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Direct and Indirect Effects of Semantic Priming in Motor Planning and Control

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Semantic priming is known to affect actions. For example, the word *SMALL* or *LARGE* appearing on an object to be grasped affects grip aperture. We presented the words *LONG* or *SHORT* shortly before, during, or after the brief presentation of a line segment and measured whether this semantic prime affected the extent of a movement to the line's end point. Priming was observed with only early presentation of the word. A 2nd experiment demonstrated that little priming was observed when the apparent line length was not relevant to the required movements. Finally, a 3rd experiment found that substantial priming was found under comparable presentation conditions when participants merely made perceptual length judgments. These results suggest that semantic priming primarily affects the representation of the line length, not the planning or control of the movement.

Public Significance Statement
The research demonstrated that the effects of potentially irrelevant semantic information on the control of simple pointing movements is largely mediated by perception. The mechanisms underlying such semantic effects presumably apply across a wide range of routine motor tasks and have implications for human factors and procedural learning.

Keywords: motor control, semantic priming, action

Supplemental materials: http://dx.doi.org/10.1037/cep0000196.supp

In the present research, we examined the relationship between semantic priming and motor control. A wide range of findings have implicated a close connection between the activation of meaning and motor processes. These include effects of depictions of graspable objects near the hands (Tucker & Ellis, 1998), effects of up−down words on mouse movements (Areshenkoff, Bub, & Masson, 2017), and effects of grasp primes on object identification (Vainio, Symes, Ellis, Tucker, & Ottoboni, 2008). Motor responses can even be affected by prime stimuli when the primes are masked and unavailable for verbal report (Dehaene et al., 1998). In the present investigation, we measured the extent of pointing movements made with a cursor and assessed whether these movement distances were affected by semantic word primes (e.g., Gentilucci, Benuzzi, Bertolani, Daprati, & Gangitano, 2000). In particular, we considered two explanations for such a semantic priming effect: In the direct model, it is assumed that the meaning associated with the prime word would directly affect the movement parameters used in motor planning; in the indirect model it is assumed that semantic information would activate perceptual features of the goal object, which in turn would affect the action that is planned and carried out. Thus, in the indirect model, it is assumed that the effect of the semantic prime is mediated by perception. The principle independent variable in these investigations was the temporal relationship between the prime and the target stimulus that controlled the pointing motion. The results provide evidence for a large indirect effect in which semantic primes affect the perceptual representation of the stimulus; direct effects on motor control appear to be much smaller.

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The data are available at https://osf.io/bvysq/?view_only=e932bc56ab374b97b5c5992d7adb331b
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The effect of distracting stimuli on motor control was previously demonstrated by Tipper, Howard, and Jackson (1997). When confronted with an array of objects, reaching movements slowed and tended to veer away from the distractors when they were near the reach trajectory. However, Castiello (1996) found that distracting objects affected the parameters of movement only when attention had to be directed to those objects. In this case, the motor control parameters for the distractors biased those used for grasping the target object. Implicit bias effects were observed by Ishihara et al. (2006) when participants were asked to reach to numerical stimuli arrayed in space: Movements were faster when the position of the target digit was congruent with its position on a number line.

This result was extended to the semantic domain by using irrelevant words as primes. Gentilucci et al. (2000; see also Gentilucci & Gangitano, 1998) demonstrated that a variety of words printed on an object to be grasped affected reach and grasp trajectories. For example, participants' peak acceleration and velocity were higher in the presence of *LONTAN* (Italian for "far") than for *VICINO* ("near"). Similarly, maximum grasp aperture and peak finger velocity increased in the presence of the word *GRANDE* ("large"), relative to the word *PICCOLO* ("small"). These results were interpreted as evidence that the automatic reading of words activated semantic properties that affected a motor program that was developed concurrently. It is important to note that the effect occurred for both extrinsic properties of the object to be grasped (e.g., near or far) and intrinsic properties (large or small).

A similar finding was reported by Glover and Dixon (2002). They also found that the words *LARGE* and *SMALL* printed on objects affected grip aperture. However, the critical contribution of this study was that the semantic priming effects were observed early in the reach trajectory, not near the end as the hand approached the object. Consistent with other studies (e.g., Glover, 2002; Glover & Dixon, 2001), this suggests that the prime words have their effect on the planning of the action rather than on online control. This result was extended further by Glover, Rosenbaum, Graham, and Dixon (2004). In this case, the prime words were the names of objects that were characteristically large or small. For example, maximum grip aperture was larger in the presence of *APPLE* than it was with *GRAPE.* This suggests that the features of the movement that might be used to grasp the prime object were incorporated into the actual movement.

The direct model provides a natural interpretation of these findings. In this account, the word prime is automatically encoded (Brown, Roos-Gilbert, & Carr, 1995; Stroop, 1935) and activates its associated meaning. This meaning then interacts with the evolving motor program and has an effect on performance. For example, *apple* might tend to activate a large grip aperture suitable for grasping an apple. A possible mechanism for this effect is that the prime word tends to automatically activate relevant action plans (cf. Klatzky, Pellegrino, McCloskey, & Lederman, 1993) and that these partially activated plans bias the parameters of the grasping movement (Praamstra, Kourtis, & Nazarpour, 2009). The result is that a larger grip aperture, such as that which might be used for grasping an apple, is selected initially.

However, an alternative interpretation is that the effect of the prime is indirect rather than direct. In particular, the prime words may affect the perception of the target or goal object rather than motor planning directly, and it is only through this effect on perception that the effect on performance appears. For example, the word *apple* might lead the viewer to expect a large, apple-sized object, and, as a consequence, the perceptual feature of size might be biased. This biased perceptual interpretation would, in turn, affect motor planning for associated grasps. Thus, the effect of the semantic information would be indirect and contingent on the perceptual interpretation. In this analysis, the critical distinction between a direct and an indirect account is whether the effect on motor control is mediated by an effect on the perception of the goal object.

In the present research, we contrasted these two accounts on the basis of timing. We assumed that, regardless of how semantic primes have their effects, performance of the task requires that participants first construct a perceptual representation of the target object and then subsequently construct a suitable motor plan for carrying out the intended task. Based on this analysis, we assumed that semantic priming effects on perception should occur relatively early in the processing sequence, whereas semantic effects on motor planning and control should occur relatively late. Our operational assumption was that varying the onset of the prime could distinguish such early and late effects on processing. This timing hypothesis is depicted in Figure 1. In the top diagram, a prime word that is presented just prior to the target stimulus leads to semantic activation that is coincident with perceptual processing of the target; in the bottom diagram, the prime leads to semantic activation that is coincident with motor planning. Thus, we hypothesized that a brief, early prime would be more likely to affect perceptual processing, whereas a brief, somewhat later prime would be more likely to affect motor planning and control. This prediction is used in Experiment 1 to distinguish prime effects on perception from those on motor planning.

Experiment 1

The present task required participants to move the cursor from a start position either up or down to the far end point of a vertical line segment. The line segment was presented briefly so that participants would have to construct a perceptual representation of the line and its position and use that to guide their cursor movement. The start position was at the center of the screen, and the line segment was presented randomly either above or below that position so that participants could not generate expectancies concerning the direction of movement. A word prime (*LONG* or *SHORT*) was presented briefly just prior to, concurrent with, or just after the line segment. This sequence of events is shown in Figure 2: In this early prime example, the prime was presented immediately after participants clicked at the fixation, the target line segment was presented after the prime, and then the participant moved the cursor to the position of the line segment end point. In other timing conditions, there was a 0.15-s delay before the target presentation, and the prime was presented at the same time as the target or immediately afterward.

According to our timing hypothesis, the early prime should be recognized sooner and the meaning should be more likely to be available while participants are constructing a perceptual representation of the line segment. This should enhance the potential for perceptual priming but minimize the potential for motor priming. In particular, the prime *LONG* may lead to a perceptual representation of the line segment that is relatively long; the prime *SHORT*

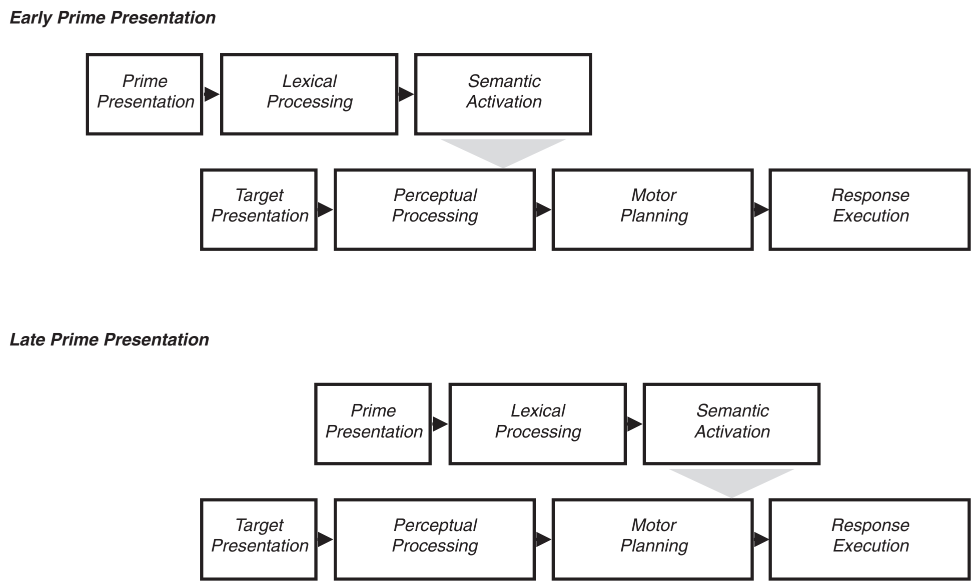

Figure 1. Hypothesized relationship between the processing of the target and the prime processing at different prime–target stimulus–onset asynchronies. With an early prime presentation, semantic activation should overlap (and potentially interact with) perceptual processing; with a late prime presentation, semantic activation should overlap with motor planning.

may lead to a perceptual representation that is relatively short. In contrast, a late prime would be recognized later and would be less likely to be available during perceptual processing; instead, the meaning of the later prime should be available during the subsequent motor planning. In this case, *LONG* may lead participants to plan a relatively long movement, whereas *SHORT* may lead participants to plan a relatively short movement. Thus, if semantic primes affect perception, the effect should be observed for early primes; if semantic primes affect motor planning and control, the effect should be observed for late primes.

Method

Participants. Seventeen University of Alberta students participated in exchange for course credit. All had normal or corrected-to-normal vision. This and the succeeding experiments were approved by Research Ethics Board 2 at the University of Alberta.

Apparatus. Participants conducted the experiment on an iMac with a 21.5-in. display with a resolution of 72 dpi viewed at a distance of approximately 50 cm under normal room illumination. Participants used an Apple 11 × 13 mm track pad to make their responses.

Stimuli. The stimuli were five vertical line segments of length 40, 45, 50, 55, and 60 mm. The line segments were presented above or below fixation with a gap of 21 mm between fixation and the central end of the line. The primes were the words *LONG* and *SHORT,* displayed in 18-point Helvetica font. The primes were presented 11 mm above or below fixation, centered in the gap between fixation and the near the end point of the line.

Procedure. Each trial began with a fixation mark consisting of a plus sign in the middle of the screen. Participants initiated the stimulus presentation by moving the cursor to the fixation mark and clicking. The line segment and the prime were always presented for 0.15 s, and the presentation of the line segment always followed the participants' click by 0.15 s. In the early prime condition, the prime was presented immediately after the click for 0.15 s followed by the line segment for 0.15 s; in the concurrent-prime condition, there was a 0.15-s blank interval followed by the simultaneous presentation of the prime and the line segment for 0.15 s; in the late-prime condition, there was a 0.15-s blank interval, the presentation of the line segment for 0.15 s, and this was followed by the prime for 0.15 s. After the stimulus presentation, participants used the trackpad to move the cursor to the position of the far end point of the line segment and to then click at that point. The vertical position of the click provided our measure of the movement distance. In addition, we measured the total response time, from the presentation of the target line to the participants' response click. The fixation mark was removed after the participants' response, and the next trial began after an intertrial interval of 1 s.

Design. Each participant took part in nine blocks of trials; the first block was regarded as practice and was not analyzed. Each block was 60 trials, consisting of three repetitions of each combination of line length, prime, stimulus onset asynchrony (SOA), and display direction (above or below fixation). There was a minimum 5-s delay between blocks. On average, the entire experiment took 45 min to complete.

Analysis. In this experiment, 3.8% of the trials were not used because participants failed to initiate the trial correctly by clicking on the central fixation. A further 0.9% of the responses that were farther than 1 cm from the horizontal position of the line or less than 2 cm from the fixation point were excluded as errors. The dependent variables were the vertical distance participants moved the cursor (either up or down) to the position they clicked as the end point of the

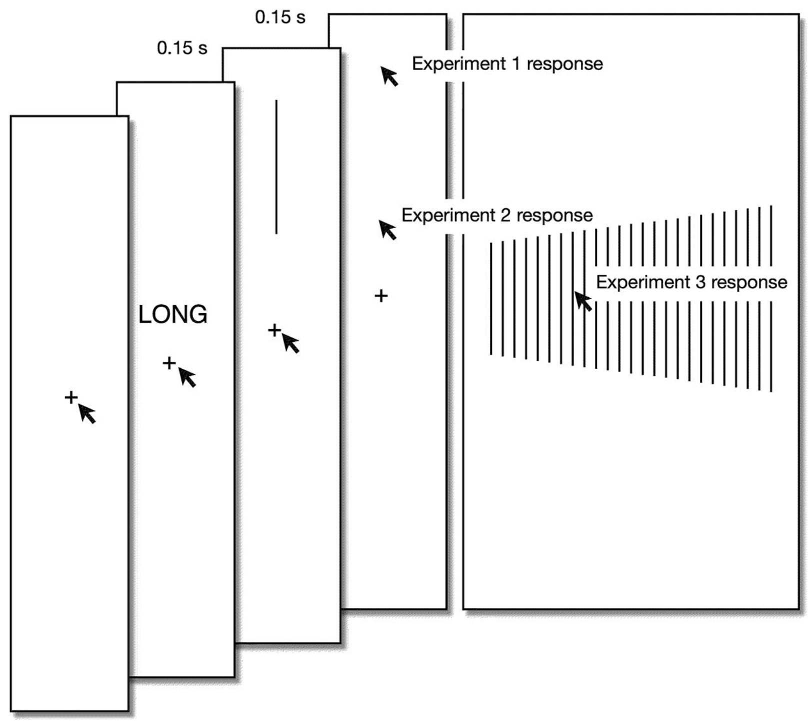

Figure 2. Illustration of an example trial in Experiment 1. Participants began a trial by clicking near fixation; on early prime trials (as in this example), the prime is then presented for 0.15 s, followed by the target line segment for 0.15 s. In Experiment 1, participants clicked at the point where they thought the far end point was; in Experiment 2, participants clicked where they thought the near end point was; in Experiment 3, participants selected a matching line from a horizontal array.

line segment. We also measured the total response time. These times generally increased with movement distance and showed little effect of prime. These are reported in detail in the online supplemental materials.

We eschewed the use of null hypothesis significance testing because of the many well-known problems with this approach (e.g., Cohen, 1994; Dixon & O'Reilly, 1999). Instead, we assessed the evidence for different interpretations of the results by comparing nested linear models of the results using likelihood ratios. Following the suggestion of Glover and Dixon (2004), we adjusted the likelihood ratios for the varying number of parameters based on the Akaike information criterion (AIC; Akaike, 1973), a well-known model comparison approach. Thus, comparing models based on adjusted likelihood ratios is tantamount to model selection based on AIC. In the presentation, adjusted (adj) likelihood ratios are denoted by λ_{adj}. For comparison, in some prototypical hypothesis testing situations, an attained significance level of .05 corresponds to an adjusted likelihood ratio of about 3.

Results

As shown in Figure 3 (left panel), the presentation of the prime either before or concurrently with the line had an effect on the participants' movements: Movements were longer following the prime *LONG* and shorter following the prime *SHORT*. However, the prime had little effect when it was presented late. Movement distances for different line lengths are shown in Figure 4 (left panel); as shown, these estimates increased in an approximately veridical fashion with line length. (Individual cell means are provided in the online supplemental materials.) This interpretation was supported by the fit of linear models. A model that included the overall effect of line length was better than a null model ($\lambda_{adj} > 1{,}000$). Adding the effect of prime–target SOA improved the model as well ($\lambda_{adj} > 1{,}000$). Finally, adding an effect of prime for early and concurrent primes also improved the model ($\lambda_{adj} > 1{,}000$). There was little evidence that adding an effect of prime for late primes had any further effect ($\lambda_{adj} = 1.17$).

Discussion

The results show that the semantic prime needed to be presented shortly before or concurrent with the line segment to have an effect on movement extent. This pattern is in line with the prediction made by an indirect model of semantic priming. In particular, it is consistent with the assumption that the semantic primes affect the perceptual representation of the line segment rather than directly affecting the process of planning or controlling the action of moving to the end point.

Of course, this reasoning and interpretation depends on the time course of word recognition processes, line perception, and motor planning processes and how these unfold over the course of the trial. As depicted in Figure 1, we hypothesized that the lexical processing of the prime and the subsequent semantic activation would be fast enough that it would coincide with the perceptual

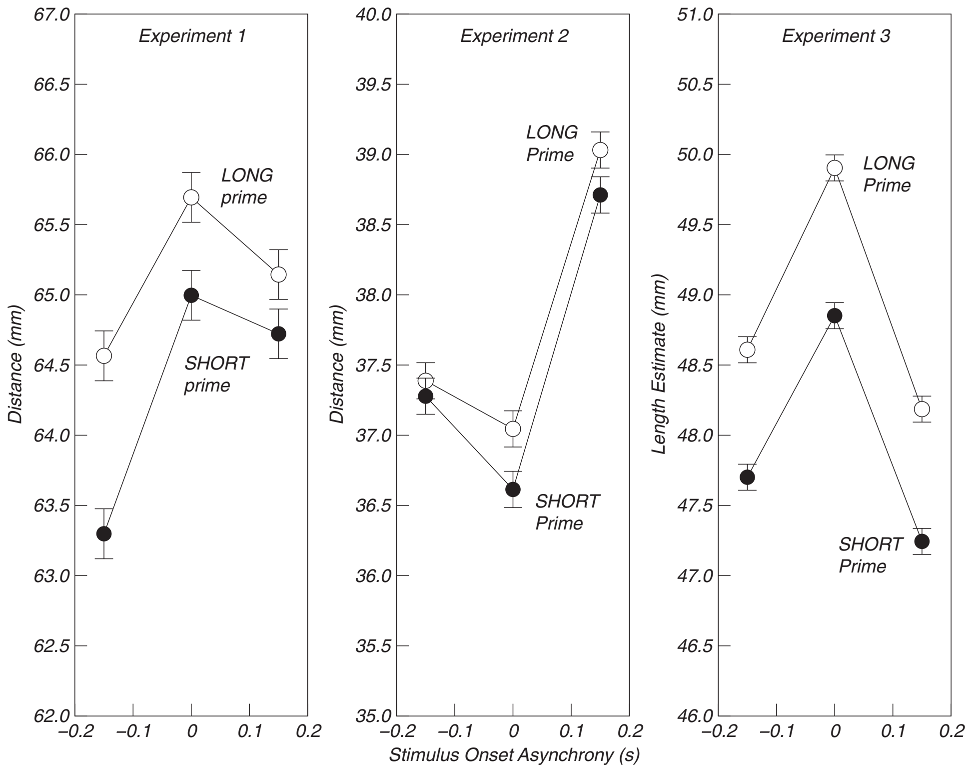

Figure 3. Cursor movement extent (or length estimate in Experiment 3) as a function of prime–target stimulus onset asynchrony and prime. Negative stimulus–onset asynchronies imply that the prime precedes the target. Error bars represent estimates of the standard error of the mean derived from the fit a full model but excluding the variance associated with the overall mean.

processing of the target line when the prime is presented prior to the target but not when it is presented after the target. However, this analysis depends on the hypothesized relative duration of the stages of processing, and other interpretations are possible. For example, if the processing of the prime were much longer than depicted in Figure 1, the semantic activation would coincide with action planning rather than perceptual processing of the target.

Other interpretations of the present pattern of results are also possible. For example, the effect of the prime may become attenuated as SOA increases, perhaps because of the increasing importance of motor control processes. In other words, an irrelevant semantic prime may be easier to ignore if most resources are concurrently devoted to planning a movement (cf. Lavie, 1995). Another possibility is that the effect of time is related to attention. For example, the immediate, early onset prime may be more likely to attract attention to the prime than the late prime, leading to greater semantic activation. This might occur because the prime is presented first (cf. Spence & Parise, 2010). Experiment 2 provides some evidence against these interpretations by manipulating the nature of the task while maintaining the same visual display parameters.

Experiment 2

In Experiment 2, we changed the nature of the task by asking participants to move to the near end of the line rather than the far end (as shown in Figure 2). Our hypothesis was that if priming affected perceptual processes, the pattern of results in Experiment 1 should not occur. For example, if the prime *LONG* leads to a representation of the line that extends farther, the represented position of the near end of the stimulus should be unchanged, and consequently there should be little effect on movement distance. Another possibility is that a prime such as *LONG* leads to a representation of the line that is longer even though the represented centroid is unchanged. In this case, the near end of the line may be represented as closer to fixation than otherwise, and movement distance would actually be shorter. In either event, there is no reason to expect movement distance to be longer as found in Experiment 1. In contrast, if priming affected the parameterization of associated motor plans, it should not matter whether the movement target was the near or far end of the line; in both cases, one would expect the prime to interact with motor planning, and the priming effect observed in Experiment 1 should be replicated. Similarly, if the previous effects were related to display timing and the allocation of attention or resources, changing the movement target should have little impact, and a substantial effect of the prime should be observed.

Method

Participants. Twenty University of Alberta students participated in exchange for course credit. All had normal or corrected-to-normal vision.

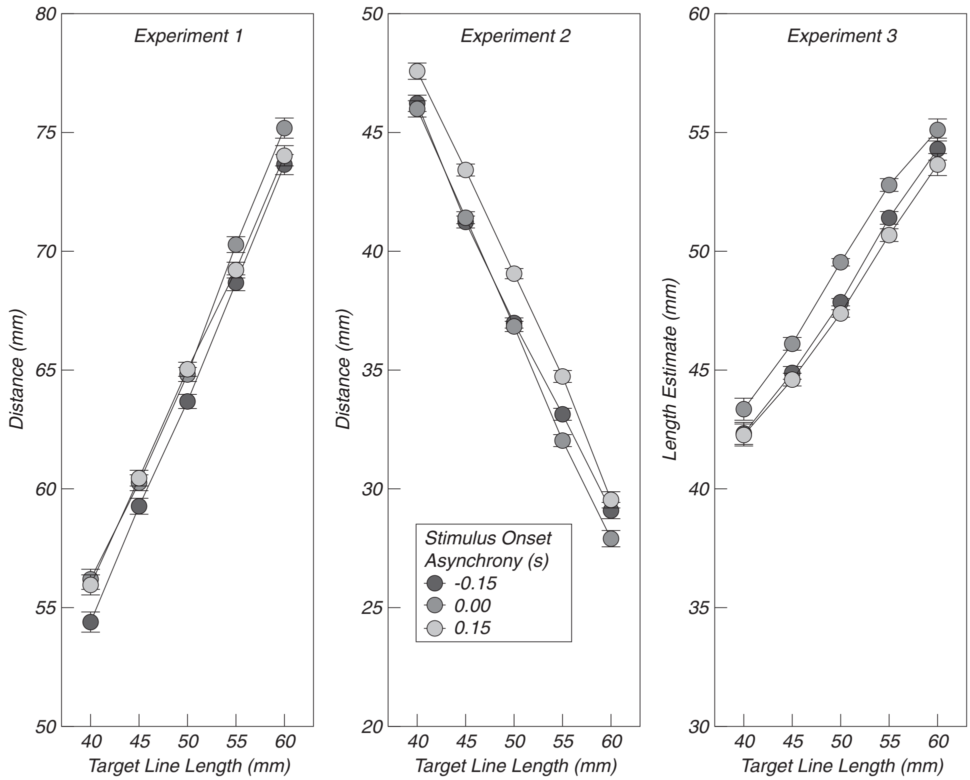

Figure 4. Cursor movement extent (or length estimate in Experiment 3) as a function of prime–target stimulus onset asynchrony and target line length. Error bars represent estimates of the standard error of the mean derived from the fit a full model but excluding the variance associated with the overall mean.

Stimuli. The same line segments, ranging from 40 mm to 60 mm, were used as stimuli. However, to make the required response variable over trials, we positioned line segments on the screen with the far end 88 mm from fixation, so that the near end point varied inversely with line length. The primes were presented 11 mm above or below fixation as in Experiment 1. (However, because the distance to the near end varied across trials, the primes were no longer centered between fixation and the line segment.)

Apparatus, procedure, and design. The experiment proceeded in precisely the same manner as Experiment 1; the only difference was that participants attempted to estimate the location of the near end of the line segment rather than the far end.

Analysis. In this experiment, 4.6% of the data were lost because participants did not initiate the trial correctly; an additional 1.1% of the trials were scored as errors because the responses were further than 1 cm from the horizontal position of the line or less than 2 cm from the fixation point.

Results

As shown in Figure 3 (center panel), there was only a small effect of the prime, averaging about 0.3 mm. Figure 4 (center panel) shows the effect of line length, with the expected effect that the longer the line segment, the shorter the distance moved. (Individual cell means are shown in the online supplemental materials.) These interpretations were supported by the fit of nested linear models. A model that included an effect of length was better than the null model ($\lambda_{adj} > 1{,}000$). Adding an effect of prime–target SOA improved the model further ($\lambda_{adj} > 1{,}000$). Finally, adding the effect of prime improved the model somewhat more ($\lambda_{adj} = 8.24$). There was no evidence that the effect of prime varied over SOA ($\lambda_{adj} = 0.28$).

Discussion

The results confirm the prediction based on an indirect model of semantic priming: When the length of the line segment no longer had a simple relationship to movement distance, the large and robust effect of priming observed in the early prime condition of Experiment 1 largely disappeared. Although an effect of prime did occur, it was much smaller: 0.3 mm compared to 1.3 mm in the early prime condition of Experiment 1. Although this pattern of results is consistent with a possible effect on motor planning and execution, it suggests that the bulk of the priming effect in Experiment 1 was due to effects on perceptual processes. (Indeed, the small effect observed in the present experiment is consistent with the small effect found in the late prime condition of Experiment 1.)

Another possible interpretation, though, is that the minimal effects of priming were due to competing direct and indirect effects. In this interpretation, for example, *LONG* leads to a longer perceptual representation of the target line; if the represented centroid were fixed, this would mean that the near end point would be nearer fixation; at the same time, *LONG* also primes a longer movement. Because these two effects are in opposite directions, the net result is a minimal effect of the prime. Although this is possible, it is not clear why there should be a minimal interaction with timing. As described in the introduction, we anticipated that perceptual effects would be more likely to occur with early primes, whereas motor effects would be more likely with late primes. Thus, the relative strength of competing direct and indirect effects should vary with SOA. The failure to observe such interactions is inconsistent with a competing-effects interpretation.

Experiment 3

As a simple test of the hypothesis that the semantic prime can affect the perception of the line length, we designed a purely perceptual task in which priming effects on motor planning and control should be irrelevant. In particular, participants were shown a line segment (and a prime) as they were in Experiments 1 and 2 but were then asked to match the length of the line by selecting from a range of alternative exemplars arrayed from left to right (see Figure 2). The required response in this experiment is rather different from that in Experiments 1 and 2, because the task was designed to index the perceptual representation. In particular, there is no reason to think that the selection of a matching line segment should be affected by motor priming in any simple way.

Method

Participants. Seventeen University of Alberta students participated in exchange for course credit. All had normal or corrected-to-normal vision.

Stimuli. The line segments and primes were the same as in Experiment 1. However, responses were made by using the trackpad to select one of 25 comparison line segments that best matched the target line segment in length (as in Figure 2). The comparison lines were arrayed horizontally from smallest (38 mm) on the left to the largest (64 mm) on the right. The array was 96 mm horizontally.

Apparatus. The apparatus was unchanged.

Procedure. The presentation of the target line segment and the prime was identical to that in Experiment 1. The response array was presented 1 s later. Participants responded by moving the cursor to a line in the array and clicking. The horizontal position of the click was used as a (nearly) continuous measure of estimated line length by interpolating between the lengths of the lines to the left and right of the click. With this procedure, there was an additional 1-s delay between the offset of the target line and the availability of the response array that did not occur in Experiments 1 and 2; in the previous experiments, participants could begin their response immediately after seeing the target line.

Analysis. In this experiment, 3.3% of the trials were not used, because participants failed to initiate the trials correctly. A few responses that fell outside of the array of comparison lines ($<$0.1%) were discarded as errors.

Results

As shown in Figure 3 (right panel), there was a substantial priming effect, even though long or short movements were not systematically related to the estimated length. Figure 4 (right panel) also demonstrates that the length estimates were largely veridical, although with some compression in the scale. (Individual cell means are shown in the online supplemental materials.) These interpretations were supported by the fit of nested linear models. A model that incorporated the effect of line length was substantially better than the null model ($\lambda_{adj} > 1{,}000$). Further, adding the effect of SOA improved the model as well ($\lambda_{adj} > 1{,}000$). Finally, there was a substantial benefit to including the effect of prime ($\lambda_{adj} > 1{,}000$).

Conceivably, the prime could have a direct effect on the (horizontal) response movement distance used to select matching line segment. To assess this possibility, we calculated the absolute distance moved to the response location and analyzed these data as before. Because participants had to move different distances to select different comparison lines, this measure demonstrates a complex interaction of prime and target line length. It is important to note, though, that movements were somewhat shorter with the *LONG* prime (18.9 mm, $SE = 0.1$) than with the *SHORT* prime (19.5 mm, $SE = 0.1$), lending no support to a possible direct effect on movement distance. (A model with this effect of prime was better than a model without it [$\lambda_{adj} = 6.98$].) Instead, this paradoxical effect can be understood as a function of the effect of the prime on the length estimate, as shown in Figure 3: As can be seen, participants underestimated line length on average, and movements tended to be toward the left (short) side of the comparison display; thus, when the prime *SHORT* led them to represent the line as shorter, participants tended to move even farther to the left, leading to an overall increase in movement distance. The *LONG* prime would have the opposite effect.

Discussion

The results demonstrate that a substantial priming effect can be found on the perceptual representation of the target, independent of any effects on action planning. In particular, the primes *LONG* and *SHORT* have no simple relationship to the required movements for selecting a matching line segment in the response array. Thus, we can be confident that the priming effect shown in Figure 3 is related to the perceptual representation of the target.

Unlike in Experiment 1, the priming effect in this experiment was unrelated to the timing of the prime. One possible explanation is that there was a relatively long delay between the target and prime presentations and the display of the response array, and participants would have to maintain visual information about the line length in memory during this delay. This may have provided more opportunity for the prime to interact with that representation, regardless of the presentation timing.

General Discussion

All three of the experiments reported here support the conclusion that in the paradigm studied here, semantic primes affect the perception of the target stimulus rather than directly affecting motor control processes. In Experiment 1, semantic primes affected movement distance when they were early but not when they were late. This is consistent with semantic prime features' interacting with the perceptual representation of the target rather than the subsequent action planning processes. In Experiment 2, the task was changed so that the prime effects on perception would have little impact on movement distance; in this case, the prime effects were much smaller. Finally, in Experiment 3, we demonstrated that prime words could have large effects on perception of the target when effects on motor planning were moot. Together, these results provide compelling evidence that the semantic prime effects in this paradigm pertain primarily to the perceptual representation of the target and that effects on action planning and control are small.

An interesting and unexpected result across the three experiments is that the timing of the prime had large effects on the distance moved (and the estimated size in Experiment 3). One analysis of these differences is based on the nature of the 0 SOA condition. We assume that, when presented simultaneously, the prime and the target together may give the impression of a single, composite stimulus. Indeed, there is evidence that the common onset and offset of two stimuli can lead to Gestalt grouping (e.g., Kurylo, Waxman, & Kezin, 2006), a form of common fate. In this case, the prime and the target with a common onset and offset may be represented as two parts of a single, larger object. To explain our cross-experiment differences, we conjecture that the total extent of this larger object biases the perceptual representation of the line length to be longer than that in the other SOA conditions. This could have biased participants to make a longer movement to the far end point in Experiment 1 and to make a larger size estimate in Experiment 3. In contrast, in Experiment 2, the larger composite stimulus might lead participants to move a shorter distance to the near end of the line segment. Clearly, participants do not simply respond on the basis of the extent of this composite stimulus. However, a small bias to do so may have been sufficient to produce the pattern of effects observed across experiments.

On balance, the results of these experiments demonstrate that semantic priming effects on movement need not be mediated by a direct connection between the meaning of the prime and the control of the movement. Instead, the results suggest that the prime can bias perception and that perception in turn affects how the motor system behaves.

Résumé

L'amorçage sémantique est reconnu pour affecter les actions. Par exemple, le fait d'afficher les mots *PETIT* ou *GRAND* sur un objet à saisir affecte l'ampleur de la préhension. Nous avons présenté les mots *LONG* ou *COURT* peu avant, pendant et après une brève présentation d'un segment de ligne et mesuré si cette amorce sémantique affectait l'ampleur d'un mouvement jusqu'à l'extrémité de la ligne. L'amorçage a été observé seulement lors de la présentation en avance du mot. Une deuxième expérience a montré qu'un faible amorçage était observé lorsque l'apparente longueur de la ligne n'était pas en lien avec les mouvements requis. Enfin, une troisième expérience a montré qu'un amorçage important était présent dans des conditions de présentation comparables lorsque les participants n'effectuaient que des évaluations perceptuelles de la longueur. Ces résultats donnent à penser que l'amorçage sémantique affecte principalement la représentation de la longueur de la ligne, et non la planification ou le contrôle du mouvement.

Mots-clés : contrôle moteur, amorçage sémantique, action.

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