



## Six months aikido training shortens reaction time

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### Abstract

A shorter reaction time in Aikido is essential for success. The aim of this study was to assess the effects of training on simple and choice reaction time in novice and experienced aikido practitioners. Sixty four Aikido practitioners between 18 to 28 years of age were divided into the experienced and the novice groups. Reaction time (RT) was assumed to be shorter in the experienced group compared to that of the novice group.

Simple visual reaction time scores of the experienced group were statistically lower in the dominant hand (M=0,16 SD=0,02sec) and the non-dominant hand (M=0,17, SD=0,02sec); in the experienced group when compared to the dominant ( t (60)= 5,94, p<0.001 ) and non dominant ( t (60)= 5,40, p<.001 d=1.2) hands of the novice group. Simple auditory reaction time scores of the experienced group were statistically lower in dominant hand (M=0,16 SD=0,03sec) and non dominant hand (M=0,16, SD=0,02sec);when compared to the dominant hand ( t (60)= 4,23, p<.001 ) and non dominant hands( t (60)= 4,22, p<0.001 d=1)of the novice group. Choice reaction time scores of the experienced group were statistically lower than that of the novice group. Choice reaction time scores of the dominant hand (M=0,43 SD=0,07sec) and non dominant hand scores (M=0,43, SD=0,06sec)of; the experienced group was significantly higher than that of the dominant ( t (60)= 5,61, p<.001 d= 1.3 ) and non dominant hand scores ( t (60)= 4,71, p<.001 d=1.2) hands of the novice group. These results indicates that six months Aikido training improves simple and choice visual and auditory reaction time scores

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## Introduction

Simple (SRT) and choice (CRT) reaction time are the principal capabilities to be measured in Sports (Zemkova, 2004). Reaction times are crucially important for success in Aikido (Taimela, 1991).

Aikido training involves significant physical activity. The intensity of physical training depends on training levels of participants. Beginners may move very slow initially in order to learn the correct forms for the techniques, while advanced participants may sometimes practice at fast speeds in order to simulate self-defense situations (Tapley, 2007).

Aikido is a unique and beautiful martial art. It is also powerful, effective and efficient defensive sport. Advanced Aikido practitioners improve their emotional, mental and social spiritual and physical condition like muscle strength, reaction time, and etc. (Phong T., Dang, 2004).

In case of Aikido, the situation is crucial. Since Aikido is defined as non-aggressive martial art (Palmer, 2008), it does not include attacking but defense against the opponents move or attack (Waobel, 2001). In that defense Reaction Time plays the most important role.

Participants who are being in general physical activity have significantly shorter reaction times than those who do not (Brisswalter et al., 1997). Studies have also shown this to be true for specific activities like martial arts (Mori et al., 2002).

In martial arts there are numerous studies on Taekwondo (Abdossaleh Zar and et all, 2008), Karate Do (Shuji Mori and et all, 2002) and Tai Chi (J X Li and et all, 2001), but there are no relevant studies on Aikido and RT (Koh, 1981).

In the literature so far reviewed, there appears to be no coherent picture concerning the advantage of experienced aikido athletes in Reaction Time tasks. That is, it is not yet clear whether they are faster than novices in simplistic settings.

It is assumed that simple auditory and simple visual and choice RT will be shorter in advanced Aikido trainers compared to the beginners. Furthermore, the RT of the dominant hand will be shorter than that of the non-dominant hand.

The aim of this study was to evaluate simple auditory and visual and choice RT in dominant and non-dominant hands of advanced and beginner Aikido trainers.

## **Methods**

### **Design of the Study**

A descriptive cross-sectional controlled study was designed. The independent variable was advanced and novice Aikido trainers. Dependent variables were auditory and visual choice and simple RT of dominant and non-dominant hands.

### **Subjects & Procedures**

Sixty-four aikido trainers of the Middle East Technical University Aikido Dojo participated. All subjects were considered as healthy males and females and did not familiar with Reaction Time measurements. All subjects were informed to avoid from drinking alcohol, smoking or consuming products that contain caffeine during the 24h preceding the test. Subjects were asked whether they were engaged in particular sports for 3 days a week more than 45 minutes other than Aikido. Four subjects who were engaged in other sport activities were excluded from the study. All subjects were informed on the study and a written consent was signed.

Participants aged between 18-24 years were subdivided and analyzed according to two Aikido level groups. The first group was called the beginners group who were selected voluntarily from new aikido class who were not trained in aikido. The experienced group was selected voluntarily from participants of aikido who were trained more than 6 months to 2 years before this study.

Simple visual and auditory RT and choice RT was measured using the Newtest 2000 (Newtest, Oulu, Finland) (Tamer, K., 2000). Subjects' dominant and non-dominant upper extremities were tested three times and the best score was used for statistics. For measuring reaction times, the subjects were asked to press the button on the index finger as quickly as possible when they observed the light stimulus on the light panel placed in front of them or heard the sound stimulus. Both hands were used in random order to perform the reaction time test.

The SPSS (Version 11.0) package for Windows was used for statistical tests. Independent t- test was used to evaluate differences in group mean between the two tests ( $p < .001$ ).

## Results

The aim of this study was to evaluate simple auditory and visual and choice RT in dominant and non-dominant hands of advanced and novice Aikido trainers. Six months Aikido training significantly ( $p < .001$ ) decreased Reaction Time (Table 1).

**Table 1. Simple reaction time and choice reaction time results of experimental groups.**

	<i>GROUP</i>	<i>N</i>	<i>X</i>	<i>SD</i>	<i>df</i>	<i>t</i>
<i>S.VisualRT (Dominant)</i>	<i>novice</i>	34	,22	,05		
	<i>experienced</i>	28	,16	,02	60	5,94*
<i>S.VisualRT(Non Dominant)</i>	<i>novice</i>	34	,22	,05		
	<i>experienced</i>	28	,17	,02	60	5,40*
<i>S.AuditoryRT (Dominant)</i>	<i>novice</i>	34	,19	,03		
	<i>experienced</i>	28	,16	,02	60	4,23*
<i>SAuditoryRT (nondominant)</i>	<i>novice</i>	34	,20	,04		
	<i>experienced</i>	28	,16	,03	60	4,22*
<i>ChoiceRT (Dominant)</i>	<i>novice</i>	34	,54	,08		
	<i>experienced</i>	28	,43	,07	60	5,61*
<i>ChoiceRT (Nondominant)</i>	<i>novice</i>	34	,52	,09		
	<i>experienced</i>	28	,43	,06	60	4,71*

\*  $p < .001$

As a result of this study, we concluded that simple visual reaction time scores of the experienced group were statistically lower in the dominant hand ( $M=0,16$   $SD=0,02$ sec) and the non-dominant hand ( $M=0,17$ ,  $SD=0,02$ sec); in the experienced group when compared to the dominant ( $t(60)= 5,94$ ,  $p < 0.001$ ) and non dominant ( $t(60)= 5,40$ ,  $p < .001$   $d=1.2$ ) hands of the novice group. Simple auditory reaction time scores of the experienced group were statistically lower in dominant hand ( $M=0,16$   $SD=0,03$ sec) and non dominant hand ( $M=0,16$ ,  $SD=0,02$ sec); when compared to the dominant hand ( $t(60)= 4,23$ ,  $p < .001$ ) and non dominant hands ( $t(60)= 4,22$ ,  $p < 0.001$   $d=1$ ) of the novice group. Choice reaction time scores of the experienced group were statistically lower than that of the novice group. Choice reaction time scores of the dominant hand ( $M=0,43$   $SD=0,07$ sec) and non dominant hand scores ( $M=0,43$ ,  $SD=0,06$ sec) of; the experienced group was significantly higher than that of the dominant ( $t(60)= 5,61$ ,  $p < .001$   $d= 1.3$ ) and non dominant hand scores ( $t(60)= 4,71$ ,

$p < .001$   $d = 1.2$ ) hands of the novice group. These results indicated that at least six months Aikido training improved all Reaction Time scores ( $p < 0.001$ ). According to the affect size, when Cohen's "d" value (Cohen, 1988) was considered, all findings were significant ( $> 1.2$ ).

### **Discussion**

The present study was designed to investigate simple auditory and visual and choice RT in dominant and non-dominant hands of advanced and novice Aikido practitioners.

In a historical study (Galton, 1899) reported on teenagers (15-19), the mean RT was 187 ms for light stimuli and 158 ms for sound stimuli. That study indicates that, age was important for RT. In our study, participants mean age was 18 to 24 years. In this study the affect of age on RT was not considered. Experience in Aikido training however had an effect on RT.

The simple reaction time is the shortest interval of time required to respond to a single stimulus. Some investigators reported that no differences in simple reaction time between athletes and non-athletes (Mori et al., 2002) suggesting that it cannot be trained. On the other hand, it has been reported that physically fit participants show faster simple reaction times than their less fit counter parts (Arito and Oguri, 1990) and Athletes have superior sports-specific perceptual skills compared to novices (Mori et al., 2002). In this study, we had significant differences in simple reaction time between novice and advanced participants. Choice RT refers situations in which there are two or more possible stimuli requiring different responses and is considered as a useful variable to infer the velocity of decision making processes. There is some evidence that choice reaction times can be trained (Johnson et al., 1991). Moreover, A few studies have reported that athletes performed faster than novices in choice RT tasks to generic stimuli, however, the differences were small (Nougier, Azemar, & Stein 1992). In this previous study we found that advanced aikido practitioners had faster reaction time in both simple and choice Reaction Time.

Welford (1980) found that physically fit subjects had faster reaction time. Levitt and Gutin (1971) and Sjoberg (1975) showed that subjects had the fastest RT when they were exercising sufficiently to produce a heart rate of 115 beats per minute. A person is still capable of complex motor skills involving more than one gross movement, has increased reaction time, increased visual ability, and retains the ability to think quickly and may even be thinking faster and more clearly than normal.

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On the other hand, there are different reports on the effect of exercise on RT. McMorris et al. (2000) found no effect of exercise on RT. In a test of soccer skill Collardeau et al. (2001) found no post-exercise effect in runners, but did find that exercise improved reaction time during the exercise. Whereas, in Aikido training, we found that there was relationship with exercise and RT. This could be related with the type of the exercise that is performed. As in Martial Arts, there are attacks and defense positions that can improve reaction time during exercise, whereas, in above there are no attacks.

In conclusion, RT is very important in Aikido. Reaction time can be improved with Aikido training; moreover, experience can give success in Aikido.

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