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Stimulus Recognition Occurs Under High Perceptual Load: Evidence From Correlated Flankers

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A dominant account of selective attention, perceptual load theory, proposes that when attentional resources are exhausted, task-irrelevant information receives little attention and goes unrecognized. However, the flanker effect—typically used to assay stimulus identification—requires an arbitrary mapping between a stimulus and a response. We looked for failures of flanker identification by using a more-sensitive measure that does not require arbitrary stimulus–response mappings: the correlated flankers effect. We found that flanking items that were task-irrelevant but that correlated with target identity produced a correlated flanker effect. Participants were faster on trials in which the irrelevant flanker had previously correlated with the target than when it did not. Of importance, this correlated flanker effect appeared regardless of perceptual load, occurring even in high-load displays that should have abolished flanker identification. Findings from a standard flanker task replicated the basic perceptual load effect, with flankers not affecting response times under high perceptual load. Our results indicate that task-irrelevant information can be processed to a high level (identification), even under high perceptual load. This challenges a strong account of high perceptual load effects that hypothesizes complete failures of stimulus identification under high perceptual load.

Keywords: perceptual load, selective attention, visual awareness, consciousness

A long-standing issue in the study of attention is the *locus of selection,* which asks whether attention selects information relatively early, before sensory inputs have been recognized, or relatively late, after all inputs have been recognized. Several decades of research has produced evidence for and against both views (see Pashler, 1998), leading to an impasse (e.g., Allport, 1993). However, perceptual load theory offers a possible solution to the locus-of-selection debate (Lavie, 1995; Lavie & Tsal, 1994; see also Miller, 1991; Yantis & Johnston, 1990, for discussion of perceptual load). Perceptual load theory proposes that attention represents a limited capacity resource that is allocated on the basis of the complexity, or "perceptual load," of a task-relevant visual display. According to load theory, when perceptual load is low, spare attentional resources mandatorily spill over to task-irrelevant information, leading this information to be recognized. In contrast, when perceptual load is high, attentional resources are consumed by task-relevant information, allowing selection against task-irrelevant information prior to stimulus recognition.

The central behavioral findings that support perceptual load theory come from an adapted flanker task (B. A. Eriksen & Eriksen, 1974; C. W. Eriksen & Hoffman, 1973), which provides a measure of selective attention. It is important to note that the flanker effect is influenced by a display's perceptual load (Lavie, 1995; but see Miller, 1991): In low perceptual load displays in which the target appears alone or pops out of the display, response times (RTs) are fast and a robust flanker effect is observed, indicating that the flanker has been recognized. In high perceptual load displays in which the target appears among several heterogeneous distractors, RTs are slow and no flanker effect is observed, indicating attentional resources were taxed and the flanker was not recognized. Thus, increasing the perceptual load of the display appears to attenuate the processing of task-irrelevant information by inducing early selection.

More-recent studies have examined the influence of perceptual load on explicit identification of nontarget items under high and low perceptual load. For example, Macdonald and Lavie (2008) asked participants to search through high- or low-load displays for a target letter; a small, masked "critical stimulus" appeared outside the search array infrequently. After each trial, participants were asked to report the presence or absence of the critical stimulus. Participants were more likely to correctly report the presence or absence of the critical stimulus in low-load displays than in high-load displays, suggesting that participants exhibited inattentional blindness to the critical stimulus in high-load, but not low-load, displays (Macdonald & Lavie, 2011; also see Cartwright-Finch & Lavie, 2007; Murphy & Dalton, 2016; Raveh & Lavie, 2015). The implication is that a lack of attentional resources under high perceptual load makes one "blind," "deaf," or "numb" to unattended stimuli; in short, stimulus recognition fails under conditions of high perceptual load. Specifically, "task-irrelevant stimuli are perceived in situations of low perceptual load when the relevant

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task leaves spare capacity for their processing, but not in situations of high perceptual load where all available capacity is consumed" (Cartwright-Finch & Lavie, 2007, p. 337).

Using load theory as a resolution to the locus-of-selection debate requires an often overlooked assumption, namely, that flanker interference provides a direct, pure measure stimulus recognition (or lack thereof). Although this seems reasonable, there are numerous demonstrations in which stimuli presumed to be unattended and not identified nevertheless affect processing, indicating some degree of recognition. For example, in inattentional blindness, participants may be unable to report a critical stimulus because of either perceptual factors (e.g., perceptual load) or postperceptual factors (e.g., encoding into memory). Moore and colleagues have demonstrated that critical stimuli in inattentional blindness tasks can elicit perceptual illusions or response effects, although participants cannot explicitly report their presence (Moore & Egeth, 1997; Moore, Grosjean, & Lleras, 2003), suggesting that these stimuli undergo sufficient perceptual processing to influence behavior. Thus, previous work using inattentional blindness approaches does not provide unequivocal evidence regarding the locus of perceptual load effects on stimulus identification.

Similarly, the absence of a flanker effect under high perceptual load could result from either a failure in recognition processes or a failure to map an identified stimulus onto an arbitrary response (e.g., map target A to a left key press and target B to a right key press). The standard flanker task relies on this type of arbitrary stimulus–response (S-R) mapping between stimuli and responses, making the absence of a flanker effect attributable to either a failure of recognition because of an early locus of attention (as argued by proponents of perceptual load theory) or to a failure in later S-R mapping processes. Consequently, in a typical perceptual load experiment, flanking letters might be recognized under high perceptual load but fail to be associated with their corresponding responses in a downstream response translation process, thereby preventing a flanker effect from being observed in the overt keypress behavior.

In the current work, we specifically asked whether the absence of a flanker effect under high perceptual load may be due to failures in postrecognition processes involving response translation rather than a failure of stimulus recognition. To examine this question, we used a correlated flankers task (Miller, 1987; also see Mordkoff & Halterman, 2008). In this task, unlike the standard flanker task, flanker letters are never potential targets and therefore are not associated with a response through the task instructions. Because the flankers are not part of the response set, their effect on behavior is not dependent upon the arbitrary, instructed relationship between a visual stimulus and a response. Instead, in the correlated flankers task, the flankers have a direct learned, statistical relationship to the target; certain flankers have either a high or low probability of co-occurring with certain visual targets. This learned relationship allows the correlated flankers to bypass S-R translation and other "central" cognitive processes, allowing the correlated flankers to influence responses directly, so long as they are perceptually processed (Mordkoff & Halterman, 2008; also see Hommel, 1998).

In a standard flanker task, the congruent and incongruent flankers are part of the instructed attentional set because they match the identity of the to-be-attended target. In contrast, in the correlated flankers task, the flankers are not part of the instructed, to-be-attended items, but instead are paired (i.e., correlated) with the targets differentially. For example, in a series of inducing trials, if the targets are *A* and *B,* the irrelevant flanker *1* may occur with the *A* target on most trials and the irrelevant flanker *2* may occur with the *B* target on most trials. Following extended exposure to these associations, on test trials the correlation is eliminated, yet a flanker effect remains. Specifically, an *A* target flanked by *1*s and a *B* target flanked by *2*s produce faster RTs than do an *A* flanked by *2*s and a *B* flanked by *1*s. Of importance, because the correlated flankers are never targets, the correlated flanker effect arises as a result of a direct associative relationship between the flanker and the response to the target, not to response interference at the level of mapping stimuli onto responses. Thus, the correlated flankers task may provide a more-sensitive measure of whether the irrelevant flanker is perceptually processed (i.e., recognized) than does a standard flanker task, because flankers are directly associated with the target, not with a downstream response.

Participants performed either a standard or a correlated flankers task, in both cases searching for a target in both low- and high-load displays. In low-load displays, the target letter appeared among homogeneous, dissimilar distractors, allowing the target to pop out of the display; in high-load displays, the target appeared among heterogeneous, visually similar distractors (see Roper, Cosman, & Vecera, 2013). In both cases, a flanker appeared outside the search display. The standard flanker task used here was similar to that used in previous studies of perceptual load. For the correlated flanker task the stimuli themselves were identical, but during a series of initial "inducing" trials (Miller, 1987), one target response was paired with one flanking letter on 83% of trials and with a different flanking letter on the remaining 17% of trials. These percentages were swapped for the other pair of target letters or flankers. Following these inducing trials, participants then completed a series of test trials in which these asymmetries were removed in order to examine the influence of flanker-response learning on response interference.

We expected to replicate previous results with the standard flanker task, namely a robust flanker effect under low perceptual load but an absence of such an effect under high perceptual load. More important are the results from the correlated flankers task. If flanking stimuli undergo sufficient perceptual processing to be recognized but are not translated into responses under high perceptual load, then one would expect a robust correlated flanker effect under high perceptual load because the correlated flanker effect bypasses instructed S-R translation. Moreover, observing a correlated flanker effect under high perceptual load would indicate not only recognition of the flanker letter during the testing phase of the experiment but also a level of recognition during the inducing trials sufficient for the probabilistic learning of stimulus–response associations. In contrast, if flanking stimuli go unrecognized under high perceptual load, then no correlated flanker effect would be present under high perceptual load.

Method

Participants

Sixty University of Iowa undergraduates participated for course credit. All had normal or corrected-to-normal vision.

Stimuli and Design

Participants completed the experiment at a viewing distance of approximately 70 cm, and a Macintosh minicomputer displayed stimuli on a 17-in. CRT monitor and recorded responses and response latencies. The experiment was controlled using MATLAB (Natick, MA) and the Psychophysics Toolbox (Brainard, 1997).

Standard flanker task. Each trial began with the appearance of a fixation point measuring 0.30° × 0.30°. Nontargets were heterogeneous in the high-load condition (*U, C, L, P,* and *J,* each measuring 1.5° × 0.75°) and were homogeneous in the low-load condition (*O*s measuring 0.75° × 0.35°). There were four possible target letters: *E, A, F,* and *H* (1.5° × 0.75°). The *E* and *A* were mapped to one response hand and the *F* and *H* to the other, with this mapping counterbalanced across participants. This resulted in linear, six-item search arrays centered on fixation. A single, cortically scaled (1.9° × 0.90°) flanker letter appeared above or below the array on each trial (centered horizontally on fixation, 1° above the search array) and always matched the identity of a possible target. On half of the trials, the flanker was incongruent with the response to the target (e.g., an *F* when the target was an *A*), and on the other half the flanker was congruent with the response to the target (e.g., an *F* when the target was an *H*). Flanker position, identity, and compatibility were chosen randomly and with equal probability on each trial.

Participants completed 48 unanalyzed practice trials followed by 144 experimental trials, with participants completing either the low-load or high-load version of the task (see the rationale in the Task Design section).

Correlated flanker task. The stimuli used in the correlated flanker task were identical to those used in the standard flanker task, with the exception of the flanker letters. As in the standard flanker task, the correlated flanker task was performed under conditions of both low and high perceptual load. In the correlated flankers task, the flanker letters were entirely unrelated to the response (letters *S* and *G*). Consistent with Miller's (1987) method, the correlated flankers task involved two types of trials. First, participants completed inducing trials, in which a correlation was established between a specific response hand and a specific unrelated flanker letter. For example, in the inducing trials, search displays that presented an *E* or *A* target were flanked on 83% of trials by a *G* and by an *S* on the other 17% of trials. Conversely, displays that presented an *F* or *H* target were flanked by an *S* on 83% of trials and by a *G* on 17%. The association between particular responses and particular flanker letters was fully counterbalanced across participants.

Following these inducing trials, participants completed test trials that were identical to the inducing trials, but the response–flanker correlation was removed and each flanker appeared equally with each target letter. The test trials allowed us to assess the associations learned in the inducing trials without the confounding effect of flanker frequency. Participants completed 288 inducing trials followed by 96 testing trials. Only these test trials were analyzed to assess the presence of a correlated flankers effect (see Miller, 1987).

Task design. Our use of two flanker tasks and two levels of load resulted in four different conditions (standard flanker high/low load and correlated flanker high/low load). Given our primary interest in associative learning and expression of S-R mappings under varying conditions of perceptual load, it was not possible to have a single group of participants complete both the high- and low-load versions of the correlated flanker task. Thus, 15 participants completed the correlated flankers task under conditions of high perceptual load, and another group of 15 participants completed the same task under conditions of low perceptual load. Because we were also interested in examining differences in flanker interference for typical and correlated flankers under varying conditions of load, in the standard flanker task we retained this between-subjects design (15 participants completed the standard flanker task under low perceptual load and 15 others under high perceptual load). This ruled out the possibility of differences in performance on the basis of carryover effects between low- and high-load displays in the typical flanker task, allowing an unconfounded comparison of flanker effects across all tasks and conditions.

Procedure

The procedure was identical across all conditions. Participants were instructed to search the central array for a target and to ignore the letter that appeared above or below the search array. Following the presentation of a fixation point for 1,000 ms, the search array appeared for 90 ms, followed by a blank display that remained until participants responded. Directly following the experiment, participants who performed the correlated flankers task were informed that there was a correlation between specific flanker items and specific targets or responses. They were then asked to match the specific target letters with their correlated flankers, and these data were used to assess participants' awareness of the correlation and how it may have influenced explicit strategies related to task performance under each load condition.

Results

Mean correct RTs were computed for each participant as a function of target–flanker relationship. RTs that exceeded 2.5 standard deviations from the individual condition means were excluded from the analyses. This trimming excluded less than 2% of the data in both tasks. We analyzed both RTs and accuracy with mixed-model, two-factor analyses of variance (ANOVAs), with load (low or high) and compatibility (congruent vs. incongruent or strongly vs. weakly paired targets and flankers) as factors.

Standard Flanker Task

Results from the standard flanker task replicated previous results from the perceptual load literature (e.g., Lavie, 1995) and appear in Figure 1. Participants exhibited a marginal effect of compatibility, $F(1, 28) = 3.5$, $p < .07$, $\eta^2 = .11$, with faster RTs on congruent trials (742.8 ms) than on incongruent trials (763.0 ms). Participants also exhibited a marginal effect of perceptual load, $F(1, 28) = 3.2$, $p < .09$, $\eta^2 = .10$, with faster RTs under low load (707.2 ms) than under high load (798.6 ms). Most important, these main effects were subsumed by a statistically significant interaction, $F(1, 28) = 4.6$, $p < .05$, $\eta^2 = .14$, with a larger flanker effect under low load (43.2 ms) than under high load (−2.9 ms). Planned comparisons confirmed a significant flanker effect under low load, $t(14) = 3.1$, $p < .01$, but not under high load, $t(14) < 1$.

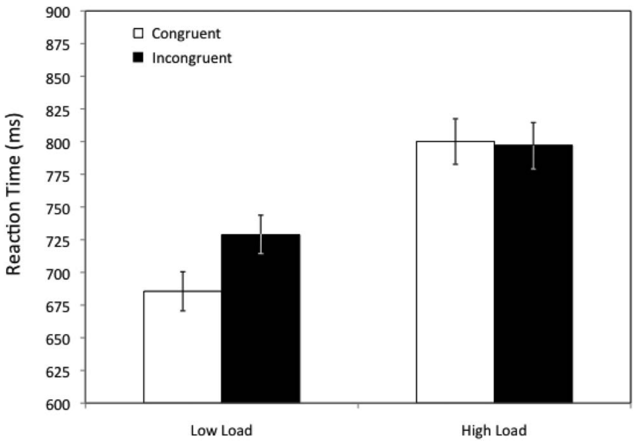

Figure 1. Results from the standard flanker task, which reveals a flanker effect in low-load but not high-load displays. Error bars are within-subject 95% confidence intervals (Loftus & Masson, 1994; Morey, 2008).

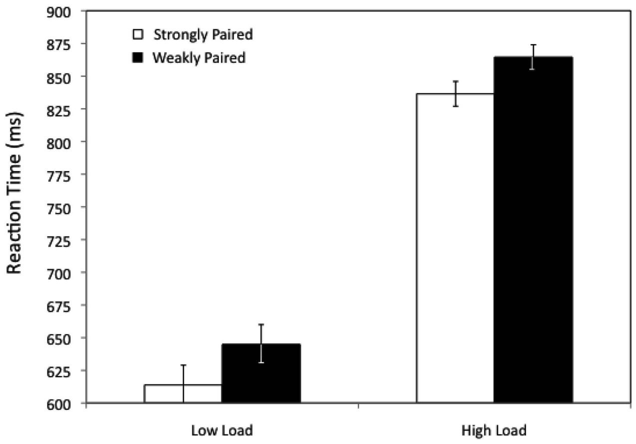

Figure 2. Results from the correlated flankers task, which reveals a correlated flanker effect in both low-load and high-load displays, suggesting that participants fully recognized flankers under high perceptual load. Error bars are within-subject 95% confidence intervals (Loftus & Masson, 1994; Morey, 2008).

Participants' accuracy in the standard flanker task appears in Table 1. As the data in Table 1 indicate, the accuracy was higher in the low-load condition than in the high-load condition, but there was no discernible effect of compatibility, and this pattern was confirmed with a two-factor, mixed-model ANOVA. There was a significant main effect of load, with greater accuracy on low-load trials (95% correct) than on high-load trials (80.8% correct), $F(1, 28) = 70.2$, $p < .001$, $\eta^2 = .72$. There was neither a main effect of compatibility, $F(1, 28) = 2.9$, $p > .05$, $\eta^2 = .095$, nor an interaction between perceptual load and compatibility, $F(1, 28) = 1.6$, $p > .20$, $\eta^2 = .05$. Of importance, this analysis of the accuracy data indicates that the response time results were not due to a speed–accuracy trade-off.

Correlated Flankers Task

Results from the test trials of the correlated flankers task appear in Figure 2, and the presence of a correlated flanker effect under high perceptual load suggests that participants readily identified the flankers under high load. The analyses demonstrated that participants exhibited an effect of target or flanker pairing, $F(1, 28) = 13.5$, $p < .001$, $\eta^2 = .33$, with faster RTs to strongly paired targets and flankers (729.1 ms) than to weakly paired targets and flankers (756.0 ms). Participants also exhibited an effect of perceptual load, $F(1, 28) = 17.7$, $p < .001$, $\eta^2 = .39$, with faster RTs under low load (629.3 ms) than under high load (850.5 ms). Finally, unlike in the standard flanker task, these factors did not interact, $F(1, 28) < 1$, $\eta^2 = .002$, with similar correlated flanker effects under low load (31.0 ms) and high load (28.0 ms). Planned comparisons confirmed a significant flanker effect under both low load, $t(14) = 2.2$, $p < .05$, and high load, $t(14) = 3.2$, $p < .01$.

Participants' accuracy (see Table 1) was generally high, particularly in the low perceptual load condition, but there was no discernible effect of compatibility. This pattern was confirmed with a two-factor, mixed-model ANOVA that showed a significant main effect of load, with greater accuracy on low-load trials (90.8% correct) than on high-load trials (84.9% correct), $F(1, 28) = 5.6$, $p < .03$, $\eta^2 = .17$. There was neither a main effect of compatibility, $F(1, 28) < 1$, $p > .50$, $\eta^2 = .007$, nor an interaction between perceptual load and compatibility, $F(1, 28) < 1$, $p > .50$, $\eta^2 = .001$. It is important to note that these findings indicate that the response time results were not due to a speed–accuracy trade-off.

Table 1
Percentage Correct (and Standard Errors) Across All Conditions

	Standard flanker task		Correlated flankers task	
Variable	Low load	High load	Low load	High load
Congruent	95.3 (1.1)	83.1 (1.7)	91.0 (2.6)	85.1 (1.5)
Incongruent	94.6 (1.0)	78.5 (2.3)	91.0 (1.7)	84.6 (1.7)

Awareness of Target–Flanker Pairings

Participants' explicit awareness of the flanker–target pairings did not affect the magnitude of the results. Under low load, 10 of the 15 participants correctly reported the target–flanker pairings correctly; five of 15 reported the pairing incorrectly. However, the magnitude of the correlated flanker effect was similar in both groups, with a flanker effect of 27.9 ms for participants who correctly identified the pairing and 20.3 ms for those who incorrectly identified the pairing. More important, under high load, only five of the 15 participants correctly identified the target–flanker pairing, and this group showed a 25.5-ms correlated flanker effect. Ten of the 15 participants incorrectly identified the pairing, yet these participants showed a 29.9-ms correlated flanker effect. Under both low and high load, the magnitude of the correlated flanker effect did not differ between participants who identified the pairing correctly versus those who did not, $t(28) < 1$.

These findings suggest that even though participants may have been aware of the flanker–response correlation, this knowledge had no bearing on task performance. Further, these findings are generally consistent with MacDonald and Lavie (2008), who demonstrated a decrease in explicit identification of a task-irrelevant critical stimulus during high (compared to low) perceptual load trials. However, in contrast to MacDonald and Lavie, we observed a covert influence of distractor identity regardless of load, supporting the notion that some degree of flanker identification occurs even under high perceptual load.

One potential concern with the current findings from high-load displays is the difference in the number of trials between the two tasks. The standard flanker task used fewer trials (192 total) than did the correlated flankers task (396 total, including induction trials). It is possible that the standard flanker effect appears under high perceptual load but only after a large number of trials, possibly because of attentional lapses that allow for spillover to the flankers. The high-load displays in the standard flanker task might not have been presented frequently enough to allow us to observe a flanker effect in the standard task.

To address this possibility, we collected data from another 10 participants who performed 384 trials of a standard high perceptual load flanker task to see whether increasing the number of trials was sufficient to drive a flanker effect. Of importance, we found no standard flanker effect in the high-load displays (1,128 ms congruent vs. 1,119 ms incongruent), $t(9) < 1$, $p = ns$),[1] even when the number of trials was equal to that in the correlated flanker task. Further, when only the final 96 trials were analyzed—the same number of trials that were analyzed in the test trials of the correlated flankers test—there remained no flanker effect (1,008 ms congruent vs. 981.7 ms incongruent), $t(9) < 1$, $p = ns$. Thus, the differences between the standard flanker task and the correlated flankers task do not appear to be attributable to trial number differences between the two tasks.

Discussion

The results of the standard flanker task replicated results demonstrating that perceptual load influences the flanker effect (e.g., Lavie, 1995). Most important, under high perceptual load, flanking letters did not influence performance, a result typically explained by a failure of flanker identification caused by extinguished resources under high perceptual load and consistent with an early locus of attentional selection. However, in the correlated flankers task using identical high perceptual load displays, learned associations between a flanker letter and a given response did influence performance. Had identification failed in this latter case, we would not have observed a correlated flankers effect. The fact that the acquisition and expression of the correlated flankers effect survived search through high perceptual load displays suggests that the flankers were recognized to a level sufficient to drive persistent influences on behavior, although not necessarily to a level to reach awareness.

On the basis of our results, we argue that the presence or absence of the standard flanker effect under low and high load may be due in part to the effects of perceptual load on postperceptual processes such as stimulus–response translation and not on perceptual identification per se. For example, it is possible that the flankers in the standard flanker task are recognized but do not readily activate the corresponding response, which prevents these flankers from speeding responses on congruent trials and slowing them on incongruent trials.

Because correlated flankers are related to the response through direct, learned associations, these flankers do not require a stimulus–response mapping and thus may be able to affect behavior directly (e.g., Hommel, 1998). Alternatively, in the standard flanker task, increasing perceptual load might slow the rate of information accumulation in the response system, allowing target responses to be programmed prior to the flanker's reaching a threshold level of identification (e.g., Ratcliff & Smith, 2004; Smith & Ratcliff, 2004). By providing a direct link between a specific flanker and its associated response, identification may occur more quickly and the correlated flanker may compete more effectively with the response to the target, generating an interference effect. Either possibility is problematic for a strong view of load theory, because both would suggest a late, postrecognition locus of selective attention under high perceptual load.

One possible argument against a stimulus–response mapping account comes from studies that show perceptual load effects in tasks that do not measure response competition (see Lavie & Torralbo, 2010) and would not require response-level processes. For example, several neuroimaging studies have measured the blood-oxygen-level dependent (BOLD) signal generated by an irrelevant stimulus while participants perform a task on either high- or low-load displays (e.g., Bahrami, Lavie, & Rees, 2007; Rees, Frith, & Lavie, 1997). Typically, the BOLD signal evoked by an irrelevant stimulus is weaker under high load than under low load. However, the mere presence of a BOLD signal from an irrelevant stimulus under high load suggests that the irrelevant stimulus has been processed *to some degree,* and it would be inappropriate to indicate that a participant was blind or deaf (i.e., did not perceive) to that irrelevant stimulus. The neural signal reductions under high perceptual load are entirely consistent with the current results, suggesting that although recognition under high perceptual load is reduced, it may still be sufficient to allow associative learning as in the correlated flankers task.

A related point is whether correlated flankers are entirely task-irrelevant. Because these flankers are implicitly associated with a response during the induction phase, one might hypothesize that these items are relevant and should be attended. (Indeed, two reviewers suggested such a possibility.) We should reiterate that the correlated flankers were irrelevant for the task's instructions, which were to report the identity of the target letter in the central portion of the display. To that end, in the standard flankers task the congruent and incongruent flankers are part of the attentional control setting to attend to specific target letters (e.g., *E, A, F,* and *H* in the current experiments). If attention were deployed toward items that are part of the control setting (e.g., Folk, Remington, & Johnston, 1992), then it would be more likely for attention to be drawn by flankers in the standard flanker task than in the correlated flankers task (see Buetti, Lleras, & Moore, 2014). Moreover, if attention were strategically directed toward the correlated flank-

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[1] This control experiment was adequately powered, because 10 participants would have been sufficient to observe the 28-ms flanker effect in the high-load condition of the correlated flankers task (power = 0.77). Moreover, the overall pattern of RTs in the control experiment is *opposite* to that of the correlated flanker effect we observed, with faster RTs to incongruent trials compared to congruent trials. Thus, there is little evidence that the correlated flankers effect was due to the larger number of trials in that task compared to trials in the standard flanker task.

ers, then one might expect participants to have shown some ability to report the flanker–target pairings, although we found no evidence for this. At a minimum, one might expect participants who could report these pairings to show a larger correlated flanker effect than did those participants who could not report those pairings. Again, we found no evidence that awareness of the flanker–target associations altered the magnitude of the correlated flankers effect.

Although our results demonstrate that perception can occur under high perceptual load, one reviewer noted that there might be spare attentional capacity under a correlated flankers task but not a standard flankers task. Such a view would allow flanker identification under correlated flankers but not standard flankers, readily accounting for the results we have presented. As the reviewer noted, there may be many task parameters that determine the extent to which attentional capacity is exhausted. Of course, the elegance of comparing correlated flankers to standard flankers is that the two tasks are remarkably similar—particularly the instructions that participants receive. Nevertheless, task parameters could be explored as an influence on perceptual load effects, and load theory should articulate the relevant task parameters that would or would not be expected to have an impact on performance.

Finally, the current work may also be challenging for recent perceptual dilution accounts of perceptual load effects (e.g., Mevorach, Tsal, & Humphreys, 2014; Tsal & Benoni, 2010; Wilson, Muroi, & MacLeod, 2011). Dilution accounts propose that flanker processing is reduced in high-relative to low-load displays because of the presence of additional nontarget items in these displays. These additional items diminish (i.e., dilute) the recognition of the flanker, with the result being a reduced flanker effect under high perceptual load. A strong dilution account should predict an absence of a correlated flanker effect, because the nontarget letters in the search task should dilute recognition of the flanker irrespective of whether the task is a standard flanker task or a correlated flanker task. Hybrid dilution accounts that allow for dilution effects in later, postperceptual stages of processing (e.g., visual working memory; see Roper & Vecera, 2014) may be able to account for the current results, but the specific predictions generated by such accounts would need to be tested in further research.

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Call for Nominations

The Publications and Communications (P&C) Board of the American Psychological Association has opened nominations for the editorships of *Clinician's Research Digest: Adult Populations* and *Child and Adolescent Populations*; *Journal of Experimental Psychology: Learning, Memory, and Cognition; Professional Psychology: Research and Practice; Psychology and Aging;* and *Psychology, Public Policy, and Law* for the years 2019 to 2024. Thomas Joiner, PhD; Robert L. Greene, PhD; Ronald T. Brown, PhD; Ulrich Mayr, PhD; and Michael E. Lamb, PhD, respectively, are the incumbent editors.

Candidates should be members of APA and should be available to start receiving manuscripts in early 2018 to prepare for issues published in 2019. Please note that the P&C Board encourages participation by members of underrepresented groups in the publication process and would particularly welcome such nominees. Self-nominations are also encouraged.

Search chairs have been appointed as follows:

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Deadline for accepting nominations is Monday, January 9, 2017, after which phase one vetting will begin.