

## Visual Search skills in Task of Spot Difference

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### Abstract

*There were few data for spot of the difference searching skilled on eye movement. Especially, it was unknown how to view and recognition of spot difference quickly. The purpose of this study was to investigate the behavior of spot the difference due to the time pressure tasks. Twelve students participated in this study (average 21years old). Every subject equipped eye movement apparatus recorder (NAC EMR-9, Tokyo Japan), it was displayed gaze point of spot the difference as the stimulus pictures. The attention stimuli was same two photos it's has spot the difference. The device was measured the spot of the difference as x and y coordinated. It was within one minute to each one recorded searching behavior. After recording gaze and eye movement coordinate apparatus was analyzed it with analytical software (EMR-dFactory ver2.12b, Tokyo Japan). The results of this study was the findings of major two skilled patterns. They gaze tracking one side that was not easily to find out the spot of difference like as inattentional blindness. And it was too quickly eye gaze movement to detected difference. The other it was equal time and trajectory on right and left stimulus picture.*

### 1. Introduction

It was important visual skills in daily life that to search quickly and accuracy. For example it was searching the any time table, web of internet and direction maps, etc. Though it was in the viewing field, it was not find out sometimes.

Inattentional blindness (IB) refers to the phenomenal experience of the visible stimulus not being perceived when attention is directed elsewhere. It is a well-known phenomenon that we do not notice anything happening in our surroundings while being absorbed in the inspection of something; focusing our attention on a certain object may happen to such an extent that we cannot perceive other objects placed in the peripheral

parts of our visual field, although the light rays they emit arrive completely at the visual sphere of the cerebral cortex. The discovery of IB led to the hypothesis that there is no conscious perception without attention and future, to the summary that when we perceive something this must be because it has at least momentarily captured attention.

Over the past few years, several researchers have demonstrated that conscious perception seems to require attention. When attention is diverted to another object or task, observers often fail to perceive an unexpected object, even if it appears at fixation a phenomenon termed IB [1]. Despite robust IB results stemming from years of exploration into the properties of the stimulus that attract attention and bring an object into conscious awareness, there remained a question about whether true IB would occur if the focus of attention and fixation were at the same spatial location as the presentation of the critical stimulus.

The IB can also stem from aspects of selection that are independent of where people attend. For example, in the aforementioned study, fewer than half of the participants noticed the unexpected cross even when it traveled in the line at the focus of spatial attention. Similarly, in other studies, it was failed to notice the critical stimulus even though it intermingled with and often overlapped the items that people were tracking. Eye-tracing studies confirm that pattern of fixation do not differentiate between people who notice and people who fail to notice unexpected objects.

However there was not enough data about eyeshot of plane face. For example it were displayed of map, ATM, ticket terminals, laptop display and plane of the paper, which were despite into the field of vision, it was hardly to find out objective words or picture. The purpose of this study was to investigate human eye-tracking movement during searching skills test whether it was depend on human properties, gaze skills and observed IB. In addition, it was evaluated between IB and selective looking behavior in the gaze pattern, how to gaze control depending the task of spot of difference.

## 2. Methods

### 2.1 Participants

A total of 15 participants, male 5 and female 10 (mean age=21.5), volunteered for the study. Participants were recruited through public health and ergonomics classes Japanese University students for preparing the normal vision subjects. All participants were then screened for gazing sickness susceptibility, visual acuity, contrast sensitivity, color deficiency, and mental and physical health.

### 2.2 Eye movement system

It was applied the gaze detection and analysis system (Eye mark recorder, NAC EMR-9, Japan) to measure the participant's eye movement and where gazing in this experiment. It was three camera in this measurement system, front vision filed camera and detection camera of white/black eyeball moving, right and left respectively. Eye movement data collection and calibration information is submitted to perform each subjects to adjusted the extent possible unless strain. Eye movement data was then processed offline after the experimental trials.



Figure 1. The image shows the experimental settings during gazing of one minute with mounting the gaze analysis device.

### 2.3 Experimental Procedures

After the informed consent and visual calibration testing, participants were seated and the eye movement system was adjusted to their heads. The eye movement system was calibrated to each participant in a number of steps. First, the position of the monacle was adjusted to capture the participant's both right and left

eye. Second, the illumination beam brightness was scaled to resolve the pupil outline and corneal reflection. Third, the participant fixated on nine numbered small circles, which formed a square 3 x 3 matrix on the divided screen in front of the participant's view. The calibration steps were performed at the beginning of each session and at various points during the experimentation if the eye tracking was lost. Participants' calibration was constantly monitored throughout their session. The experimental session consisted of 1-min searching task in the spot of difference picture. It was prepared the picture which has 9 spot of differences as a searching task (Figure 2). All participants were tested the skill of searching for different points in front of view as a stimulation left and right side sport of different picture board. It was recording 1 min gazing movement, the participants was to find out different spot less than a minute as soon as possible. When it was find out correctly they say quietly. After collecting the data recording, it was analyzed software to moving the point of coordinate their gaze (EMR dFactoryVer.2.12b, NAC Image Technology Inc, Japan).



Figure 2. This board is spot of difference as a searching tasks. There were 9 differences point, number of rice ball, pick around the rabbit mouse, color of frog, fox left hand, cloud shape in upper left, rabbit stepping foot, rabbit right ear, mouse of bear and one difference point.

## 3. Result

There were nine spot of difference in this experiment's picture as a stimulation for searching skill test. There was no person to find out all difference point unless 1 min. The number of finding difference that : 3 spots( one person, Figure 3, 4 ), 6 spots( three persons), 7 spots( eight persons, Figure 5, 6 ). All subjects were not only gazing left or right picture, but also concerned left/right each other looking quickly. The result clearly revealed the association the visual environment considered as an explanatory variable and

the frequency of collisions considered as an object variable.

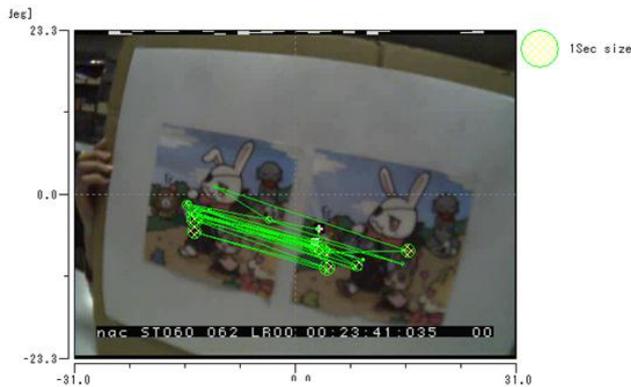


Figure 3. Typical gazing pattern in finally three spots finding out during 10 to 20 second onset initial period. It was show green line as gaze movment, and circle size was mean catch sight of spot 1 second.

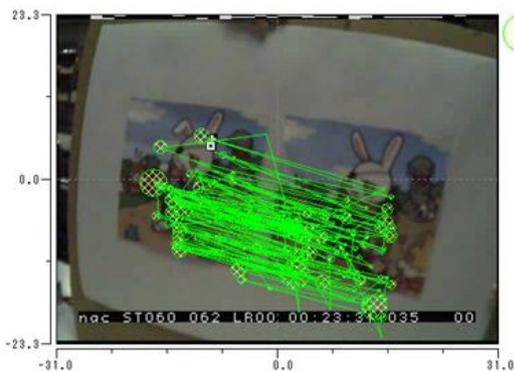


Figure4. Typical gazing pattern in three spots of difference finding out in 1 min end period. It was show green line as gaze movment, and circle was mean catch sight of spot during 1 second.

According to figure 3 and 4, it was only three spot of different gaze movement pattern. There was no record gazing in right picture of rabbit ear (Figure 4) in participant's front view. Also there was no record gazing the edge. The task of spot difference was compared the picture as the stimulation between left and right and center. It was shows rhythmic skilled searching pattern in figure 3. There were almost same duration at gazing left and right. However it was not finding out spot of difference in time of figure 3, just selective looking over face. There was few behavior gazing pattern on up and down searching eye movement in this participant.

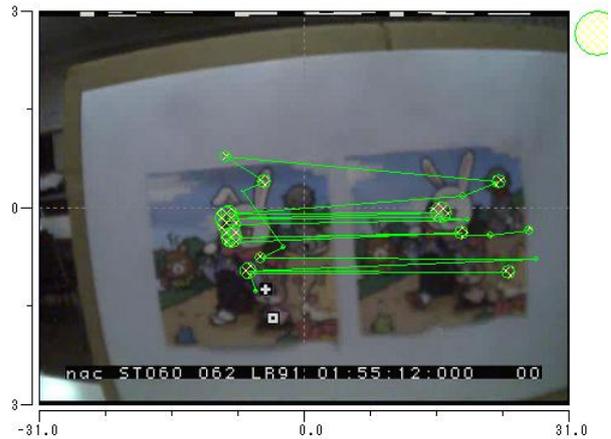


Figure 5. Typical gazing pattern in seven spots finding out 10 to 20 seconds onset period during in Figure 6. It was showed typical gazing pattern movement between left and right comparing for searching spot of difference. It was mean the bigger circle than Figure 3 that increasing the number of catching the spots.

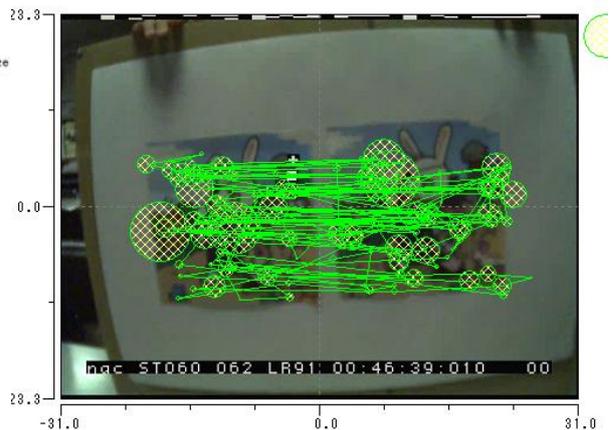


Figure 6. Typical gazing pattern in seven spots of difference finding out 1 min end period in Figure 5. It was showed typical gazing pattern movement between left and right almost same time searching. It was mean the bigger circle than

There was top score in this experiment in Figure 5 and 6, 9 of seven finding out spot of difference quickly. It was showed typical selective looking in eye movement pattern by comparison left and right picture on gazing. There were widely searching skill all the way down. It was appeared the bigger circle that it was means gazing to store memory for comparing opposite site picture as a spot of difference task. It was observed not only looking rapidly but also selective and gazing period searching skills in over 6 spot of difference find

out participants. Also there were a few eye movement not only left to right gazing pattern also up and down.

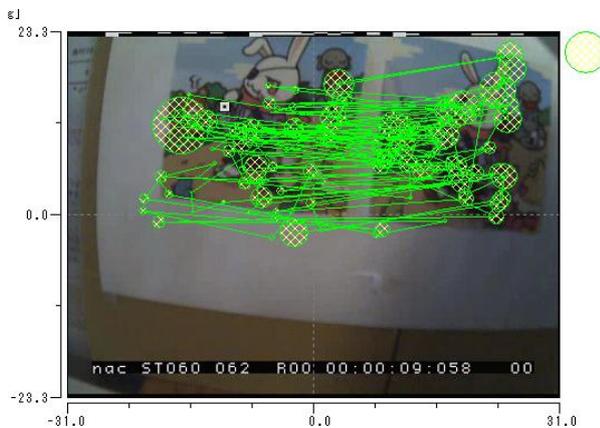


Figure 7. Typical gazing pattern in six spots of difference finding out 1 min end period. It was showed typical gazing pattern movement between left and right

It was no observed gazing pattern on upper left area, missing the around rabbit ear and the cloud shape. In result this participant was find out the six spot of different (Figure 7). It was keeping enough to attention and motivation level in 1 min. Despite into the front viewing area, it was showed unexpected objects fail to capture attention, like as IB. However it was observed to searching behavior down edge of pictures as a searching skill task. There was undeniable possibility for the preconceived idea in participant's searching skills.

#### 4. Discussion

It was important behavior of selective looking and cognition of memorized figure shape. It was intuitively believe that salient or distinctive objects will capture human attention, surprisingly often do not. For example, drivers may fail to notice another car when trying to turn or a person may fail to see a friend in a cinema when looking for an empty seat, even if the friend is waving. This research suggested that expected difference spot in the picture are often over viewing. The study of attentional capture has focused primarily on measuring the effect of an irrelevant stimulus on searching task performance. The question of whether looking behavior leave an implicit trace remains opened. How well observers can ignore something of searching skill tasks that expect but know to be irrelevant. There was a phenomenon knowing as IB. Unnoticed stimuli in the Static IB paradigm can lead to priming effects. It is clear from our work that our understanding of the factors that underlie IB and

misdirection is still in its infancy. Both IB and misdirection are broad sets of phenomena encompassing and arising from a range of different underlying mechanisms. It is important to utilize the opportunities presented by these paradigms rather than dwell upon the minutiae of subtle differences between particular instances of each. It was suggest that picture of animals in general may be more easily accessed in memory than representations of objects and shapes, some equivocal results suggested that, based on the conditions of the task (e.g., color difference in fog, Figure 2), a distinction between implicit and explicit memory and perception were required. It is widely accepted that explicit memory draws on conceptual processes such as elaboration, organization, and meaningful processing in addition to prior or parallel perceptual processes. Moreover, increased attention and higher-level processing during learning benefit explicit memory performance to gaze short time. In constant, implicit memory can depend more strongly on either voluntary perceptual processes, as tested in perceptual implicit memory as searching skill tests, moving so fast searching gaze pattern, or on strictly conceptual/semantic sensitivity processes, as skill tested in conceptual implicit skill tests. Future research should explore the issues of preserved representations and directed ignoring within the sustained IB paradigm. To conclude, the term "inattentional blindness" has to date been used largely to refer to a phenomenologically related family of instances where people fail to see objects and events due to a preoccupation of attention. Therefore it was implicit attentional capture and IB studies provide a more complete understanding of the varieties of attentional capture, both in the experimental skills test and in the real daily life.

#### 5. Conclusion

There were observed IB behavior in simple searching skill test. Despite of looking with enough attention, it was considered that not only IB but also selective looking with preconceived idea. The finding of IB suggested that distinctive objects do not necessarily explicitly capture attention, perhaps attentional capture failed in this experiment data, because the objects were static and presented clearly into viewing.

#### References

- [1] Mack, A., & Rock, I. Inattentional blindness. Cambridge, MA: MIT Press. 1998