CHAPTER 14

Why the Mind Wanders

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The essential achievement of the will . . . is to attend to a difficult object and hold it fast before the mind.

—William James, *Principles of Psychology* (1890, p. 266)

The mind wanders. Ideally, it does not wander so far that it forgets it is reading this chapter. But consciousness does have an inevitable drift, changing its contents moment by moment. The focus seems to move relentlessly, shimmering and fidgeting no matter how hard we may try to concentrate on a thought, preserve an image, or otherwise freeze the instant. Not only does it seem quite impossible to hold a particular thought or percept fully in mind for an indefinite period, it also seems futile to attempt to keep consciousness away from a chosen target by fixing our minds on something else. Consciousness simply cannot hold itself still.

The persistent flow of consciousness prompted James (1890) to use the descriptive metaphor of a "stream," and this quality has been recognized by contemporary commentators as one of the key phenomena of consciousness that must be explained (e.g., Baars, 1988; Johnson-Laird, 1988). Why, after all, must it be like this? Why can't we just push the psychological equivalent of a "still frame" button on a videotape recorder and stop all this wriggling and hopping about? The purpose of this chapter is to suggest a theoretical framework within which the necessity of a wandering consciousness is made clear, and through which predictions can be made about where the mind will wander. In this framework, the constant metamorphosis of consciousness turns

out to be a natural product of the mechanism that allows consciousness to control itself.

First, the chapter considers several explanations of the wandering mind, with a view toward clarifying what it is that must be explained and what prior explanations have contributed. Then, mechanisms of the self-control of consciousness are explored from the perspective of the theory of *ironic processes of mental control* (Wegner, 1994). The implications of this theory are traced for the way that wandering happens in two forms of the intentional fixation of consciousness—intentional concentration and intentional thought suppression—and evidence is offered from laboratory studies of these cases. This discussion leads to a consideration of the peculiar fact that wandering typically moves against our attempts to control consciousness, not just in random directions. The chapter concludes with a consideration of brain functions in these processes. Mindwandering, as becomes evident, is a conscious manifestation of contrary unconscious processes created when we attempt to control the direction of consciousness.

PERSPECTIVES ON MENTAL WANDERING

There is no shortage of observations by psychologists that the mind does wander (see, e.g., Bills, 1931; Giambra, 1991; Vallacher & Nowak, 1994). James (1890, Vol. 2, p. 421) remarked forcefully that *"no one can possibly attend continuously to an object that does not change,"* and offered an account of this that was already traditional and widely accepted in his era (cf. Carpenter, 1875). He held that attention has both voluntary and involuntary manifestations, and that any voluntary or willful direction of the mind could be overcome by the powerful and involuntary attraction of attention by other objects. This approach suggests that each movement of attention can be chalked up alternatively to voluntary mental control or to involuntary environmental guidance.

The environment does guide the mind quite effectively, as one can easily attest in viewing a stirring film or listening to an absorbing piece of music. These instances were appreciated by James as objects that do change, and it is no doubt true that many cases of mental movement occur as the result of the guidance of mind by changing stimulation. The mind can wander even from these attractions, however, suggesting that the distinction between voluntary and involuntary attraction of attention can even be applied to changing stimulation. The Jamesian account would suggest that voluntary control of attention is simply incomplete, and so can be overridden by involuntary forces whether attention is being focused voluntarily on some stationary object or has been voluntarily attached to some moving environmental event. This perspective leaves open the question of what it is that creates the regular

involuntary movement of attention, short of saying that certain objects are just more naturally attractive than anything to which we might voluntarily attend.

The Jamesian approach thus accounts for what draws attention, but fails to account for why attention must be drawn every few moments. It does not explain why voluntary attention is so perpetually weak in the face of involuntary attention. It seems plausible, for example, that in a sufficiently boring environment the frequency of involuntary attractions could be reduced to any arbitrarily low level, and as a result, voluntary consciousness could be made to fix steadily for lengthy periods of time. This is not, however, what happens. In conditions of slightly reduced sensory input, the mind continues to wander, often with greater vigor than during normal input (e.g., Klinger, 1978; Pope, 1978). Even when sensory stimulation is almost fully obstructed during sleep, wandering continues in the form of dreaming. Indeed, dreaming is such raucous wandering that it begins to seem that the environment is more of a help in the prevention of wandering than the culprit behind it (Hobson, 1988). Wandering is not just the result of weakness of will in the face of absorbing environmental stimulation, but rather is compelled somehow, perhaps even required, by the architecture of the mind.

If the processes of mind dictate wandering, then useful purposes might be served. It is possible, for example, that wandering might be built into the functioning of consciousness as a means of preventing debilitating habituation. In suggesting this possibility, Baars (1988) noted that the wandering of consciousness could serve the same sort of purpose that physiological nystagmus or eye tremor serves in keeping the sensors of the eye fresh and sensitive to experience. Just as redundant stimulation leads to habituation of sensory structures, redundancy in conscious experience might lead to the habituation of consciousness and so to insensitivity. Effects such as semantic satiation (Amster, 1964; the tendency of a word frequently repeated to seem different or somehow meaningless) and repetition blindness (Kanwisher & Potter, 1990; the tendency not to detect or recall repetitions of words in rapid serial presentation) suggest that habituation could be a danger not only at neural or sensory levels but also at semantic or conceptual levels of conscious experience. In other words, perhaps the mind wanders to keep it from getting weary with monotony.

This sort of functional, teleological explanation of wandering is not fully satisfying, however, because it offers no suggestion of a mechanism whereby wandering is achieved. Like postulating that the mind wanders because of a need for variety or simply because it is alive, the habituation–prevention theory does not allow prediction of the course of wandering. Baars (1988, p. 205) made an effort in this direction by proposing a model that traces conscious wandering to certain nonconscious processors that stop being interested in the conscious contents. But this is an explanation of conscious wandering in terms of the wandering of something else, and the wandering of these lower

level units then begs for explanation. Although understanding wandering as "refreshment" of the system may still be useful (see Vallacher & Nowak, 1994), this approach has not yet engendered a causal theory.

One step toward a causal theory of mindwandering is suggested in the work of Jonides (1981). He presented subjects with arrows in various parts of the visual field as a means of directing their attention and found that peripheral arrows are processed more automatically than central ones. That is, when given instructions to ignore an attention-directing cue, subjects were able to comply when the cue appeared in the center of the display, but they were less able to do so when the cue appeared in the periphery. This suggests that the mind may wander because things that are not in its focus are inevitably more compelling than those in its focus. The evidence provided by Jonides pertains only to visual attention, of course, and it does not suggest why items on the periphery might be more likely to draw attention automatically than those in the center of the mind. But this finding provides a good hint, which is carried further in the theory of ironic processes of mental control (Wegner, 1994).

WANDERING AS IRONY

The mind wanders when we want to control it. The peculiar next step that the ironic process theory suggests is that the mind wanders as the result of our attempts to control it. Although this assertion may sound suspiciously like an Eastern religious insight into the achievement of mental peace (see Taylor, 1978), it arises from a decidedly Western scientific analysis of the self-control of mental states.

The theory begins with the supposition that consciousness can control itself. It is the nature of this control that conscious preferences for mental states that appear in mind at one time (e.g., preferences to concentrate on something, to avoid thinking about a painful sensation, to get into a better mood, etc.) can function to create those preferred states at a subsequent time. This much has been surmised in a number of theories of the self-control of consciousness (e.g., Carver & Scheier, 1982; Logan, 1985; Uleman, 1989; Wegner, 1989), and the ability of consciousness to control itself has been mentioned as one of its defining features (Lefebvre-Pinard, 1982; Oatley, 1988; Umiltà, 1988). Indeed, there is a growing research literature suggesting that mental control is a useful construct for understanding many domains of psychology (Wegner & Pennebaker, 1993).

The ironic process theory offers the idea that each instance of mental control is implemented through the production of a control system that consists of two processes. These include an *intentional operating process* that searches for mental contents yielding the desired state, and an *ironic monitoring process* that searches for mental contents signaling the failure to achieve the de-

sired state. The control of anything involves changing it to a certain criterion, after all, and processes are thus needed to provide both the change and the assessment of progress in reaching the criterion. The two processes suggested here thus resemble the "operate" and "test" units traditionally included as components of control systems (Miller, Galanter, & Pribram, 1960; Powers, 1973) or production systems (Newell & Simon, 1972).

The intentional operating process is what we sense as our conscious activity when we exert mental control. Imagine, for example, deciding to attend to the period at the end of this sentence. The intentional operating process searches for the period. If we are not looking at the period, then the operating process is what finds the period; if we are looking at the period, then the operating process is the effortful attempt to continue looking at it and thinking about it. Such an operating process takes effort and remains in awareness during its operation. Thus, it has some of the properties normally associated with conscious or "controlled" mental processes (Bargh, 1984, 1989; Hasher & Zacks, 1979; Logan, 1988; Posner & Snyder, 1975; Shiffrin & Schneider, 1977). Because this operating process absorbs cognitive capacity, it is susceptible to interference from distraction and can easily be sidetracked or terminated. Fortunately, there is a monitoring process to keep track of this.

The ironic monitoring process is not normally sensed as part of the activity of mental control, as its functioning is unconscious and relatively less demanding of mental effort. In this sense, it resembles an automatic cognitive process (cf. Wegner, 1992). Unlike the intentional operating process, the monitor does not come and go over time with variations in the allocation of mental effort, and instead stands continually watchful of lapses in the intended control as long as the intention to engage in control is in effect. In the case of the intention to concentrate on the period at the end of this sentence, for instance, the monitor would search for any item that was not the period (e.g., noises in the next room, thoughts of lunch, etc.). The monitor searches for failures of control by examining preconscious mental contents arising from memory and/or sensation, and when items indicating failed control are found it restarts the operating process. In this way, the cyclic interplay of the operating and monitoring processes implements the intended control and we concentrate our attention on the dot.

The watchfulness of the monitor is also the source of ironic effects, however, and it is in this sense that the monitor is an *ironic* process. Because the monitor searches for potential mental contents that signal failure of mental control, it increases the accessibility of these contents to consciousness (cf. Higgins, 1989). Just like an externally encountered prime, the ironic monitor increases the likelihood that the primed content will enter the conscious mind and become available for report. In the usual functioning of the operating and monitoring processes, of course, the ironic monitor is relatively less effective than the conscious operator in introducing items to consciousness. The con-

scious operating process prevails by and large, and the ironic monitor primarily serves its watchdog function. So, we watch the dot for the most part, only occasionally to glance off or think of other things.

The ironic process theory suggests that the mind does not just *wander*, then, but rather that it is alternating between intentional and ironic contents. The intentional operating process and the ironic monitoring process both act to increase the accessibility of their associated search targets to consciousness, as both processes bring items from preconscious sources in memory and sensation into consciousness as part of their usual functioning. Each of them acts as a conduit of sorts between what could be conscious and what is conscious. When there is plentiful mental capacity, the intentional operating process can be very effective, and so will largely dominate consciousness with its output and balance any sensitivity produced by the monitor. The monitor runs continually once the intention to control the mind has been implemented, however, and for this reason it can create wanderings even when the operating process is performing well under conditions of full mental capacity. More commonly, however, it is when the operating process is undermined by other processes that also consume cognitive resources that the ironic monitoring process is uncovered to yield significant episodes of the ironic wandering of mind.

IRONIC WANDERING OF CONCENTRATION

If the mind wanders because of ironic processes, then it should be possible to enhance the wandering with the imposition of a very direct manipulation. When a distracter or cognitive load is imposed during concentration, the intentional operating process should be undermined and the ironic monitoring process should have relatively greater influence. With load, then, a person who is trying to concentrate should experience excessive wandering. Such wandering would not merely take the form of a reduction of processing of the target of concentration—although that should certainly happen as a result of interference with the intentional operating process. Wandering should also take the form of a relative release of the ironic monitor. Irrelevant items that are not the intended target of concentration, and are instead the focus of the ironic monitor, should become more accessible to consciousness as the result of the mental load.

In a way, the theory suggests that mental loads should produce a paradoxical state of mind in which unattended items are especially accessible. With a load, we should all be in the position of Alice in *Through the Looking Glass:* "The shop seemed to be full of all manner of curious things—but the oddest part of it all was that, whenever she looked hard at any shelf, to make out exactly what it had on it, that particular shelf was always quite empty, though the

others round it were crowded as full as they could hold" (Carroll, 1982, 1872, p. 175).

One test of whether such a state of mind might be induced experimentally was made by Wegner and Erber (1991), who invited subjects to study a map containing the names of 40 unfamiliar African cities. Subjects were asked to concentrate their attention on half the cities (e.g., those highlighted in yellow on the map) and not on the other half (highlighted in blue) because a later test would ostensibly cover only the yellow ones. During the study period, cognitive load was varied in that some subjects were given a 9-digit number to hold in mind and recall at the end of their studying, whereas others were given no number. After studying and then spending some time on a filler task, all subjects completed a recognition test for the entire map in which they were to indicate on a list whether each of the cities (as well as 40 other ones) had appeared on the map.

The obvious expectation for this study was that cognitive load would reduce memory for the cities that were the target of concentration, and this was indeed found. Subjects under load who were concentrating on the highlighted cities recognized them less well (by a recognition index of hits minus false alarms) than did those with no load. The less obvious but more specifically ironic effect was also observed: Subjects under load who were concentrating on the highlighted cities later recognized more of the other set of cities than did those who were not under load (see Fig. 14.1). This could be explained by suggesting that the load manipulation undermined the operating process, and
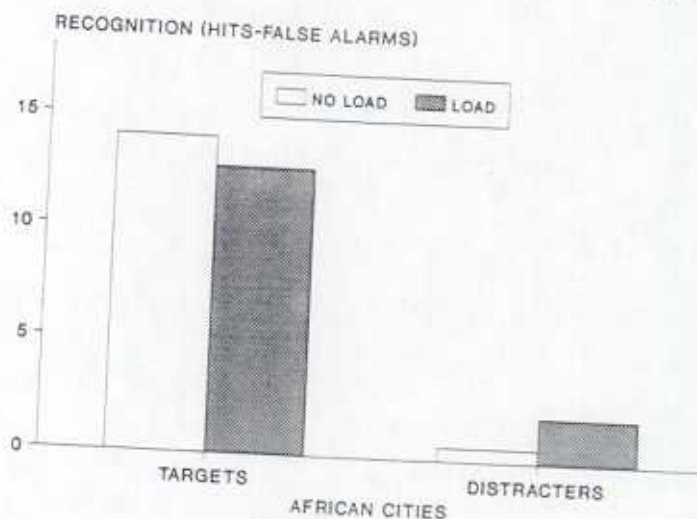

FIG. 14.1. Recognition of target and nontarget items following study with or without mental load. Based on data from Wegner and Erber (1991).

thus allowed the monitoring process to come forward and produce the ironic effect. Subjects trying to concentrate under mental load, in other words, ended up memorizing the distracters.

Zukier and Hagen (1978) reported a parallel result in their study of the effects of distraction on learning in children. In their research, distracting conditions were found to enhance recall of incidental information while reducing recall of task-relevant information. These studies lend some credence to the insight offered by one of my students on the irony of concentration in cramming for an exam. He noted that when he arrived at an exam with "just a few last things to look over" in the stressful moments before the test, he ended up not only failing to concentrate on the items, but unfortunately, hearing with near superhuman acuity all the conversations going on at each side. It may well be that the intention to concentrate creates conditions under which mental load enhances the monitoring of irrelevancies.

Taken together, however, these studies do not substantiate this contention very effectively. Specifically, they fail to rule out the possibility that subjects under load or distraction simply forget the task instructions and so attend more often to irrelevant items. It could be, after all, that distractions muddy the distinction between to-be-attended and to-be-ignored items, and greater processing of the to-be-ignored items enhances memory for them. It is still remarkable in some sense that adding a memory load can increase subjects' memory for anything, especially incidental items, but it is not clear that these findings necessitate postulating an ironic monitoring process.

Stronger evidence for the ironic monitoring view of concentration comes from research on the automatic accessibility of concentration targets in the Stroop (1935) interference paradigm (Wegner, Erber, & Zanakos, 1993, Exp. 2). In this study, subjects were asked to imagine a personal episode that resulted in a success or a failure, and to write 5 to 6 sentences about it in a 5-min period. Then, they were asked to spend another 5-min period either thinking about that episode or trying not to think about it. As they continued to follow this instruction, all subjects then performed a Stroop task at a computer monitor, responding with different keypresses to signal whether words appearing on the screen were in red or blue. In addition, as a manipulation of cognitive load, prior to each word presentation either a 5-digit or a 2-digit number appeared on the screen for the subject to remember during the trial and report aloud afterward. The words appearing on the screen included 8 occurrences of the target ("success" or "failure") embedded with 64 nontarget words unrelated to success or failure.

Now as a rule, the latency to name colors in this situation is interpreted as a sign of cognitive accessibility of the meaning of the word. Just as one might hesitate ever so slightly in color naming if one's own name appeared as the word on the screen, one hesitates in naming the color of other words that are highly accessible. The ironic process prediction for the "think" condition in
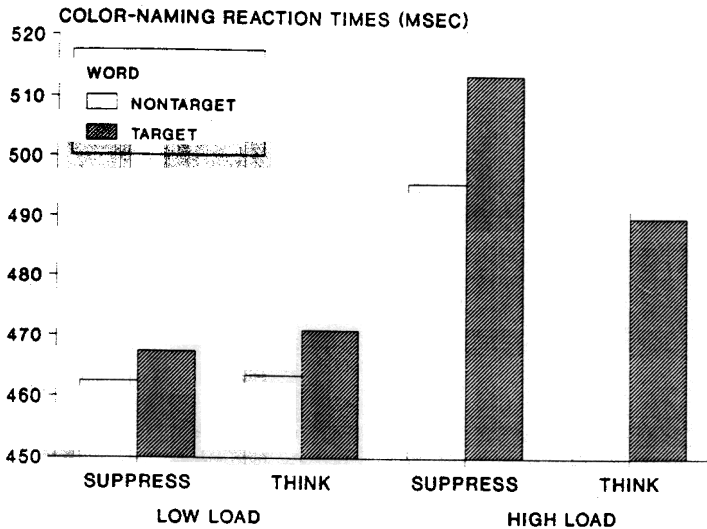
FIG. 14.2.   Color-naming reaction times (msec) for target and nontarget words during instructions to suppress or to think about the target under high or load mental load. Based on data from Wegner, Erber, and Zanakos (1993). ©1993 by American Psychological Association.

this experiment, then, is that subjects trying to think of their target who are given a high cognitive load should show greater accessibility of nontarget words than target words. As shown in Figure 14.2, this is exactly what was found. This difference was not observed under conditions of low cognitive load, or under conditions of thought suppression. It appears, then, that the attempt to concentrate on a target increases the person's sensitivity to anything that is not the target. This finding is not susceptible to the argument noted for the earlier studies—that load simply makes people forget the task, as in this case it was found that interference for nontarget words was significantly greater than for target words. A task-forgetting interpretation would only predict parity for these conditions.

The results for thought suppression in this study are also remarkable. This research indicates that trying not to think about something can increase the accessibility of that target to consciousness under conditions of cognitive load. This is, of course, another prediction of the ironic process theory. When one tries to suppress a thought, the intentional operating process is turned to the task of searching for distracters. The ironic monitor, in contrast, is aimed to search for the target because it is the target's appearance that indicates failed mental control. With load, then, the suppression target should become highly accessible. The prediction of the theory is that the suppression of a thought

under conditions of mental load should increase the accessibility of the thought, even beyond the accessibility of that thought given concentrated attention. This odd result of thought suppression was examined in the studies discussed next.

IRONIC WANDERING OF SUPPRESSION

The mind wanders, not just away from where we aim it, but also toward what we forbid it to explore. In fact, it is in the case of suppression that the ironic failure of mental control is especially evident to the would-be controller. The failure to suppress the thought of a white bear, for example, is announced by the ironic monitor whenever a single search target is encountered—the white bear. This target is thus made relatively more accessible by the ironic monitor in suppression than are any of the wide array of nontargets that are each only slightly highlighted by the ironic monitor in concentration. The ironic monitor in suppression is applied to a relatively smaller range of search targets, making the search more effective (cf. Newman, Wolff, & Hearst, 1980; Sternberg, 1966). And, the ironic monitor in suppression is aimed at a cue that serves as an obvious reminder of the needed operation—the unwanted thought; this should make the monitor more effective as well.

The upshot of this reasoning is that suppression should produce strong ironic effects, measurable as the increased accessibility of the suppressed thoughts to consciousness. This has been observed in a variety of formats, beginning with the finding that suppressed thoughts recur frequently in stream-of-consciousness reports (Wegner, Schneider, Carter, & White, 1987). Similar observations have been made without a reporting requirement. When subjects are asked to suppress thoughts that are exciting (say, of sex), they show skin conductance level (SCL) reactivity rivaling the strength of reactions that occur when they are asked explicitly to entertain those thoughts (Wegner, Shortt, Blake, & Page, 1990). Evidence from a range of studies in which subjects are asked to suppress many different kinds of thoughts indicate that this manipulation dramatically increases the ease with which these thoughts are subsequently brought to mind (see Wegner, 1989, 1992).

Wegner and Erber (1992) termed this the *hyperaccessibility* of suppressed thoughts. In their first experiment, mental load was manipulated by imposing time pressure on subjects' word association responses. The subjects were asked to think or not to think about a target word (e.g., *house*), and over several trials their tendency to respond associatively with that target word to related prompts (e.g., *home*) and unrelated prompts (e.g., *adult*) was observed. Suppressing subjects who were under time pressure to report associates responded often with the target word to target-relevant prompts—blurting out the very word they had been trying not to think about. They did this more

often than did suppressing subjects who were not under time pressure to give their associations. This high level of access was termed *hyperaccessibility* because suppression with time pressure even boosted responses of the target word to target-relevant prompts over the level of subjects under time pressure who were actively trying to think about the target.

This observation of hyperaccessibility can be attributed to the operation of ironic processes in both the suppression and concentration conditions. For subjects performing suppression, time pressure undermines the effortful operating process that looks for distracters, releasing the relatively less effortful ironic monitor to sensitize the person to the unwanted thought. For subjects performing concentration, time pressure undermines the effortful operating process that looks for the target thought, releasing the ironic monitor to sensitize the person to distracters. Thoughts suppressed under load thus enhance accessibility beyond that of thoughts concentrated on under load, so to increase the frequency of target associates in the suppression condition.

Wegner and Erber's (1992) second experiment tested the ironic process prediction in the Stroop interference paradigm, much as in the aforementioned study by Wegner et al. (1993). As in that study, subjects who were suppressing a target word (e.g., *house*) under high cognitive load showed interference with color naming when the target word appeared on the screen, as compared to nontarget words and as compared to target-related words (e.g., *home*). Subjects who were suppressing the target with low load, or who were concentrating on the target in either load condition, did not show evidence of differential interference. This study indicated, then, that suppressing a word during cognitive load promoted relatively effortless cognitive access to the target word. It seems that when the range of the ironic monitor is sharply focused by the intention to suppress, it is easy for a mental load to undo the intended operation and reveal the monitor's activity. This experiment did not show enhanced accessibility of nontargets during concentration that was found by Wegner et al. (1993). The arguments noted earlier do suggest that ironic effects of suppression should be stronger than ironic effects of concentration because the range of ironic search targets is smaller (see also Wegner, 1994). However, the theory predicts an ironic concentration effect here (at least a minor one), and its absence suggests that further inquiry is needed.

The overall conclusion suggested by this and other suppression research (Wegner, 1989, 1992) is that the suppression of thoughts is difficult. The mind wanders back to the suppressed thought repeatedly, apparently as a result of an ironic monitoring process that promotes the hyperaccessibility of the suppressed thought. These experiments suggest that it is only with enough mental capacity that suppression may be at least modestly effective. In other words, plentiful time and distraction may allow people to work themselves into the position of experiencing intrusions of their unwanted thoughts only very rarely. With the occurrence of mental loads or stresses, however, the

mind does not merely wander toward suppressed thoughts, it seems to lurch
back to them with a vengeance.

WANDERING INTO TRAFFIC

Ironic processes appear to make the mind go precisely where it does not want
to go. This may be why we often find that the very thing we do not want to say,
feel, think, or do comes forward to assert itself most obstinately when we are
distracted or distressed. The phenomena of Freudian slips that are precisely
the least appropriate thing to say in a given situation might also be explained
in this way (Baars, 1985). Cognitive busyness or time pressure could interfere
with many processes of self- presentation, deception, self-regulation, or self-
control that depend on mental control for their success, and so promote social
blunders, unintentional disclosures of deceit, or self-control lapses that are
not entirely random. Rather, because the most unwelcome mental states are
typically chosen as targets for suppression, and the most desired states are cho-
sen as the focus of concentration, ironic effects will expose us to the caprice
of our least desired states of mind.

There are a distressing number of such unwanted states, but a specific re-
search example may suffice to communicate the point here. This is the case
of trying not to be sexist (Wegner, Erber, & Bowman, 1994). Now, there is a
growing body of research on the idea that certain untoward expressions (such
as sexist, racist, or otherwise prejudiced remarks) may be subject to the op-
posing forces of automatic and controlled cognitive processes (see, e.g.,
Devine, 1989; Fiske, 1989; Perdue & Gurtman, 1990). Although prejudices
may be brought to mind as an automatic result of knowledge of a pejorative
stereotype, for example, it is believed that controlled cognitive processes typi-
cally will also come forward to counteract or undermine such expressions.
By this logic, everyone may be automatically prejudiced, but some fight it
through controlled processes and so express unprejudiced attitudes and be-
haviors. Bargh (1990) summarized this view by suggesting that "stereotype
and trait construct activation . . . can be *prevented* from influencing re-
sponses, given sufficient motivation and effort" (p. 95).

The ironic process framework would suggest, however, that the motivation
to be unprejudiced could well backfire if effort cannot be expended. If ironic
processes are engaged in the pursuit of the mental control of prejudice, it
might be that expressions of prejudice could occur merely because of the
monitoring process. The theory would predict, for example, that subjects
given the task of trying not to be sexist might even be especially inclined
toward sexist responses under conditions of cognitive load.

Wegner, Erber, and Bowman (1994, Exp. 2) encouraged one group of sub-
jects to try not to be sexist as the subjects completed a series of sentence

stems. Some of the stems prompted completions relevant to sexism, as they were derived from items on the *Attitudes Toward Women Scale* (*ATWS*, Spence & Helmreich, 1972). So, for instance, subjects heard someone say "Women who go out with lots of men are . . . ," and were asked to complete the sentence. An egalitarian completion might be something like "popular," whereas a sexist completion might be something like "cheap." Other subjects for comparison were given no special instruction on how to respond. For some sentence completions, mental load was imposed by asking for immediate responses; for others, mental load was reduced by allowing subjects up to 10 sec to respond. The frequency of responses rated as sexist by coders was examined in each condition.

As would be expected, the rate of sexist sentence completions under low load was indeed substantially reduced when subjects were admonished not to be sexist as compared to no instruction. But the rate of sexist completions was significantly increased by the instruction not to be sexist under conditions of high load. This result was observed for both male and female respondents, and it also did not differ between subjects who were high in sexist attitudes as measured by the ATWS and those who were low in such sexist attitudes. In short, the attempt not to be sexist under time pressure increased the likelihood that sexist comments would be made, regardless of the person's sex or attitudes toward women. It makes sense, then, that ironic processes might be responsible for some fair proportion of the daily errors we least intend, from sexist remarks to faux pas of every kind.

There is reason to believe that certain psychopathologies might be traceable to ironic processes working under similar conditions. An individual who dearly desires to gain some form of mental control over an undesired symptom, and who attempts to exert this control under conditions of cognitive load, is likely to create ironic effects that could be quite unexpected—and that could prompt further attempts at control that serve only to compound the problem. This analysis might be useful in understanding the conditions that produce obsessive thinking, anxiety disorders such as phobias or generalized anxiety, insomnia, depression, overeating, and posttraumatic stress disorders. In each of these instances, people are confronted with symptoms of some kind—recurrent thoughts, unpleasant emotions, inability to perform some desired behavior or avoid an undesired behavior—and they may choose, not unwisely it would seem, to try to control the occurrence of the symptom.

If such attempts to control symptoms occur under conditions of stress, fatigue, or other forms of mental load, then ironic processes could be unleashed. It is known that stresses can exacerbate many of these conditions (e.g., Jacobs & Nadel, 1985; Polivy, 1990). It makes sense that people might produce some fairly deviant unwanted states and actions if they thought they were only trying to help themselves, and so continued only to dig themselves deeper with continued control in the face of failure. This perspective may pro-

vide a useful way of understanding apparently paradoxical effects such as panic attacks induced among panic-prone individuals by the instruction to relax (Adler, Craske, & Barlow, 1987) or sleep induced in insomniacs by the instruction to stay awake (Turner & Ascher, 1979). Perhaps people with problems like these are already trying so hard to control themselves that additional inducements unleash ironic reversals of the control.

Ironic effects could eventually become the sources of new stress and mental load themselves, as when a person becomes highly anxious and preoccupied with a symptom such as insomnia, panic, overweight, or the like. When the ironic effect produces its own load, no amount of further effort aimed at gaining mental control would derail the system from its self-perpetuating ironic outcome. In essence, ironic processes could create a mind that wanders permanently toward some desperately unwanted state.

THE WAY THE MIND STOOD STILL

This suggestion of "permanent" wandering begins to sound suspiciously like stability. A mind that always wanders toward some particular state or constellation of thoughts is at least attracted to a stationary point, if not always resident at that point. The examples of extreme states such as obsession and phobia suggest that there may be some forms of mental fixedness that are afforded by the ironic process model.

Indeed, there are a number of circumstances in which the mind does not seem to wander. Although the focus of the chapter to this point has been on the seeming inevitability of wandering, the alert reader will probably have generated several potential counterexamples. What about cases of meditation or trance states in which people assert that their minds are empty or otherwise effectively stopped? What about the occurrence of mental "blanking" in which the mind seems to have no contents for a significant period of time? What about cases of "fixed ideas" or other obsessional states in which people do not seem to be able to avoid thinking about one thing for excessive intervals?

These cases appear to fall into two groups. First, there are instances when wandering may stop because mental control is not exerted. Second, there are instances when wandering ceases because ironic processes of mental control are in extreme effect due to the crippling of their complementary operating processes. Exceptions to the rule of wandering, in other words, occur without mental control or in opposition to mental control.

Consider the first of these options: The relaxation of mental control should diminish the pace of mindwandering, perhaps even to a standstill. Without any intention to control consciousness, there is no operating process and no monitoring process either, so the constant war between them that normally jiggles the focus of attention should not occur. The relaxation of wandering

should result when people have either relaxed control voluntarily or have become so fatigued or distracted that intentions to control the mind are not even formulated or implemented. It makes sense, then, that phenomenal descriptions of "going blank" are found among people using meditation techniques that involve specifically rescinding mental control (Taylor, 1978), as well as among depressed individuals who do not have the energy to exert mental control (Watts, MacLeod, & Morris, 1988). The peace of mind that comes from no more wandering may result from no more control.

The relaxation or repeal of mental control should not be confused with the exercise of control in the pursuit of a blank state of mind. Pennebaker (1993) asked a group of subjects to clear their minds completely for a period of 30 sec, for example, with the instruction that they make note each time they experienced any thought during this period. They reported a mean of 5.29 thoughts in this interval, and most indicated they never achieved anything akin to a state of empty-mindedness. A very few did report successful blanking, however, suggesting that they may have indeed suspended mental control. It would be interesting to learn what sort of mental translations or interpretations of the instructions were made by subjects who experienced these different outcomes, as this might allow a step toward the study of the intentional suspension of mental control and its associated ironic processes.

It is worthwhile to note in this regard that mindwandering appears to lessen with age. Giambra (1989) reported laboratory studies showing that older people are less inclined to experience "task- unrelated thoughts," and suggested by way of explanation that unconscious cognitive activity may decline with aging and so create fewer intrusions. There is also the possibility, though, that mental control is gradually suspended or reduced in vigor with age. With lessened energy devoted to concentration and/or suppression, older people may experience a release of sorts from the ironic processes that normally compel wandering. A reduction in the desire to concentrate may actually improve concentration.

The second way in which wandering stops, as already noted, involves individuals who have not relaxed control but instead have exerted control in such a way that their minds are invariably drawn to the same point. Although it is still fair to say that their minds are wandering, in the sense that they have no desire to keep returning to that attractive point, it does seem that they have achieved a certain sameness of consciousness, a fixed outlook that does not appear all that wonderful. The state of obsessive preoccupation or fixation on an idea, then, is the other escape from "free" wandering that can be produced by ironic processes. When people try suppressive forms of mental control, that target the avoidance of a thought, feeling, or action, they may find themselves returning so frequently to that target that they achieve a seemingly stable mental focus. The various psychopathologies mentioned earlier fit this model, as they all represent states of mind that are deeply unwanted by their hosts.

and are thus the target of constant suppression. To the degree that such recurrent suppression occurs in the presence of constant load, or creates its own mental load conditions, it produces a state of overcontrolled consciousness—an obsessive return to exactly that which the control is attempting to eliminate.

It is interesting to reflect, in this light, on the relation between mental control and the wandering of mind. It appears that mindwandering is a symptom, of sorts, indicating the ongoing operation of everyday mental control. We know the mind is being controlled with some modicum of success when it wanders from time to time. When it does not seem to wander, in contrast, this is a signal that mental control has either lapsed entirely, or that it has entered a hopeless and self-defeating feedback loop that leaves it spinning wildly only to undermine its own efforts. The mind that does not wander is the mind that does not control itself.

THE BRAIN WANDERS, TOO

As a final exercise for this chapter, it is worth examining physical evidence of the postulated processes. Do we know anything about the brain that would allow us to evaluate the ironic process model? Although brain research specifically aimed at testing this theory has not yet been conducted, there is psychophysiological and neuropsychological evidence pertinent to the theory that suggests its plausibility.

Perhaps the most sweeping proposition of the ironic process theory is that each attempt at mental control produces not only an active operating process but also an ironic monitor that searches for errors. It is thus noteworthy that recent studies of brain psychophysiology support the existence of a general error-monitoring system like this one. In particular, the analysis of human event-related brain potentials (ERPs) indicates a regular ERP associated with errors in reaction-time tasks (Gehring, Coles, Meyer, & Donchin, 1990). This error-related brain activity is observed shortly after the onset of electromyographic (EMG) activity in the muscles of the limb that is about to make the error, and it peaks about 100 msec following its onset. The error-related ERP takes the form of a sharp, negative-going deflection of up to 10 mV in amplitude and is largest at electrodes placed over the front and middle of the scalp. The response is enhanced when subjects strive for accurate performance, and is also related to attempts to compensate for the erroneous behavior. Such an ERP would make sense as an indicator of the proposed ironic monitoring process.

Neuropsychological findings also appear supportive of an ironic error monitor that can be disabled given certain patterns of damage to the brain. Luria

(1966) identified such a dysfunction among patients with massive lesions of the frontal lobes. The "frontal syndrome" he described amounted to a breakdown of voluntary activity accompanied by an inability to discern when actions are in error. He noted that a preponderance of cases of frontal lobe damage resulted in an inability to respond even to direct commands. A patient asked to squeeze a bulb repeatedly, for example, might squeeze a few times, after which the pressure of the squeeze gradually diminished. The patient might repeat verbally "yes, squeeze" on each trial without making any movement. In other patients, the movements transformed over trials into a series of related, uncontrolled movements, or the bulb is squeezed without stopping to the point that the patient must be instructed to let go. Luria noted that characteristically, a patient asked to "squeeze 3 times," for example, would later respond to queries on the instructions by saying "yes, I squeezed 3 times," even though there were actually 6 squeezes, or perhaps none at all.

More contemporary neuropsychological theorizing suggests that such a syndrome is part of a lapse in "frontal control" (Stuss & Benson, 1987) that may permeate several cognitive and memorial systems in frontal lobe pathology. A key feature of such failed control is the patient's unawareness of errors of action, a seeming obliviousness to even the most conspicuous mistakes. Beyond the "local" unawareness of a specific error, frontal syndrome patients may also exhibit a more "global" unawareness of the implications of their overall handicap (Zaidel, 1987). In one case, a patient "would sit idly for long periods of time. The only activities the patient initiated on his own were simple card games and backgammon. . . . [Yet] the patient had very little insight into his condition. He had been told about his professional activities and how successful he had been. . . . [Still, he] considered himself fully recovered and was unperturbed by the obvious incongruity between his premorbid status and his present situation" (Goldberg, Bilder, Hughes, Antin, & Mattis, 1989, p. 689).

The inability to appreciate the errors of intentional action is very much like what one would expect of a person deprived of an ironic monitoring system. The decision of whether this is an apt portrayal of the individuals who have frontal lobe damage must await further research. For now, it is worth noting that the lives of people deprived of error monitoring come to an abrupt standstill. Apart from the occasional movement produced as an automatic or habitual response to irrelevant stimuli, frontal syndrome patients live without doing anything. Certainly, there seems to be no wandering of the mind. These observations serve as a reminder that ironic monitoring has a fundamental role in consciousness and cognition. This chapter has cast ironic processes as villians in an erstwhile critique of the wandering mind, but such processes can also be understood as keys to the capacity of consciousness to move anywhere at all.

CONCLUSIONS

A reader who successfully finishes a chapter on the wandering of mind is to be congratulated. Just in case you glazed over at some point, here is a summary of what you missed: The wandering of the mind has classically been ascribed to the interest value of the wide variety of stimuli that impinge on it. With this approach, James and many others noted the involuntary character of much of mental life and have explained mindwandering as though our intentional mental control had little to do with it. A contrasting approach is offered by the ironic process model outlined in this chapter. This account includes among the involuntary forces that produce a wandering mind a special class of forces: the involuntary attractions of mind that occur as the result of the mind's monitoring of its own acts of control. This theory indicates that consciousness may be prone to wander when we try to hold it in place while we check to make sure it has not moved. In this checking, and particularly when our conscious mental energies are taxed, we inadvertently draw our minds toward precisely where they least intend to go. Our voluntary mental control becomes the culprit in our involuntary mindwandering.

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