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A SURVEY ON THE RELATIONSHIP BETWEEN PROCESSİNG SPEED, REACTION AND AGILITY ON CHILDREN FROM 10 TO 11

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ABSTRACT
This is a scanning study on 42 students of ages from 10 to 11 from a primary school located in Istanbul on surveying the relationship between process speed, reaction and agility. In the study, an "Academy Reaction Timer" was used to evaluate Simple, Selective and Distinctive reaction types, "Side Direction Alter", "T" and Short "T" tests were used as agility tests, and "WJ-R COG Cognitive Ability Test" was used to evaluate process speed (Test 3: Visual Matching and Test 10: Draw Out). The data were analysed and interpreted by general distribution statistics, arithmetic mean and standard deviation and Pearson Product-Moment Correlation Coefficient test for the relationship. Significant ratio was accepted as $p<0.05$. While there isn't a significant relationship between the children's processing speed with Simple, Selective "reaction time", "movement time" and "response time" and Distinctive "movement time" a significant relationship was found between processing speed and Distinctive "reaction time" and "response time". While there isn't a significant relationship between processing speed and "Side Direction Alter" and "T" agility tests; a significant relationship was found between processing speed and Short "T" agility test. While there isn't a significant relationship between "Side Direction Alter" agility test and Simple "movement time", Selective "reaction time" and "response time" and Distinctive "reaction time", but a relationship between Simple "reaction time" and "response time", Selective "movement time", Distinctive "movement time" and "response time" was present. While there isn't a a significant relationship between "T" agility test and any part of Simple, Distinctive reactions, Selective "reaction time" and "response time" but there was a relationship found between only in Selective "movement time". There was no a significant relationship between Short "T" agility test and any part of the Simple reaction, Selective "reaction time", "response time" and Distinctive "reaction time" but a significant relationship found between Selective "movement time" and Distinctive "movement time", "response time".
Key words: Processing speed, types of reaction (simple, selective, distinctive), agility.

INTRODUCTION

Tests of reaction which are used to reveal the human performance and to understand operation processes were also used to measure the speed of processing information by scientists (Schmidt, 1991). It is considered that a child's action skills indicate his intelligence too. It is thought that process speed, which is a sub dimension of intelligence, is related to reactions. The relation between brain and movement makes us think that psychomotor learning is initially a product of the brain. Intelligence is in large part affected by heredity and neurological factors. At the same time, it is supposed that action, which is an indicator of intelligence and behaviour, and reaction time, which is answering the stimulant fast by the help of experience and learning.

Drovatzky (1981) expresses that reaction is a sum of processes in sense organs, brain, nerves and muscles. Speed and timing are frequently used performance criteria in the motor learning studies. As a significant indicator of success, performance is a notion that is measurable by time. It is argued that completing a performance in shorter time indicates a fast learner. Deary et al. (2001) argue that the action of a child in a performance cause a speed up process in branching neurologic cells by rich environmental stimulants and therefore enhances the development of the brain. It is expressed that in order to learn the skills besides mental awareness, readiness and effort, first coordination between brain and muscles should be established.

Eysenck (1986) has researched the biologic roots of intelligence and claims that intelligence and processing speed are the same things and processing speed is one of the main indicators of intelligence. If damage would come to the processing speed, which is referred to as the gift of constant concentration in thinking speed, doing simple cognitive duties would slow down (cited by Ramazan, 1997, p.18).

Lehr and Fisher (1990) and Matchintoch (1986) acknowledge fast analysing and synthesizing, fast thinking, the gift of evaluating information rapidly, using it in the correct place and creating new ideas from it as indicators of higher intelligence and state that it is directly related to processing speed. Processing speed is acknowledged as the biologic origin of intelligence. It is also referred to as thinking speed.

The motor behaviours of a child bear a lot of significant information for an adult. Even though children seem to grow differently in mental, social, physical and psychomotor fields, the order of learning specific actions are universal. There is a certain relation between behaviour and skills in a child's development. The effect of rich stimulants and environmental conditions in learning new actions is incontrovertible. (Thomas, Lee, Thomas, 2008).

Young et al. (2001) describe agility as the shifting action in many sports, chasing the opponent (following), escaping the opponent or intervening a moving ball, starting an action, stopping skills and showing reaction. At the same time the performance of agility could be defined as a response to a stimulant and in this sense a relation between agility and reaction is considered.

In many studies on reaction versus factors like age, gender, sport and exercise, intelligence etc. or mental processes (perception, attention, decision-making, reasoning etc.) a relation between reaction and intelligence is discussed. In situation where knowledge is measured against time, having the desired information is not enough; you need to think fast. Increasing thinking speed gives ability the skill to create fast and correct solutions in tough situations and some motor abilities (reaction and agility) are needed for this.

METHOD

The Purpose of the Study

The study is conducted to investigate the relation between Processing Speed, Simple, Selective and Distinctive (reaction, movement and response time) reaction types and agility of 10 to 11 year old children.

Research Model and Study Group

This is a descriptive study based on the scanning model. The study group consists of 42 students 10 to 11 years of age from a primary school located in Istanbul.

Collecting data and Analysing

"Academy Reaction Timer" device, is a tester used for Visual (Simple, Selective, Distinctive Reactions) and Audial Reactions. In this study only visual reaction evaluation is used. WJ-R COG Cognitive Ability Test (Processing Speed (Gs) Test 3: Visual Matching and Test 10: Draw Out) is used "Side Direction Alter", "T" and Short "T" (the researcher reduced the 10 m running distance of the "T" agility test by half as it wouldn't measure the agility correctly) agility tests are used. After briefing the students and their teachers about the study, the researcher tested the students one by one, computerized the data collected and the data were analysed and interpreted by general distribution statistics, arithmetic mean and standard deviation and Pearson Product-Moment Correlation Coefficient test for the relationship. Significant ratio was accepted as $p<0.05$.

FINDINGS

Table 1. The Pearson Product-Moment Correlation Coefficient Test Results Showing The Relation Between Processing Speed and Simple, Selective and Distinctive (reaction, movement and response time) Reactions

Variables	N	x	ss	r	p
PROCESSİNG SPEED	42	52,78	9,19049	- ,011	,945
Simple "rt"	42	,2927	,06351	- ,012	,940
Simple "mt"	42	,7038	,11180	-,011	,946
Simple "rt"					
Selective "rt"	42	, 5144	,13261	-,045	,779
Selective "mt"	42	,2841	,04982	- ,019	,904
Selective "rt"	42	,7957	,14257	-,037	,814
Distinctive "rt"	42	,4282	,10243	-,451	,003
Distinctive "mt"	42	,2705	,06489	-,155	,327
Distinctive "rt"	42	,6292	,13876	-,404	,008

According to Table 1, While there isn't a significant relationship between the children's processing speed with any part of Simple and Selective (reaction, movement, response time) and Distinctive "movement time" but Distinctive "reaction time" and "response time" showed a $p<0.01$ statistically significant relationship with the processing speed test scores.

Table 2. The Pearson Product-Moment Correlation Coefficient Test Results Showing The Relation Between Processing Speed And Agility Tests

Variables	N	x	ss	r	p
PROCESSİNG SPEED					
Side Direction Alter	42	7,2505	7,2505	-,243	-,121
"T"	42	12,7952	1,01177	-,164	-,299
Short " T"	42	8,4869	,82988	-,367	-,017

According to Table 2, While there isn't a significant relationship between processing speed and "Side Direction Alter" and "T" agility tests; but a $p<0.05$ statistically meaningful relation between "Short T" agility test scores and processing speed was present.

Table 3. The Pearson Product-Moment Correlation Coefficient Test Results Showing The Relation Between Reaction Times And Agility Tests

Variables	N	x	ss	r	p
"SİDE DİRECTİON ALTER"					
Simple "rt"	42	7,2505	,59740	,336	,030
Simple "mt"	42	,2927	,06351	,273	,080
Simple "rt"	42	,7038	,11180	,398	,009
Selective "rt"	42	,5144	,13261	,084	,595
Selective "mt"	42	,2841	,04942	,476	,001
Selective "rt"	42	,7957	,14257	,257	,101
Distinctive "rt"	42	,4282	,10243	,279	,074
Distinctive "mt"	42	,2701	,06489	,359	,019
Distinctive "rt"	42	,6992	,13876	,375	,015
"T"					
Simple "rt"	42	7,2505	1,01177	,284	,068
Simple "mt"	42	,2927	,06351	,142	,370
Simple "rt"	42	,7038	,11180	,290	,062
Selective "rt"	42	,5144	,13261	,033	,836
Selective "mt"	42	,2841	,04982	,346	,025
Selective "rt"	42	,7957	,14257	,159	,316
Distinctive "rt"	42	,4282	,10243	,062	,697
Distinctive "mt"	42	,2701	,06489	,271	,083
Distinctive "rt"	42	,6992	,13876	,173	,274
SHORT "T"					
Simple "rt"	42	8,4869	82,988	,258	,099
Simple "mt"	42	,2927	,06351	,180	,254
Simple "rt"	42	,7038	,11180	,253	,059
Selective "rt"	42	,5144	,13261	,070	,659
Selective "mt"	42	,2841	,04982	,373	,015
Selective "rt"	42	,7957	,14257	,211	,179
Distinctive "rt"	42	,4282	,10247	,212	,177
Distinctive "mt"	42	,2705	,06489	,377	,014
Distinctive "rt"	42	,6992	,82988	,355	030

According to Table 3, there was no significant relationship between "Side Direction Alter" agility test and Simple "movement time", Selective "reaction time" and "response time" and Distinctive "reaction time", but Simple "reaction time" showed p<.05, "response time" showed p<.01, Selective "movement time" showed p<0.1, Distinctive "reaction time" showed p<.05 and "response time" showed p<.05 significant relationship with "Side Direction Alter" agility test. There was no statistically between significant relationship "T" agility tests and any part of the Simple and Distinctive reaction and Selective "reaction time" and "response time" but a p<0.05 significant relationship with only Selective "movement time". Short "T" agility tests and none of the Simple reaction types, Selective "reaction time", "response time" and Distinctive "reaction time" showed no significant relationship, but showed p<.05, a statistically significant relationship between Short "T" tests Selective "movement", Distinctive "movement time" and "response time".

DISCUSSION

Among the results of studies conducted on intelligence and reaction, despite some conflicts, a relation between intelligence and reaction is discussed. When we look at the relation between processing speed and agility and reaction (simple, selective and distinctive) times of the 10 to 11 year old students in our study, a significant relationship between the processing speed of the children any part of Simple, Selective and Distinctive "movement time" was not present but their processing speed showed a significant relationship with Distinctive "reaction tie" and Distinctive "response time".

Lynn et al. (1990) stated that there was a relation between psychometric intelligence and features like action time, decision making time, simple and multiple choice reaction times and accomplishing simple duties of 9 year old children and that mental practice is effective on reaction time.

Chan et al. (1991) have exhibited that there was a relation between intelligence and action time, decision making time, simple and multiple choice reaction time in Chinese children. Shigehisa and Lynn (1991) have indicated a relation between multiple choice reaction time and intelligence in a study of Japanese children on the relation of intelligence and reaction.

In their study conducted to determine the relation of intelligence and reaction types where general mental skill test (IQ) results were used, Deary et al. (2001) state that the advantage of speed of people with higher intelligence is more visible in complicated tests and the importance of reaction is better realized.

The results of this study are parallel to other researches in this field and a meaningful relation between intelligence is indicated. Considering skill such as fast thinking (decision making), acting, and completing the action as fast as possible as a common point in processing speed and distinguish reaction tests explains the meaningful relation between processing speed and Distinctive "reaction time" and Distinctive "response time".

There was no significant relationship between processing speed and "Side Direction Alter" and "T" agility tests of the children, but a significant relationhip between processing speed and Short "T" agility test was present.

In a study conducted on children with mental disorder Sommers et al. (1970) reported a relation between reaction and agility, which they thought as an indicator of intelligence, and balance and receptive synchronization.

In a study conducted to find the relation between intelligence and motor skills, where they measured agility, action and the coordination of rhythm and speed and movement in simple motor duties, Kovac and Strel (2000) stated that experiences and the variability of recorded motor programs in the brain increase the stimulant flow rate in our central nerve system.

When we look at the relation between Simple, Selective and Distinctive reaction types (reaction, movement and response time) and agility, we see parallel results with other studies. There was no significant relationship between "Side Direction Alter" and Simple "movement time", Selective "reaction time", "response time" and Distinctive "reaction time", but a significant relationship between Simple "reaction time", "response time" Selective "movement time", Distinctive "movement time" and Distinctive "response time" with "Side Direction Alter" agility test was present.

There was no significant relationship between "T" agility test and any part of the Simple and Distinctive reaction types and Selective "reaction time", Selective "response time", but a significant relationship between "T" agility test and only Selective "movement time" was present.

There was no significant relationship between Short "T" and any part of the Simple reaction, Selective "reaction time", Selective "response time", Distinctive "reaction time" but a significant relationship between short "T" agility test and Selective "movement time", Distinctive "movement time", Distinctive "response time" was present.

Çömük and Erdem (2010), in their study on agility and reaction scores on ice-skaters and Ölçücü (2007) in his study on the factors affecting the development of tennis playing skills on 10 to 14 year old children, they determined that children playing sports had better reactions and agility and athletes with better reaction times were also getting high agility scores.

In a study where the change on reaction time, agility and anaerobic performance of female volleyball players is researched Büyükipekçi and Taşkın (2011) emphasized how important reaction time was on the action the players made instantly both in defence and offence and how important agility was to be able to move the whole body rapidly and correctly. Besides, the study mentions that players with good reactions had developed agility features, too.

With regard to similar research findings on this subject, related to the general features of mental performance, if we consider that the response time to stimulants includes the time of designing process in the brain, it is possible to define the relation between agility, reaction and processing speed as an indicator of thinking speed. If we consider the features of the speed as the common feature in mental synchronization speed test and processing speed test, a similar relation is mentioned in our study, which shows parallelism with other studies in the subject, between agility and processing speed it could be said that the common feature of processing speed and agility is fast thinking and fast acting.

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