中　華　心　理　學　刊
民97，50卷，4期，357-366

Chinese Journal of Psychology
2008, Vol. 50, No. 4, 357-366

Inhibition of Return and Attentional Disengagement: The Importance of a Fixation Cue

Hsuan-Fu Chao and Yei-Yu Yeh

Department of Psychology, National Taiwan University

MS No.: 07038; Received: October 26, 2007; Revised: November 7, 2008; Accepted: November 8, 2008
Correspondence Author: Hsuan-Fu Chao, Department of Psychology, Chung Yuan Christian University, No. 200, Chung Pei Rd., Chung Li 32023, Taiwan. (E-mail: hfchao@cycu.edu.tw)

Inhibition of return is the effect due to which it takes a longer time for people to attend recently examined locations. In a typical inhibition of return paradigm, a peripheral location was exogenously cued, following which attention was disengaged from the cued location. Thereafter, return to the cued location was inhibited. Although attentional disengagement from the cued location was a critical component in inhibition of return, the effect of a fixation cue following the peripheral cue on eliciting exogenously triggered attentional disengagement was not fully tested. The present study examined the effect of this fixation cue, while endogenous attentional disengagement was varied across the experiments. It was demonstrated that the fixation cue, or exogenously triggered attentional disengagement from the cued location, was critical to inhibition of return only in the absence of endogenous attentional disengagement from the cued location.

Keywords: *attentional disengagement, fixation cue, inhibition of return*

In a complex environment, people often strive to find a target among multiple distractors. However, search efficiency can increase if one can ignore previously searched items and focus on those that have not been searched. Findings from studies on inhibition of return reveal this kind of ability (Klein, 1988; Klein & MacInnes, 1999).

Posner and colleagues first described this phenomenon (Posner & Cohen, 1984; Posner, Rafal, Choate, & Vaughan, 1985; see Klein, 2000 for a review). In a typical study regarding inhibition of return, three boxes were presented on a screen, from left to right. Following this, one of the two peripheral boxes was brightened, as the peripheral cue. After that, the central box was brightened, as the fixation cue. Finally, a target appeared at either the cued location, the uncued location, or the fixation location. When the temporal interval between the peripheral cue and the target was short, a facilitatory effect was found, revealing that attention was

Author Note
Part of this work was presented at the fourth annual meeting of the Vision Science Society, Sarasota, Florida.
Correspondence should be sent to Hsuan-Fu Chao, Department of Psychology, Chung Yuan Christian University, No. 200, Chung Pei Rd., Chung Li 32023, Taiwan. E-mail: hfchao@cycu.edu.tw.

captured by the peripheral cue to enhance subsequent target processing. However, when the temporal interval was long, an inhibitory effect was observed. That is, responding to a target at the cued location is more difficult than responding to a target at an uncued location. Inhibition of the cued location was proposed, and it was believed that such a process can facilitate visual search.

Attentional disengagement from the cued location is assumed to be a critical aspect in inhibition of return (Klein, 2000; McAuliffe, Pratt, & O'Donnell, 2001; Posner & Cohen, 1984). If attention did not leave the cued location, inhibition of return would not occur. However, the presence of a fixation cue after the peripheral cue, which should exogenously distract attention from the cued location, was usually found to be unnecessary for manifesting inhibition of return (e.g., Lupiáñez, Milliken, Solano, Weaver, & Tipper, 2001; Posner & Cohen, 1984; Riggio, Scaramuzza, & Umiltà, 2000). Therefore, the importance of exogenously triggered attentional disengagement to inhibition of return remains unclear.

To date, several studies have demonstrated certain situations in which the presence of a fixation cue can affect the magnitude of inhibition of return. First, the fixation cue was found to be critical when there was a short temporal interval between a cue and a target. When the stimulus onset asynchrony (SOA) was short (133 ms), the fixation cue could eliminate the facilitatory effect at the cued location (Briand, Larrison, & Sereno, 2000). Pratt and Fischer (2002) showed that the presence of the fixation cue could increase the magnitude of inhibition of return in comparison to the condition in which the fixation cue was absent. In addition, this occurred only at a short SOA (200 ms) but not at longer SOAs (400 or 800 ms). A similar pattern was observed by McAuliffe et al. (2001). Second, young children (5–10 years old) did not show a significant inhibition of return in the absence of the fixation cue (MacPherson, Klein, & Moore, 2003). According to MacPherson et al. (2003), inhibition of return was modulated by the efficiency of attentional disengagement from the cued location. Attentional disengagement could be achieved either exogenously by the fixation cue or endogenously by attentional control. For the young children who could not efficiently remove their attention from the cued location, the fixation cue was particularly important.

Nevertheless, the impact of exogenously triggered attentional disengagement on inhibition of return at longer SOA was not demonstrated in adults. The possible explanation for this was that, for adults, exogenously triggered attentional disengagement was a critical aspect in eliciting inhibition of return only when SOA was short (e.g., McAuliffe et al., 2001; Pratt & Fischer, 2002). Assuming that both exogenous and endogenous attentional disengagement can produce inhibition of return (Klein, 2000; Klein, Castel, & Pratt, 2006), when SOA was long, there is sufficient time for the endogenous process to occur. Therefore, exogenously triggered attentional disengagement is not important when SOA is long.

In order to evaluate this hypothesis, the current study aims to examine the importance of exogenously triggered attentional disengagement to inhibition of return in adults while endogenous attentional disengagement is varied. In this study, endogenous attentional disengagement was controlled by varying the predictability of the peripheral cue (Lupiáñez, Decaix, Siéroff, Chokron, Milliken, & Bartolomeo, 2004). The probability of a target's presentation at the cued location was 20%, 50%, and 80% in Experiments 1a, 1b, and 1c, respectively. Endogenous attentional disengagement from the cued location should have been absent when the peripheral cue indicated a high probability (80%) of the target appearing at the cued location. If both exogenous and endogenous attentional disengagement could affect inhibition of return (Klein, 2000; Klein et al., 2006), it was predicted that exogenously triggered attentional disengagement from the cue location would be critical to the inhibition of return effect only when endogenous attentional disengagement was absent.

In addition, the fixation-cue-to-target onset asynchrony (hereafter referred to as fixation CTOA) was manipulated in Experiment 2. It was assumed that exogenously triggered attentional disengagement after a fixation cue takes more time (see also Pratt & Fischer, 2002) when it is competing with endogenous attentional disengagement. Therefore, the effect of inhibition of return should be observed only when the fixation CTOA is long.

Experiments 1a–1c

Validity of the peripheral cue was manipulated across these three experiments. The probability of presenting a target at the cued location was 20%, 50%, and 80% in Experiments 1a, 1b, and 1c, respectively. In each experiment, a 2 x 2 factorial design was employed. The within-subject factor was target location, which could be either at the cued location or at an uncued location (cued vs. uncued). The between-subject factor was the presence or absence of the fixation cue after the peripheral cue (with vs. without).

If either endogenous attentional disengagement or exogenously triggered attentional disengagement was sufficient to produce inhibition of return (Klein, 2000; Klein et al., 2006), the fixation cue or exogenously triggered attentional disengagement would be critical only when the validity of the peripheral cue was high. That is, inhibition of return would be modulated by the presence of the fixation cue only in Experiment 1c, in which the endogenous attentional disengagement from the cued location was absent.

Method

Participants. Sixty undergraduate students at National Taiwan University volunteered to participate in this study for a bonus course credit. All the participants were naive regarding the purpose of the experiment and had normal or corrected-to-normal vision. Twenty of them participated in Experiment 1a, another 20 participated in Experiment 1b, and the remaining 20 participated in Experiment 1c.

Stimuli. Three boxes were presented on the screen as placeholders. The viewing distance was approximately 60 cm. Each box had a width of 2.8° and a height of 2.0°, with a border thickness of 0.1°. The three boxes were presented at the center of the screen, aligned on the horizontal meridian. The center-to-center distance between two adjacent boxes was 4.7°. When a location was cued, the outline of the box was thickened to 0.3°. The target was a dot, presented in the center of a box. All these stimuli were presented in white, while the background was black.

Procedure. The experiment was run using DMDX software (Forster & Forster, 2003). The reaction time was measured using a mouse connected to a serial port. Half of the participants were assigned to the condition in which a fixation cue followed the peripheral cue. The other half of the participants were assigned to the condition in which there was no fixation cue after the peripheral cue.

There was a practice block of 12 trials at the beginning of the experiment, and a total of 150 test trials were conducted. Each trial began with a display of the three placeholders. These placeholders were presented on the screen across the trial. After 500 ms, a 300-ms peripheral cue was presented at either the left or the right box with an equal probability. In the condition wherein the fixation cue followed the peripheral cue, a 300-ms cue was presented at the central box after an interval of 200 ms. For cued and uncued trials, a target was presented after 200 ms; for catch trials, no target was presented. In the condition wherein there was no fixation cue after the peripheral cue, a target was presented after 700 ms, after the offset of the peripheral cue. No target was presented in the catch trials. The participants were instructed to press the left button of the mouse on seeing a white dot. They were allowed to rest after completing 75 trials.

Among the 150 test trials, 30 were catch trials. In Experiment 1a, the probabilities of a target's presentation at the cued location, uncued location, and fixation location were 20%, 20%, and 60%, respectively. In Experiment 1b, the probabilities of a target's presentation at the cued and uncued locations were 50% for each condition. In Experiment 1c, the probabilities of a target's presentation at the cued location and uncued location were 80% and 20%, respectively. In Experiment 1a, unlike in the other two experiments, 60% of the targets were presented at the fixation location. Targets were presented at the uncued location for 20% of the trials and at the cued and fixation locations for 80% of the trials in order to prevent the effect of inhibition of return from being contaminated by facilitated responses to the uncued location (Posner, Cohen, & Rafal, 1982).

Results

The mean reaction time (RT) for correct trials and average percentage of misses were computed for each condition. Outliers were excluded based on the criterion in Van Selst and Jolicoeur's (1994) method. A total of 1.7%, 1.6%, and 1.5% of the trials were excluded as outliers in Experiments 1a, 1b, and 1c, respectively. Table 1 shows the average mean correct RT and percentage of miss for each condition. An analysis of variance (ANOVA) with a mixed design was carried out to analyze the data.

1a. An analysis of the RT data revealed that only the main effect of target location was significant, $F(1, 18) = 25.5$, $MSE = 300.1$, $p < .01$, revealing a significant effect of inhibition of return. Other effects were not significant, *p*s > .10. The percentage of miss was not analyzed because no miss was recorded.

1b. The analysis of the RT data revealed that only the main effect of target location was significant, $F(1, 18) = 49.9$, $MSE = 183.6$, $p < .01$. Further, the analysis of percentage of miss showed a trend of comparatively more misses in the cued condition, $F(1, 18) = 3.2$, $MSE = 0.2$, $p = .0855$. Other effects were not significant, *p*s > .10.

1c. The analysis of the RT data showed a significant main effect of target location, $F(1, 18) = 15.1$, $MSE = 239.9$, $p < .01$. More importantly, the interaction was significant, $F(1, 18) = 7.6$, $p < .05$. Moreover, the analysis of simple main effects revealed a significant effect of target location in the presence of a fixation cue, $F(1, 18) = 22.1$, $p < .01$. This effect of target location was not significant in the absence of a fixation cue, $p > .10$. The analysis of the percentage of misses revealed no significant effect, *p*s > .10.

Discussion

The three experiments described above demonstrated the impact of the fixation cue on inhibition of return. Moreover, the fixation cue was important only in the absence of endogenous

Table 1 Mean Correct Reaction Time (ms) and Average Percentage of Miss for Each Condition of Experiments 1a-1c

Fixation cue	Target location							
	Cued				Uncued			
	RT		%Miss		RT		%Miss	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Experiment 1a: 20%								
With	387.3	55.2	0.0	0.0	367.9	54.2	0.0	0.0
Without	365.7	51.1	0.0	0.0	329.8	40.1	0.0	0.0
Experiment 1b: 50%								
With	338.5	62.3	0.3	0.7	311.7	47.5	0.0	0.0
Without	348.4	49.3	0.2	0.5	314.6	48.7	0.0	0.0
Experiment 1c: 80%								
With	366.5	76.5	0.1	0.3	334.0	70.8	0.0	0.0
Without	332.3	26.7	0.3	0.5	326.7	25.9	2.5	6.6

attentional disengagement. The fixation cue's presence did not increase the magnitude of inhibition of return in Experiments 1a and 1b; however, its presence was critical in Experiment 1c. When endogenous attentional disengagement from the cued location was not encouraged, inhibition of return was observed only in the presence of a fixation cue, which exogenously triggered attentional disengagement. Therefore, it can be concluded that exogenously triggered attentional disengagement at long SOA was not a critical aspect in the adults' data (e.g., McAuliffe et al., 2001; Pratt & Fischer, 2002) because endogenous attentional disengagement was sufficient.

It should be noted that the standard deviations of the RTs in Experiment 1c appeared to be higher when a fixation cue occurred after the peripheral cue. The individual differences between the two groups of participants could be one plausible reason for this phenomenon. Another possible reason could be the conflict between the endogenous cuing of the peripheral cue (to stay at the cued location) and the exogenous cuing of the fixation cue (to leave the cued location). As a result, the variance was higher in the above condition. Since this condition was replicated in Experiment 2, it was likely to provide some clues regarding this issue.

Experiment 2

In comparison with Experiment 1c, Wright and Richard (2000) did not observe the effect of inhibition of return when the cue validity of the peripheral cue was 80% and when the fixation cue was present. To account for the discrepancies, it was hypothesized that when there was a conflict between exogenously triggered and endogenous attentional disengagement, it took time for an exogenous cue to overcome the effect from the endogenous cue (Pratt & Fischer, 2002). Consistent with this hypothesis, the fixation CTOA in Wright and Richard (2000) was too short. The fixation CTOA was 200 ms in their Experiment 2 while it was 500 ms in Experiment 1 of the current study.

The following experiment was conducted to verify this hypothesis using a 2 x 2 mixed design. A fixation cue was always presented after the peripheral cue. The fixation CTOA was 200 ms for one group of participants and 500 ms for the other group. It was hypothesized that if exogenously triggered attentional disengagement takes time, the effect of inhibition of return should be observed only when the fixation CTOA is long (500 ms).

Method

Participants. Twenty undergraduate students volunteered to participate in this study, for which they were granted a bonus course credit. All the participants were naive regarding the purpose of the experiment and had normal or corrected-to-normal vision.

Stimuli and Procedure. The experimental design, stimuli, and procedure were identical to those in the previous experiments, except for the cue validity and the time course of presenting a fixation cue. Similar to Experiment 1c, 96 cued trials, 24 uncued trials, and 30 catch trials were conducted. Therefore, the probability of a target being presented at the cued location was 80%. A fixation cue was always present in this experiment. In the 200-ms condition, 500 ms after the offset of the peripheral cue, the fixation cue was presented for 200 ms. Immediately after the fixation cue was offset, the target was presented. In the 500-ms condition, 200 ms after the offset of the peripheral cue, the fixation cue was presented for 200 ms. After the fixation cue was offset for 300 ms, the target was presented.

Results and Discussion

The mean RTs for the correct trials and average percentage of misses were computed for each condition. Outliers were excluded based on the criterion in Van Selst and Jolicoeur's (1994) method. In all, 1.6% of the trials were excluded as outliers. Table 2 shows the mean correct RT and average percentage of misses for each condition.

The RT and accuracy data were analyzed using an ANOVA with a mixed design. The analysis of the RT data showed a significant main effect of target

Table 2 Mean Correct Reaction Time (ms) and Average Percentage of Miss for Each Condition of Experiment 2

Fixation CTOA	Target location							
	Cued				Uncued			
	RT		%Miss		RT		%Miss	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
200	343.3	45.6	0.0	0.0	335.5	49.0	0.0	0.0
500	333.5	43.5	0.4	1.0	310.8	39.8	0.4	1.3

location, $F(1, 18) = 23.2$, $MSE = 100.1$, $p < .01$. More importantly, the interaction was significant, $F(1, 18) = 5.6$, $p < .05$. The analysis of simple main effect revealed a significant effect of target location when the CTOA of the fixation cue was 500 ms, $F(1, 18) = 25.7$, $p < .01$. The effect of target location was not significant when the CTOA of the fixation cue was 200 ms, $p = .097$. The analysis of the percentage of miss revealed no significant effect, *p*s > .10.

The results replicated the findings of Experiment 1c. In the absence of endogenous attentional disengagement, the effect of inhibition of return was observed only in the presence of exogenously triggered attentional disengagement. Moreover, the effect of exogenously triggered attentional disengagement required time to develop.

Regarding the high variance of RT in Experiment 1c in the presence of a fixation cue, such a phenomenon was not observed in this experiment. Therefore, the experiment revealed that high variance along with the presence of a fixation cue was not stable.

General Discussion

Attentional disengagement from the cued location was assumed to be a critical process of inhibition of return (e.g., Klein, 2000; Posner & Cohen, 1984). Although it was believed that a fixation cue following a peripheral cue could elicit exogenously triggered attentional disengagement (Posner & Cohen, 1984), the presence of such a fixation was usually unnecessary for manifesting inhibition of return (e.g., Lupiáñez et al., 2001; Posner & Cohen, 1984; Riggio et al., 2000). The importance of the fixation cue was demonstrated when either the SOA was short (McAuliffe et al., 2001; Pratt & Fischer, 2002) or the test was conducted on young children (MacPherson et al., 2003).

The current study demonstrated that the importance of the fixation cue to inhibition of return was not limited to short SOA or young children. At longer SOA, when adults were tested, the presence of the fixation cue continued to be important in eliciting exogenously triggered attentional disengagement. Further, its importance was confirmed by removing endogenous attentional disengagement. Experiments 1a–1c demonstrated that the presence of the fixation cue did not affect inhibition of return when endogenous attentional disengagement was not removed; however, the fixation cue did influence inhibition of return when there was a high probability of a target being presented at the cued location. In such a condition, inhibition of return manifested only when the fixation cue was present. These results explained why the effect of exogenously triggered attentional disengagement on inhibition of return at longer SOA was not demonstrated in adults. For adults, endogenous attentional disengagement at longer SOA was sufficient for producing inhibition of return. Only when endogenous attentional disengagement was discouraged did the importance of exogenously triggered attentional disengagement surface.

These results have extended previous findings pertaining to the impact of the fixation cue or exogenously triggered attentional disengagement on inhibition of return. McAuliffe et al. (2001)

observed the influence of the fixation cue on inhibition of return at a 400-ms SOA, but not at a 600-ms or 800-ms SOA. Pratt and Fischer (2002) observed the effect of the fixation cue at a 200-ms SOA, but not at a 400-ms or 800-ms SOA. Similarly, Briand et al. (2000) did not observe the impact of the fixation cue on inhibition of return at a 1,000-ms SOA. Although the specific time course at which the fixation cue was important varied, it could be concluded that the fixation cue was important only when the time course was short. In the current study, the SOA was set at 1,000 ms. On the basis of the results of McAuliffe et al. (2001), Pratt and Fischer (2002), and Briand et al. (2000), the fixation cue was not expected to be important. However, on removing endogenous attentional disengagement, the effect of inhibition of return was observed only in the presence of the fixation cue. These results support the idea that both exogenous and endogenous attentional disengagement can produce inhibition of return (Klein, 2000; Klein et al., 2006). Only when endogenous attentional disengagement is made unavailable by either using a short SOA or frequently presenting the target at the cued location, exogenously triggered attentional disengagement is important for the manifestation of inhibition of return.

Experiment 2 of the current study further demonstrated that exogenously triggered attentional disengagement from the cued location required time to develop, at least when the target was frequently presented at the cued location. Although the fixation cue was always presented, the effect of inhibition of return surfaced only when the fixation CTOA was long (500 ms), not when it was short (200 ms). These findings explain why Wright and Richard (2000) did not observe the effect of inhibition of return when the cue validity was 80% and the fixation cue was present. In their study, the fixation CTOA was 200 ms, a time course that is too short for exogenously triggered attentional disengagement to operate.

In a recent study, Chica, Lupiáñez, and Bartolomeo (2006) observed a significant effect of inhibition of return at the expected location at a SOA of 1,000 ms. Moreover, there was no onset fixation cue after the peripheral cue to exogenously distract attention away from the cue. The differences between their study and the present one as regards the expected condition include (1) a target was presented at the cued location for 75% of the trials in their study and 80% of the trials in this one, (2) the peripheral cue was presented 50 ms in their study and 300 ms in the present study, and (3) the CTOA was randomized in their study and fixed in the present study. It is likely that one of or the combination of these factors contributed to the inhibition of return effect in their study.

The magnitude of the inhibition of return effect can be increased by improving the effect of the fixation cue. For example, Pratt, O'Donnell, and Morgan (2000) studied the effect of the second cue (which functioned as the fixation cue after the peripheral cue used in this study) on inhibition of return and found that when the second cue was placed at a peripheral location instead of the fixation location, the magnitude of inhibition of return was larger. It is possible that a second cue at a peripheral location can more efficiently distract attention away from the cued location than a second cue at the fixation, because the participants' attentional set is tuned to detect a target at a peripheral location. Such a result further implicates the importance of exogenously triggered attentional disengagement with respect to inhibition of return.

The presence of the fixation cue can also increase the reliability of the inhibition of return effect. In a recent study, Berger (2006) estimated this reliability by calculating the correlation of the magnitude of inhibition of return in two sessions as well as for the left and right eyes. In the absence of the fixation cue, the correlation was not significant. However, a significant correlation between the two eyes was found in the presence of a fixation cue. Such a finding further demonstrated the importance of the fixation cue, or exogenously triggered attentional disengagement, to inhibition of return.

The influence of exogenous and endogenous attentional disengagement from the cued location on inhibition of return can be explained by means of both the single-process view and the dual-process view of inhibition of return (Klein, 2000). According to the single-process view, a peripheral cue results in early facilitation and late inhibition. Attentional disengagement from the cued location is the key event for converting facilitation into inhibition. According to the dual-process view, a peripheral cue leads to both a facilitatory effect and an inhibitory effect, and the former masks the early-onset inhibitory effect (Danziger & Kingstone, 1999). Therefore, attentional disengagement from the cued location can increase the magnitude of the inhibition of return effect by removing the facilitatory effect.

In conclusion, when a location is cued by an exogenous cue, attentional disengagement away from the cued location is required to produce inhibition of return. To achieve this, either endogenous or exogenously triggered attentional disengagement is sufficient. Endogenous attentional disengagement operates when the validity of the peripheral cue was not high. Exogenously triggered attentional disengagement is elicited by the presence of the fixation cue and may take time to operate when there is a conflict between endogenous attentional cuing and exogenous attentional cuing.

References

Berger, A. (2006). Individual performance based on cognitive experimental measurements? The case of inhibition of return. *Experimental Psychology, 53*, 209-217.

Briand, K. A., Larrison, A. L., & Sereno, A. B. (2000). Inhibition of return in manual and saccadic response systems. *Perception & Psychophysics, 62*, 1512-1524.

Chica, A. B., Lupiáñez, J., & Bartolomeo, P. (2006). Dissociating inhibition of return from endogenous orienting of spatial attention: Evidence from detection and discrimination tasks. *Cognitive Neuropsychology, 23*, 1015-1034.

Danziger, S., & Kingstone, A. (1999). Unmasking the inhibition of return phenomenon. *Perception & Psychophysics, 61*, 1024-1037.

Forster, K. I., & Forster, J. C. (2003). DMDX: A Windows display program with millisecond accuracy. *Behavior Research Methods, Instruments, & Computers, 35*, 116-124.

Klein, R. M. (1988). Inhibitory tagging system facilitates visual search. *Nature, 334,* 430–431.

Klein, R. M. (2000). Inhibition of return. *Trends in Cognitive Sciences, 4,* 138-147.

Klein, R. M., Castel, A. D., & Pratt, J. (2006). The effect of memory load on the time course of inhibition of return. *Psychonomic Bulletin & Review, 13*, 294-299.

Klein, R. M., & MacInnes, W. J. (1999). Inhibition of return is a foraging facilitator in visual search. *Psychological Science, 10*, 346-352.

Lupiáñez, J., Decaix, C., Siéroff, E., Chokron, S., Milliken, B., & Bartolomeo, P. (2004). Independent effects of endogenous and exogenous spatial cueing: Inhibition of return at endogenously attended target locations. *Experimental Brain Research, 159*, 447–457.

Lupiáñez, J., Milliken, B., Solano, C., Weaver, B., & Tipper, S. P. (2001). On the strategic modulation of the time course of facilitation and inhibition of return. *Quarterly Journal of Experimental Psychology, 54A*, 753-773.

MacPherson, A., Klein, R. M., & Moore, C. (2003). Inhibition of Return in Children and Adolescents. *Journal of Experimental Child Psychology, 85*, 337-351.

McAuliffe, J., Pratt, J., & O' Donnell, C. (2001). Examining location-based and object-based components of inhibition of return in static displays. *Perception & Psychophysics, 63*, 1072-1082.

Posner, M. I., & Cohen, Y. (1984). Components of visual orienting. In H. Houma & D. G. Bouwhuis (Eds.), *Attention and Performance X: Control of language processes* (pp. 531-556). Hilldate, NJ: Erlbaum.

Posner, M. I., Cohen, Y., & Rafal, R. D. (1982). Neural systems control of spatial orienting. *Philosophical Transactions of the Royal Society of London. Series B, 298*, 187-198.

Posner, M. I., Rafal, R. D., Choate, L., & Vaughan, J.

(1985). Inhibition of return: Neural basis and function. *Cognitive Neuropsychology, 2*, 211-218.

Pratt, J., & Fischer, M. H. (2002). Examining the role of the fixation cue in inhibition of return. *Canadian Journal of Experimental Psychology, 56*, 294-301.

Pratt, J., O'Donnell, C., & Morgan, A. (2000). The role of the fixation location in inhibition of return. *Canadian Journal of Experimental Psychology, 54*, 186-195.

Riggio, L., Scaramuzza, E., & Umiltà, C. (2000). Modulation of inhibition of return by type and number of dynamic changes of the cues. *Psychological Research*, *64*, 56-65.

Van Selst, M., & Jolicoeur, P. (1994). A solution to the effect of sample size on outlier elimination. *Quarterly Journal of Experimental Psychology, 47A*, 631-650.

Wright, R. D., & Richard, C. M. (2000). Location cue validity affects inhibition of return of visual processing. *Vision Research*, *40*, 2351-2358.

迴向抑制與注意力脫離：凝視線索之重要性

趙軒甫　葉怡玉

國立台灣大學心理學系

倘若注意力要回到先前曾經注意過的位置，需要花費比回到先前未注意過的位置要長的時間。這樣的效果被稱爲迴向抑制。在一個典型的迴向抑制研究之中，會藉由外生性線索將注意力吸引到一個特定的位置，之後再測試參與者對於呈現在該位置的刺激的表現。雖然注意力脫離被認爲是產生迴向抑制的關鍵成分，過去的研究並未針對凝視線索在注意力脫離中扮演的角色進行充分的研究。本研究藉由同時操弄外生性與內生性注意力線索，展現凝視線索做爲外生性線索的重要性。結果顯示，唯有在不存在內生性注意力轉移的情況下，注意力系統方需要凝視性線索來引發迴向抑制效果。

關鍵詞：注意力脫離、迴向抑制、凝視線索