	.21***	.27***	.04	.18***	384
Pursuit of perfectionism	.35***	.29***	.20***	.32***	384
Concern over mistakes	.20***	.03	.17**	.24***	384

* $p < .05$, ** $p < .01$, *** $p < .001$

The preference of dichotomy subscale showed significant positive correlations with narcissism ($r = .34, p < .001$), undervaluing others ($r = .20, p < .05$), intolerance of ambiguity ($r = .36, p < .001$), personal standards ($r = .27, p < .001$), and pursuit of perfectionism ($r = .29, p < .001$). The dichotomous belief subscale showed significant positive correlations with borderline ($r = .17, p < .01$), undervaluing others ($r = .34, p < .001$), intolerance of ambiguity ($r = .23, p < .01$), pursuit of perfectionism ($r = .20, p < .001$), and concern over mistakes ($r = .17, p < .01$). The profit-and-loss thinking subscale showed significant positive correlations with borderline ($r = .13, p < .05$), narcissism ($r = .21, p < .001$), intolerance for ambiguity ($r = .46, p < .001$), personal standards ($r = .18, p < .001$), pursuit of perfectionism ($r = .32, p < .001$), and concern over mistakes ($r = .24, p < .001$). Self-esteem, however, had no significant correlations with the DTI scores.

CORRELATIONS BETWEEN SELF-REPORTED AND FRIEND-REPORTED ATTITUDES AND DTI

Correlations among the five adjectives reported by the participants themselves and by their friends, and scores on the DTI are shown in Table 5. The total DTI score showed significant negative correlation with self-rated ambiguous ($r = -.14, p < .01$) and significant positive correlations with self-rated articulate ($r = .26, p < .001$), faddish ($r = .21, p < .001$), straightforward ($r = .21, p < .001$), and assertive ($r = .30, p < .001$), whereas for the friend-reported attitude only articulate ($r = .19, p < .05$) and straightforward ($r = .30, p < .01$) showed significant positive correlations with the total score gained on the DTI. Results indicate that people who think dichotomously tend to be judged as articulate and straightforward when described by their friends.

TABLE 5
CORRELATIONS AMONG THE DTI SELF-RATING AND FRIEND-RATING ADJECTIVES

	Total	Dichotomous Thinking		Profit-and-loss
		Preference	Belief	
Self-reports (<i>n</i> = 352)				
1. Ambiguous	-.14**	-.24***	-.05	-.02
2. Articulate	.26***	.34***	.11*	.14*
3. Fussy	.21***	.20***	.11*	.18**
4. Straightforward	.21***	.19***	.08	.21***
5. Assertive	.30***	.34***	.14**	.20***
Friend-reports (<i>n</i> = 121)				
1. Ambiguous	-.10	-.08	-.06	-.09
2. Articulate	.19*	.26**	.05	.14
3. Fussy	.06	.08	.06	.00
4. Straightforward	.30**	.24**	.18*	.28**
5. Assertive	.15	.19*	.03	.11

* $p < .05$, ** $p < .01$, *** $p < .001$

DISCUSSION

The DTI had significant positive correlations with two personality disorders: borderline and narcissism. However, there are different correlations among these and three subscales of the DTI. The preference for dichotomy had a significant positive correlation with narcissism and a nonsignificant correlation with Borderline Personality Disorder. Dichotomous belief had a significant positive correlation with Borderline Personality Disorder and a nonsignificant correlation with narcissism. At the same time, profit-and-loss thinking showed significant positive correlations with both Borderline and Narcissistic Personality Disorders. These results suggest that different dimensions of dichotomous thinking are related to each of the personality disorders. Additionally, narcissism and self-esteem are positively related to each other (Brown & Zeigler-Hill, 2004; Emmons, 1984; Raskin, Novacek, & Hogan, 1991). The score gained on the DTI had a significantly positive correlation with narcissism but a nonsignificant correlation with self-esteem. These results suggest that, with the exception of positive self-evaluation, the DTI shares some components, with narcissism.

According to Frost and Henderson (1991), personal standards of perfectionism relate to positive perfectionism, whereas concern over mistakes relates to negative perfectionism. From this viewpoint, the preference for dichotomy subscale may be related to the positive aspects of perfectionism. The dichotomous belief subscale is related to the negative aspects of perfectionism, and it also has a connection to Borderline Personality Disorder and undervaluing others. The profit-and-loss subscale is related to both positive and negative aspects of perfectionism. Further studies are needed to examine the positive and negative

meanings of the DTI subscales.

The DTI, especially the preference for dichotomy and the dichotomous belief subscales, had significant positive correlations with the tendency to undervalue others. People who think dichotomously have a tendency to classify people into two types: winners or losers. In relation to this, it may be assumed that they want to be winners; therefore they tend to undervalue others.

The positive link between the DTI and intolerance for ambiguity supports the convergent validity of the DTI. However, the correlation coefficients ranged from low to moderate, suggesting that the actual semantic contents of the DTI partially overlap with intolerance for ambiguity because intolerance for ambiguity has a much wider scope than the DTI, including not only thinking style but also emotion and behavior. In future studies the similarities and differences between the two could be explored.

Those who gained high scores on the DTI were described as being articulate and straightforward people by their friends. Interestingly, the correlation coefficient between the DTI and friend-reported straightforwardness was found to be higher than the coefficient for self-rating. This result indicates that the dichotomous thinking tendency goes along with an honest and frank interpersonal communication with friends. But overall, correlation coefficients between the DTI and friend-reported adjectives were low, so dichotomous-thinking style may be displayed as a particular kind of behavior. More research is required to examine this further.

Overall, the DTI was found to have acceptable levels of reliability and validity for measuring individuals' dichotomous thinking. This inventory may be applicable not only to personality disorders and depression but also to wider psychological symptoms. For example, uncertainty avoidance and intolerance of ambiguity are related to ideological orientation. In particular, in some studies it has been found that intolerance of ambiguity has a positive relationship with conservative political attitude (e.g., Jost, 2006), and results in the present study showed a positive relationship between high scores gained on the DTI and intolerance of ambiguity. So, it is possible that dichotomous thinking is related to certain political attitudes such as conservatism. In addition, a positive relationship was found between high scores gained on the DTI and tendency to undervalue others. Undervaluing of others is positively related to anger (Hayamizu, Kino, & Takagi, 2005) and hostility (Kodaira, Oshio, & Hayamizu, 2007), and dichotomous thinking is also related to entity versus incremental theory in perception of others (Levy, Stroessner, & Dweck, 1998). It would be worthwhile to explore the relationships between dichotomous thinking, interpersonal theory, and interpersonal decision making. However, the data gathered to validate the DTI in this study are not sufficiently comprehensive, hence further studies are required to carry out further validation tests.

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APPENDIX
DICHOTOMOUS THINKING INVENTORY

To what extent do you agree with the following statements? For each statement, please circle one of the points on the scales from 1 = *strongly disagree* to 6 = *strongly agree*.

1 = *strongly disagree*, 2 = *disagree*, 3 = *slightly disagree*,
4 = *slightly agree*, 5 = *agree*, 6 = *strongly agree*

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| A. | All things work out better when likes and dislikes are clear. | 1 | 2 | 3 | 4 | 5 | 6 |
| B. | There are only “winners” and “losers” in this world. | 1 | 2 | 3 | 4 | 5 | 6 |
| C. | I want to clearly distinguish what is safe and what is dangerous. | 1 | 2 | 3 | 4 | 5 | 6 |
| D. | It works out best when even ambiguous things are made clear-cut. | 1 | 2 | 3 | 4 | 5 | 6 |
| E. | I think all people can be divided into “winners” and “losers.” | 1 | 2 | 3 | 4 | 5 | 6 |
| F. | Information should be defined as either true or false. | 1 | 2 | 3 | 4 | 5 | 6 |
| G. | I dislike ambiguous attitudes. | 1 | 2 | 3 | 4 | 5 | 6 |
| H. | People can clearly be distinguished as being “good” or “bad.” | 1 | 2 | 3 | 4 | 5 | 6 |
| I. | I want to clarify whether things are beneficial to me or not. | 1 | 2 | 3 | 4 | 5 | 6 |
| J. | I want to clarify whether things are “good” or “bad.” | 1 | 2 | 3 | 4 | 5 | 6 |
| K. | All questions have either a right answer or a wrong answer. | 1 | 2 | 3 | 4 | 5 | 6 |
| L. | I prefer to classify information as being useful or useless for me. | 1 | 2 | 3 | 4 | 5 | 6 |
| M. | It feels good when boundaries are clear for all things. | 1 | 2 | 3 | 4 | 5 | 6 |
| N. | I think of everyone as being either my friend or my enemy. | 1 | 2 | 3 | 4 | 5 | 6 |
| O. | It is best when competitions have clear outcomes. | 1 | 2 | 3 | 4 | 5 | 6 |

