

1992

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Recommended Citation

Buissink, Joe (1992) "The effect of field dependence and target type on search time," *Modern Psychological Studies*: Vol. 1 : No. 1 , Article 3.

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The Effect of Field Dependence and Target Type on Search Time

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ABSTRACT

This study investigated search time as a function of field dependence and target type. Thirty-nine students were given the Group Embedded Figures Test (GEFT). Two female and two male students each were randomly selected from the first and fourth quartiles. These eight participants were given forty-five sets of background letters in which they were to locate either a specific number, a specific letter, or an any-number target. The field independent participants located the embedded targets much more quickly than the field dependent participants. It was expected that the differences in scan times for target types would be significant, however, the differences in scan times for target types were small for field dependent participants, and even smaller for field independent participants. These results indicate that the category effect, which states that the targets and field items belong to different categories such as letters and digits, was not in effect. The results may also be due to the small sample size used. Future research would dictate using a larger sample size.

INTRODUCTION

In a previous experiment of the effects of sex and target type on search time (Buissink & Kissick, 1990), the main effect for sex was almost significant, and further exploration of the sex variable was suggested. The correlation between sex and field dependence suggested that field dependence not sex may have been the operative variable since it has been found that males tend to be more field independent than females (Witkin, Oltman, Raskin, and Karp, 1971).

There is a significant difference between field dependent and field independent individuals when searching for an embedded figure in an organized field.

In a field dependent mode of perceiving, perception of the figure is strongly dominated by the overall organization of the surrounding field, and parts of the field are experienced as "fused". In a field independent mode of perceiving parts of the field are discrete from the organized ground and the figure is more readily identified (Witkin et. al, 1971).

In the visual search experiment used in this and the original study background noise was in the form of columns of letters, and targets consisted of letters or numbers which were embedded in these columns. The searchers looked for three types of targets, a specified letter (L), a specified number (N), or any-number (AN). In this experiment it is hypothesized that field independent participants would be significantly quicker at locating the embedded targets than the field dependent participants. It was also expected that search times for number and letter targets would be significantly different for both field dependent and field independent participants. It was thought that the number 4 targets embedded in a field of letters would stand out more than the letter target embedded within that same field.

METHOD

Subjects

Thirty-nine CSUN students were given the Group Embedded Figures Test (GEFT). Four females and four males (two each from the first and fourth quartile of the distribution obtained from the GEFT scores) were randomly selected to participate in the visual search experiment.

Procedure

Each searcher was instructed to look for targets in sets of background letters. The searcher was told to locate the target indicated at the top of each set. There were three classes of targets: a specific letter target (L), a specific number target (N), or an any-number target (AN). Participants were instructed to start at the top of each set and work their way down. They were also instructed to work as quickly and as accurately as possible. Speed and accuracy

were equally important. Participants who completed a set without finding a target were instructed to stop searching. The participants were told to adhere to the instructions as closely as possible.

A total of sixty sets of stimulus materials were used: fifteen practice trials and forty-five experimental trials. Of the forty-five experimental trials, fifteen specified a letter (L), fifteen specified a number (N), and fifteen specified any-number (AN). When the participants located the target, the search time was measured with a stopwatch accurate to one-hundredth of a second. The search time was then divided by the line number of the target to obtain the scan time per line (s/l).

RESULTS

Table 1 and Figure 1 show that the scan times for field dependent (M=.41, .32, .39) and field independent (M=.24, .19, .23) participants were different. The differences in scan times for target types were small: specific letter (M=.33 s/l), specific number (M=.26 s/l), and any number (M=.31 s/l).

Table 1
The Effect of Field Dependence and Target Type on Mean Scan Time (s/l)

Participant		Target Type		
		Specific Letter	Specific Number	Any Number
Field Independent	1	.24	.17	.25
	2	.27	.23	.19
	3	.19	.18	.21
	4	.27	.17	.28 ^c
	M	.24	.19	.23
Field Dependent	5	.45	.29	.40
	6	.40	.36	.41
	7	.39	.31	.41
	8	.35	.33	.35
	M	.41	.32	.39
Total	M	.33	.26	.31

Note: N= 15

A two-factor, between-within ANOVA was used to analyze the mean scan times as a function of field dependence and target type. Table 2 shows that the main

effect for field dependence was significant, $F(1,6) = 112.50, p < .05$. The main effect for target type was not significant $F(2,12) = 2.97, ns$. The interaction between field dependence and target type was also not significant $F(2,12) = .12, ns$.

Table 2

Summary ANOVA of Scan Time (s/l) as a Function of Target Type and Field Dependence

Source	df	SS	MS	F	p
Field Dependence	1	.1350	.1350	112.50	<.05
Between Error	6	.0073	.0012		
Target Type	2	.0202	.0101	2.97	ns
Target Type X Field Dependence	2	.0007	.0004	.12	ns
Within Error	12	.0413	.0034		
Total	23	.2045			

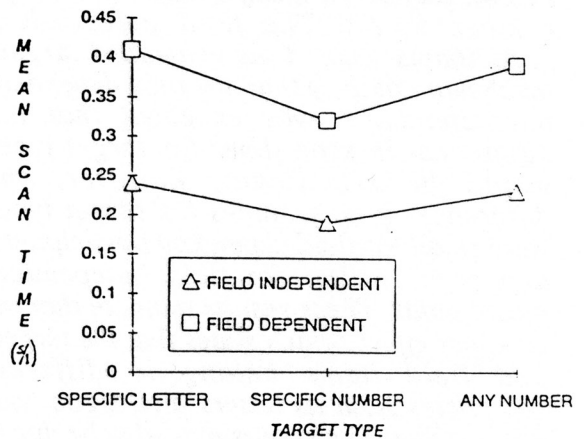


Figure 1. Mean scan time (s/l) as a function of target type and field dependence.

DISCUSSION

The results demonstrate how search time varies between field dependent and field independent participants. This is due to the field independent person's ability to disorganize a given field, and to locate an embedded figure more quickly than a field dependent person. What was unexpected was that the scan times (s/l) between number and letter targets were not significantly different for field independent participants. Jonides and Gleitman (1972), found that searchers were quicker at locating the number "0" than the letter "o" on a letter background. This was due to the

category effect where the targets and field items belong to different categories such as letters and digits. However, the category effect did not apply to the field independent participants. It may be that the field independent person creates his or her own category effect where letters and digits are viewed as being in the same category. Because there was no category effect for field independent participants, there was no interaction. Future research may explore the possibility of a significant main effect for target type if a larger sample size is used. Another means for finding a significant main effect for target type may be to run the study on just field independent persons.

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