

Responding to the source of stimulation

An interdisciplinary conference
in tribute to J. Richard Simon

October 10th – 12th, 2008

Iowa City

Simon Fest

Sponsored by

The Perry A. and Helen Judy Bond Fund for Interdisciplinary Interaction,
The College of Liberal Arts and Sciences, The University of Iowa

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Friday	Meeting Room A	Hotel Vétro
3:30 pm	coffee hour	
4:30 pm	J. Toby Mordkoff & Eliot Hazeltine - University of Iowa Welcome	
4:45 pm	Robert Proctor - Purdue University <i>Playing the Simon game</i>	
Saturday	Room 101	Biology Building East
9:30 am	Raymond Klein & Jason Ivanoff - Dalhousie University <i>The components of visual orienting and the ubiquitous Simon Effect</i>	
10:05 am	Wim Notebaert - Ghent University <i>Attention and control in the Simon Task</i>	
break		
10:55 am	Kim-Phuong Vu - California State University, Longbeach <i>Influence of Practiced Spatial Mappings on Simon Effect</i>	
11:30 am	Peter Urcuioli - Purdue University <i>The Pigeon as Realtor: Location! Location! Location!</i>	
lunch		
1:15 pm	Cathleen Moore - University of Iowa <i>Using the Simon Effect to measure inattentive processing</i>	
1:40 pm	Dan Weiss - Pennsylvania State University <i>Simon says: General cognitive processes related to word segmentation abilities</i>	
break		
2:30 pm	Boris Burle - Université de Provence <i>Electrophysiological investigation of the Simon Effect: From automatic response activation to incorrect response inhibition</i>	
3:05 pm	Hartmut Leuthold - Glasgow University <i>Electrophysiology of the Simon Effect: From response competition to control</i>	
break		
4:00 pm	Bernhard Hommel - Leiden University <i>The Simon Effect as a window into human cognition and action</i>	
Sunday	Meeting Room A	Hotel Vétro
9:30 am	J. Toby Mordkoff - University of Iowa <i>Our hands were forced: New issues in four-choice as compared with two-choice Simon Tasks</i>	
10:05 am	Eliot Hazeltine - University of Iowa <i>Simple Simon: Examining conflict adaptation and repetition of stimulus features with two-choice tasks</i>	

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Robert Proctor - Purdue University

Playing the Simon game

My talk starts with a historical overview of research on stimulus-response compatibility in general and the Simon Effect in particular. I discuss how I came to be involved in research on the Simon Effect, beginning with Simon's (1990) review chapter. I then describe several contemporary variations of the Simon Task, with an emphasis on results of research conducted in my lab. The talk concludes with a summary of knowledge about human information processing that has been gained from the Simon Task and its variants.

Raymond Klein and Jason Ivanoff - Dalhousie University

The components of visual orienting and the ubiquitous Simon Effect

Spatial responding is influenced by the degree of correspondence between the stimulus-response (S-R) code activated by the target's task-irrelevant location and the S-R code activated by the target's non-spatial, task-relevant feature. A generally accepted explanation of this "Simon Effect," named after its discoverer, is that there is a natural tendency to respond towards the source of stimulation. First we will review the ubiquity of the Simon Effect. Then we will review the literature, including our own studies when appropriate, that has explored (intentionally or incidentally) the relationship between the Simon Effect and attentional orienting. When attention is allocated endogenously, or is captured exogenously by uninformative peripheral stimulation, the Simon Effect is additive with attentional facilitation (i.e., the Simon Effect is the same magnitude for targets presented at attended and unattended locations). Yet, some forms of orienting, such as orienting directed by gaze and inhibition of return, modulate the Simon Effect. We will explore the implications of these patterns of additivity and interaction for our understanding of both the Simon Effect and spatial attention.

Wim Notebaert - Ghent University

Attention and control in the Simon Task

The Simon Effect is often considered to reflect an automatic tendency to react towards the source of stimulation. Several researchers therefore investigated the influence of attention shifts towards the irrelevant stimulus location. We performed sequential analyses on Simon Tasks with short and long response-stimulus intervals (RSI). In conditions with short RSI, we observed a Simon Effect only for location alternations, in conditions with long RSI, we observed a Simon Effect for location repetitions and alternations, in line with an attention-shift account. In follow-up experiments, however, we reported similar sequential effects in Stroop and flanker tasks and explained the effects in terms of more general attentional mechanisms. More recently, we demonstrated a larger Simon Effect when the relevant dimension was orientation rather than shape or color. This effect is also interpreted in terms of attention that is directed towards the spatial dimension in the orientation task. In general, we conclude that the Simon Effect depends on attention to the irrelevant spatial information. Moreover, we also demonstrate that cognitive control processes modulate the amount of attention that is reserved for processing irrelevant spatial information. Our data indicate that the Simon Effect, as any other congruency effect, depends on attention and control, which is not in line with presumed automatic response priming.

Kim-Phuong Vu - California State University, Longbeach

Influence of Practiced Spatial Mappings on Simon Effect

The Simon Effect is often attributed to activation of long-term stimulus-response associations that are overlearned or innate. These long-term associations are typically considered to be robust and not easy to over-ride. However, there has been a line of research showing that practice with an incompatible spatial mapping can eliminate or reverse the Simon Effect in a subsequent transfer session. It has been suggested that the elimination of the Simon Effect after practicing with an incompatible location-relevant mapping is due to the prior task-defined associations continuing to influence performance. This talk will focus on the nature of the transferred associations as well as their impact on the Simon Effect.

Peter Urquioli - Purdue University

The Pigeon as Realtor: Location! Location! Location!

Another vertebrate animal besides humans, the pigeon, also responds more quickly to a spatial-response cue when it appears at the same location as the required (reinforced) response than when it appears at the opposite location. This latency difference occurs across a variety of training conditions and is not simply a consequence of higher reinforcement probabilities for correct responses to the former, corresponding-trial stimuli. In fact, pigeons' accuracies are typically lower on corresponding than on non-corresponding trials, which should bias latencies in favor of the latter. The fact that it doesn't attest to the orienting power of stimulus location in producing the Simon Effect.

Cathleen Moore - University of Iowa

Using the Simon Effect to measure inattentive processing

To what extent is unattended information processed? To answer this question, one cannot simply ask observers to report various aspects of unattended information. This procedure would draw attention to the (no longer) unattended information. Our lab has assessed inattentive processing using indirect online measures of specific processes. We look for effects that could have occurred only if some particular process had occurred. To the extent that the effect manifests, one can conclude that the process occurred without asking about the unattended stimuli directly. Early work using this method asked questions about perceptual processes, and confirmed that although observers had no explicit memory of the unattended information, they nonetheless organized the information on the basis of surface similarity (i.e., Gestalt grouping). We also confirmed that surface representations are formed from discontinuous regions of the retinal image despite observers showing no evidence of having been aware of these surfaces. We then used the Simon Effect to assess whether unattended information is processed all the way to the level of activating associated responses. Irrelevant visual stimuli were presented to the left or to the right of a letter stimulus that indicated a left or right response. A standard accessory Simon effect occurred. However, this effect occurred only after attention had been drawn to these stimuli by requiring observers to report on what side the square had appeared. Thus, although unattended stimuli are processed to a great extent perceptually, there is no evidence that they are categorized to the level of response association.

Dan Weiss - Pennsylvania State University

Simon says: General cognitive processes related to word segmentation abilities

The process of word segmentation is adaptive, with many strategies potentially available to learners. We explored how segmentation cues interact, and whether successful resolution of cue competitions may be related to general executive functioning as tested by the Simon Task. Adult participants listened to artificial speech streams that contained both statistical and pause-defined cues to word boundaries. When these cues "collided" (indicating different locations for word boundaries), cue strength appeared to dictate the predominant parsing strategy. However, when cues were relatively equal in strength, the ability to consistently deploy a segmentation strategy significantly correlated with stronger performance on the Simon Task, a non-linguistic cognitive task typically thought to involve executive processes such as inhibitory control and selective attention. Our results extend our understanding of speech segmentation by demonstrating that cue strength alone can modulate segmentation strategies and that general information processing strategies may play a role in solving one of the early challenges for language learners.

Boris Burle - Université de Provence

Electrophysiological investigation of the Simon Effect: From automatic response activation to incorrect response inhibition

It is largely admitted that the location of a lateralized stimulus, even irrelevant, "automatically" activates the ipsilateral response thus giving rise to the so-called Simon Effect. More recently, inhibitory processes have been proposed to play an essential role in the regulation of such interference. We have investigated activation and inhibition components of the task, thanks to both detailed behavioral analyses and electrophysiological indices. Electromyographic (EMG) analysis allowed us to study directly response activation, through the observation of "partial errors", that is small EMG activation, too small to trigger a mechanical response, occurring on the muscles involved in the incorrect response. At a more central level, electromyographic (EEG) activities reveal the subtle interplay between response activation and inhibition to regulate interference.

Hartmut Leuthold - Glasgow University

Electrophysiology of the Simon Effect: From response competition to control

I will discuss the role of event-related brain potentials (ERPs) in advancing our understanding of the mechanisms underlying the Simon Effect. Initial ERP examinations were mainly concerned with the serial organization of processing stages in the Simon Task. This mental-chronometric approach was much advanced by studies employing the lateralized readiness potential (LRP), an online index of selective motor activation within the primary cortex. LRP studies provided strong support for models that explain the Simon Effect in terms of two parallel S-R processing routes, that is, an unconditional route, which automatically activates the response that spatially corresponds to stimulus location, and a conditional route within which the appropriate response is intentionally selected and then activated. Importantly, we showed that the Simon Effect is reduced if the preceding trial is non-corresponding compared to corresponding and that, as indicated by the LRP, this adaptation effect has its origin at the level of motor activation. Consistent with cognitive control theory, we explained the sequential modulation of the Simon Effect by assuming that unconditional S-R processing is under the control of an ancillary response monitoring mechanism. Additional electrophysiological evidence provided direct support for this view of a dedicated monitoring system. I will close by outlining possible future avenues towards more comprehensively studying the brain mechanisms underlying the Simon Effect.

Bernhard Hommel - Leiden University

The Simon Effect as a window into human cognition and action

On its 41th anniversary the Simon Effect can look back at a long and varied history. First treated as a curious observation with implications for human factors research, it slowly evolved not only into a valuable target of psychological theorizing itself but also into a handy means to investigate attentional operations, the representation of space and of one's body, the cognitive representation of intentional action, and executive control. In fact, in several research areas the Simon effect outcompeted apparently related phenomena with an honorable history of their own, like the Stroop Effect or the Flanker Effect, and it did so for good methodological and theoretical reasons. I will provide an overview of the major lines of research, theoretical developments, and ongoing controversies on and around the Simon Effect.

J. Toby Mordkoff - University of Iowa

Our hands were forced: New issues in four-choice as compared with two-choice Simon Tasks

One of the great attractions of the Simon Effect is its simplicity and tractability; historically, the effect is most often demonstrated in two-choice tasks with a total of only four different specific trials. Unfortunately, recent interest in the dependence of the Simon Effect on the specifics of the preceding trial have forced researchers to employ much more complicated designs – viz., four-choice tasks with 16 different trials. The reason that this is unfortunate, albeit quite understandable, is that the switch from two-choice to four-choice raises many new issues. I will argue that several of these issues require more attention before work concerning inter-trial influences on the Simon Effect can proceed using four-choice tasks.

Eliot Hazeltine - University of Iowa

Simple Simon: Examining conflict adaptation and repetition of stimulus features with two-choice tasks

Simon Tasks require subjects to respond to the identity of a stimulus whose possible locations correspond to the possible response locations. These simple task demands produce remarkably rich sets of behavioral effects, including the Simon Effect. Moreover, four-choice Simon tasks typically produce distinct and even more complex patterns of data than two-choice Simon tasks, suggesting that they involve additional operations. Therefore, we examined sequential effects with a set of two-choice tasks that maintained many of the symmetries of the basic Simon Tasks. The three tasks used two stimuli (X and O) in two irrelevant locations (left and right) that required two responses (left and right). Because the same stimulus did not always require the same response in two of the tasks, they allowed for conflict adaptation to be manipulated independently from repetition benefits. The results indicated that conflict adaptation can be observed in two-choice tasks independently of repetition benefits. Furthermore, the responses appeared to be bound to the stimuli, even when the responses were not associated with particular stimuli. Finally, the fading of the Simon Effect was observed in all three tasks and appeared to follow similar time-courses. However, previously incongruent trials did not change the direction or magnitude of the fading. These findings suggest several independent processes shape RT during two-choice Simon Tasks.