The appeal of invoking inhibitory processes to explain successful cognitive and behavioral performance in a variety of domains becomes readily apparent when one considers a situation such as the following: Subjects are presented with multiple stimuli, and are required to respond to one of them while not responding to the others. Furthermore, at least one of the unselected stimuli has a strong automatic response associated with it or has recently been a target item itself. The ability to specifically inhibit the processing of the nontarget items in that context, or at least their access to response mechanisms, would seemingly allow for a degree of flexibility in behavioral and cognitive control that might otherwise be difficult, although not impossible, to achieve.

Appealing to inhibition to resolve such conflict is not a new theoretical insight: Inhibitory mechanisms were invoked to explain how we are sometimes able to exert voluntary control over involuntary behaviors well over a century ago (Sechenov, 1965), and early accounts of selective attention were often couched in terms of inhibition as well as facilitation (Pillsbury, 1908). However, systematic research into the actual contributions of inhibitory processes was relatively sparse for many decades after that.

That clearly is no longer the case. In recent years, the possible contributions of inhibitory processes to cognitive and behavioral performance have received extensive scrutiny. This interest was sparked in part by demonstrations of the apparent role of inhibition in a number of seemingly tractable experimental paradigms (Dagenbach & Carr, 1994; Dempster & Brainerd, 1995), the development of a theoretical perspective in which the development and decline of inhibition provided a basis for explaining important aspects of cognitive development (Dempster, 1991, 1992; Harnisfeger & Bjorklund, 1993; Hasher & Zacks, 1988), and the linkage of inhibition to specific neural regions (Fuster, 1998). Not surprisingly, the extensive ensuing research has
changed our understanding of the role of inhibition. In some cases, this research has borne out
the importance of inhibitory processes, but in other cases the role of inhibitory processes is either
in doubt or less straightforward than it once seemed. Thus, this seems to be a good point in time
to take stock of the role of inhibitory processes in memory.

What Constitutes Inhibition?

One fundamental challenge is determining whether inhibition is really necessary to explain the
observed data. Inhibition is frequently invoked to explain successful performance in the face of
potential interference. Thus, successfully naming the color of ink and ignoring the word name in
the color word Stroop task might be explained in terms of inhibiting the reading pathway
(MacLeod, 1991). Correspondingly, deficits in inhibition may be invoked to explain observed
interference such as the greater susceptibility of older adults to misremember an erroneous
interpretation of a story that was set up by the initial sentences but disconfirmed in subsequent
text (Hartman & Hasher, 1991). However, as noted below, alternative mechanisms to inhibition
for overcoming interference must be considered, so observing either successful or unsuccessful
resolution of interference does not by itself constitute evidence for inhibition. A stronger case
would seem to exist when inhibition is invoked to explain slower or less accurate processing of
information subsequent to its occurrence in a setting in which it had the potential to cause
interference.

The negative priming paradigm provides a good illustration of this. In a typical negative
priming experiment, a target and distractor appear simultaneously, either adjacent to or
overlapping with each other. The target is generally designated by some salient quality such as
color. Effective responding on a given trial requires processing the target, and not the distractor
item. A hint to how this is achieved is provided by trials in which the ignored distractor becomes
the target item on the subsequent trial. In such cases, responding is actually slower -- hence the
term negative priming. One interpretation of this effect invokes inhibition, assuming that the
slowed responding reflects the lingering consequences of active suppression of the item’s
representation from the previous trial on which it was the distractor (Tipper, 1985).

Although the negative priming paradigm may provide an example of inhibition following
an item’s occurrence in a situation in which it had the potential to cause interference, this
interpretation has been contested. An alternative episodic retrieval account of negative priming
has been proposed that suggests it stems from the retrieval of a “don’t respond” tag attached that
is attached to the distractor on trial $n$. That tag is automatically retrieved when the distractor is
the target item on trial $n + 1$, and results in the observed slower responding (Neill, Terry, &
Valdes, 1994). One might conceive of this as a form of representational inhibition (Henik & Carr,
in press), but it clearly is quite removed from the simple suppression account of inhibition
suggested by many cognitive models.