CHAPTER 11

Normal and Pathological Consequences of Encountering Difficulties in Monitoring Progress toward Goals

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People pursue different goals. In an interview, we try to impress the interviewer. We study before an exam with the goal to understand and remember the study materials. We wash our hands to make them clean. But how do we know when to stop, and how do we know, in the process of goal pursuit, whether we need to exert more effort or may relax our effort? This chapter addresses these questions from the perspective of discrepancy-reduction models. We address difficulties in monitoring progress toward goals and discuss their antecedents and consequences. Finally, we propose to conceptualize obsessive–compulsive disorder as a pathology in monitoring goal progress and discuss its symptoms from that perspective.

We first review the basic components of the discrepancy-reduction process, and then discuss the motivational, emotional, and cognitive consequences of tight versus loose monitoring. We then turn to examine difficulties in monitoring: their antecedents (which goals are difficult to monitor) and consequences (possible strategies of coping with these difficulties).

Goal Pursuit via Discrepancy Reduction: An Overview

Lewin's Field Theory: Goals as Quasi-Needs

In Lewin's (1951) field theory, goals are viewed as quasi-needs. Like a need (e.g., hunger), a goal involves a discrepancy between an actual state and

a desired state, a discrepancy that creates tension that a person tries to reduce by fulfilling the goal. This tension is motivation, a force directed toward goal fulfillment. According to Lewin (1951), goal-related tension is also reflected in the cognitive system as a preoccupation with (and better memory for) an unfulfilled goal. Modern cognitive theories showed that, indeed, an active goal enhances the accessibility of goal-related constructs whereas fulfillment of the goal inhibits the accessibility of goal-related constructs (Förster, Liberman, & Higgins, 2005; Liberman, Förster, & Higgins, 2007; for a review see Förster, Liberman, & Friedman, 2007). Unfulfilled and failed goals from which a person does not disengage create rumination—repeated and often-intrusive thoughts about the incomplete goal (Martin, Tesser, & Cornell, 1996). For example, research on current concerns has shown that they often emerge in dreams (Klinger, 1996). We refer to this state of being preoccupied with and focused on a goal and feeling motivated and energized in relation to the goal as "motivational tension" (to be distinguished from anxiety, e.g., due to anticipating a negative outcome).

Cybernetic Models of Goal Pursuit: The Feedback Loop and the Metamonitoring Loop

Lewin's field theory (1951) suggested that people work toward closing the discrepancy between the current state and a desired end-state, but it did not specify the process of discrepancy detection and reduction. This process was elucidated later in cybernetic models of goal-driven (i.e., teleological) systems. Miller, Galanter, and Pribram (1960) describe goal-directed actions in terms of a test–operate–test–exit (TOTE) system (also termed the "principle of feedback control"), in which the current state is compared to a goal state, exits the loop if no discrepancy is detected, and operates to reduce the discrepancy if a discrepancy is detected, after which the test phase is repeated.

Carver and Scheier (1999) added to the TOTE model a metamonitoring feedback loop, which takes as input the rate of discrepancy reduction, compares it to a reference value, and signals a need to speed up or an option to slow down, depending on the outcome of the comparison. In this model, the metamonitoring loop produces emotion. An acceptable rate of discrepancy reduction enhances positive emotion, whereas an unacceptably low rate of discrepancy reduction produces negative emotion (see also Hsee & Abelson, 1991; Hsee, Abelson, & Salovey, 1991). This means that people feel good not only when they attain a goal (i.e., eliminate the discrepancy), but also when they believe that they are making good progress toward goal attainment, irrespective of the discrepancy from goal attainment. For example, when only starting to work toward a goal, the discrepancy to the

goal is relatively large, but rate of progress is high relative to the preengagement stage, and therefore the early stage of goal pursuit would be characterized by high spirits and positive affect. In contrast, attaining a goal (closing the discrepancy) is often characterized by slowing down, and thus produces negative emotion: the feeling of anticlimax. For example, upon completing a long and torturous graduate program and finally submitting a copy of the Ph.D. thesis, students often find themselves discouraged and sad instead of feeling the long-anticipated elation.

Rate of Approach and Avoidance

It is possible to look at rate of progress in moving away from the starting point, as well as at rate of progress toward the end point (Fishbach & Zhang, 2008). For example, a student who has to read 200 pages for an exam may consider the pages read so far or the pages that are still left. Advancing from page 20 to page 30 may be thought of as advancing by 50% of the material already covered (10/20), or as reducing by 6% the material that is still left to cover (10/170). Some goals allow monitoring progress from the starting point and the end point, and whether the former or the latter is chosen may depend on many situational, personal, and content factors. For example, it seems that initially the starting point is more salient, whereas close to goal completion, the end point is more salient. Correspondingly, early on, people would tend to monitor progress with respect to what has been done already, whereas later on, they would shift to regulating toward what still needs to be achieved. Regulatory focus (Higgins, 1997, 1998) may also moderate monitoring tendencies. A prevention focus, because of its concern with the presence and absence of negative outcomes, is likely to increase the tendency to monitor progress toward the end point. Conversely, a promotion focus, because of its concern with the presence or absence of positive outcomes, would increase the tendency to monitor progress from the starting point.

It should be emphasized, however, that for some goals the starting point and the end point are not equally clear. For example, in avoidance goals (e.g., in running away from a terrifying snake) the starting point is oftentimes specific but the end point is not, and one can only examine rate of progress from the starting point (Carver & Scheier, 1999; Brendl & Higgins, 1996).

Embedded Feedback Loops: Goal Hierarchies

Powers (1973) and Carver and Scheier (1990, 1999) introduced the notion of goal hierarchies, according to which each goal is subordinated to a higher-level goal, which answers the question of why the focal goal is

being pursued, and is superordinate to a lower-level goal, which answers the question of how the focal goal is to be pursued (see also Vallacher & Wegner, 1987). For example, for the goal "call a friend" a superordinate goal, which answers the question why we call a friend, might be "express support," and a subordinate goal, which answers the question how we call a friend, may be "get the friend's phone number." In this hierarchy, "being goals" (e.g., to be successful, to be moral) are superordinate to "doing goals" (e.g., maintain social contact) and still lower are motor control goals (e.g., call a friend; Carver & Scheier, 1999). At the lowest level of the hierarchy are automatic physical actions that cannot be further reduced (e.g., take a pen, descend the stairs) in the sense that we cannot meaningfully specify how we do these actions. At the highest level of the hierarchy are basic needs that cannot be further reduced to (or derived from) other needs. Various theories identify the most fundamental human need as the pursuit of happiness (Gilbert, 2006), managing the terror of our imminent death (Solomon, Greenberg, & Pyszczynski, 1991, 2004), spreading one's genes (Dawkins, 2006), or seeking self-determination via autonomy, mastery and relatedness (Deci & Ryan, 2000).

In the hierarchical goal system, once a goal is fulfilled and the system exits the discrepancy-reduction loop of the goal in question, it immediately shifts to a superordinate goal, and, correspondingly, to regulate toward reducing discrepancies from the new goal. For example, once a person finds the friend's phone number, the goal of calling the friend is resumed, and further actions are taken toward fulfilling it. In this sense, achieving a goal is equivalent to making progress toward a superordinate goal.[1]

The Effect of Practice: Automatization

Some goals are pursued in an automatic, proceduralized manner. These goals do not require specification of subgoals. For example, most of us already know fairly well how to drive from our home to the office and do not require breaking this action down into subgoals (e.g., get into the car, get out of the parking lot, etc.).

Repeated goal-directed actions become easier, requiring less and less effort, and in that sense become automatic (Schneider & Shiffrin, 1977). With repetition, actions may also acquire other features of automaticity (Bargh, 1994): They may be more easily activated by a relevant cue and more difficult to stop once initiated. When a goal is performed in an automatic way, it requires only minimal monitoring, and the monitoring system may remain at a higher, superordinate level. For example, if driving to the office is automatic, a person can monitor the superordinate level

("today I need to prepare the week's teaching") instead of monitoring the subordinate goal of driving to the office.

Difficulties in Goal Pursuit: Lowering Level of Identification

When the monitoring system encounters difficulty in goal pursuit, the system shifts to a subordinate goal (Vallacher & Wegner, 1987). This process may be seen as the flip side of automatization, which fosters shifting to a superordinate goal as goal pursuit becomes easier. For example, when we want to call a friend and do not find her phone number, we may shift to a lower-level goal of finding the phone book. A difficulty in performing an automatic goal is likewise accompanied with adopting a lower-level goal, which, in this case, means deautomatization of performance. For example, if our usual way to the office is blocked, we will explicitly set getting to the office as a goal and will pursue it in a controlled way, instead of in the habitual, automatic mode.

The Effect of Monitoring

In the remainder of this chapter, we look more closely at the monitoring process. We examine some implications of monitoring (specifically of tight vs. loose monitoring) for motivation, emotion, self-evaluation, and cognition. We then turn to difficulties in monitoring and examine the conditions that give rise to such difficulties and the consequences of encountering difficulties in monitoring.

Motivation and Persistence

Suppose that you are working toward a goal but have not yet reached it: for example, you are trying to find a supermarket but have not found one yet. In that situation, it is easier to persist if you know that your efforts generate progress than if you do not have any feedback on progress. For example, you would be more likely to continue looking for a supermarket if you knew that you were getting closer to it, compared to a situation in which you did not have any indication of getting closer to your destination. Indeed, a vast literature has documented the advantages of extensive monitoring for motivation and persistence. For example, consider the classic finding in Locke and Latham's (1990, 2002) goal-setting theory that setting specific difficult goals (e.g., write 20 pages of the book every day) is more motivating (i.e., produce better performance, higher persistence, mobilization of more effort) than urging people to do their best. Impor-

tantly, these authors note that "Goal setting is . . . usually only effective when feedback allows performance to be tracked in relation to one's goals (Locke & Latham, 1990, p. 241; see Erez, 1977, for a similar point). It seems, then, that the motivational advantages of concrete goals depend on continuous feedback on progress toward the goal. In education, too, it is widely recognized that setting specific goals and providing feedback on progress increases persistence and improves performance (Kulik & Kulik, 1988; Bandura & Schunk, 1981), a principle that is widely advised in educational programs (Schunk, 2000).

Monitoring progress toward goal attainment creates a state of attention and concentration on goal-relevant activities. It keeps resources mobilized toward achieving the goal and minimizes distraction by non-goal-related activities (Locke & Latham, 2002; Schunk, 2000). For example, a tourist who looks up her map more frequently to assess her distance from a destination (e.g., the Eiffel Tower in Paris) would be more concentrated on reaching that destination, perhaps at the expense of not noticing other attractions on the way.

We mentioned earlier that goals enhance the accessibility of goal-related constructs, whereas goal fulfillment inhibits their accessibility (Förster et al., 2005). Although research is lacking on how monitoring is related to these effects, it is reasonable to predict that goal-related accessibility and postfulfillment inhibition would be more pronounced with more extensive monitoring. For example, we would predict that a tourist who closely monitors her progress to the Eiffel Tower in Paris would experience enhanced accessibility of related constructs compared to a less extensive monitor. Moreover, we predict that a person who closely monitors her progress would experience a stronger sense of completion after completing the visit, which would manifest itself in a stronger postfulfillment inhibition effect.

Emotion

Carver and Scheier (1999) proposed that during goal pursuit, emotions derive from registering sufficient or insufficient progress. An acceptable rate of discrepancy reduction is said to enhance expectancy and positive emotion, whereas an unacceptably low rate of discrepancy reduction is said to reduce expectancy and produce negative emotion. This analysis implies that more extensive monitoring would be accompanied with more intense emotions, positive and negative. For example, the tourist who more closely monitors her progress toward the Eiffel Tower, compared to a less intense monitor, would be happier upon noticing progress and more anxious upon noticing insufficient progress.

Difficulties in Monitoring Progress toward Discrepancy Reduction

Discrepancy-reduction models of goal pursuit provide a useful framework for thinking about human goal-directed behavior. These models originated with cybernetic models in engineering and were initially designed to describe fairly mechanistic goals, such as grasping an object, regulating the temperature in a room, or driving to a specific destination. Many of the goals that people pursue in everyday life, however, are of a different sort. Consider the goal of making a good impression on the interviewer, the goal of studying material for an exam or the goal of being open minded. How would one know if and when the goal is achieved? How would one know if enough progress is being made toward achieving the goal? Furthermore, when increasing efforts toward the goal, how would one know if the extra effort produced a corresponding decrease in the discrepancy between one's current state and the desired end-state?

More generally, how can discrepancy-reduction models apply to situations that are characterized by difficulties in monitoring goal attainment, rate of progress, and/or difficulties in evaluating the contingency between effort and rate of progress? We propose that when people encounter difficulty in monitoring, they do one of two things, which are quite similar to what people do when encountering any other difficulty: They either relax monitoring or increase monitoring attempts. In what follows, we first discuss the different types of difficulties in monitoring discrepancy reduction, then look at different types of goals that are likely to cause such difficulties. We then discuss the consequences of relaxing monitoring and of increasing monitoring attempts. Finally, we discuss factors that moderate the choice of relaxing versus increasing monitoring (see Figure 11.1 for a schematic representation of the main points).

Conditions that Give Rise to Difficulties in Monitoring

There are different reasons for why monitoring of discrepancy reduction may prove difficult. First, vague end-states may make it difficult to register goal attainment as well as to calculate the discrepancy from the current state. For example, the goals of "becoming famous" or "being a considerate person" provide only a vague idea of an end-state that would qualify as goal attainment. A second possible source of difficulty in monitoring is that it is often difficult to assess progress. For example, if one is being interviewed with the goal of being admitted to a graduate program, it might be difficult to get a clear sense of how well one is doing in closing the gap
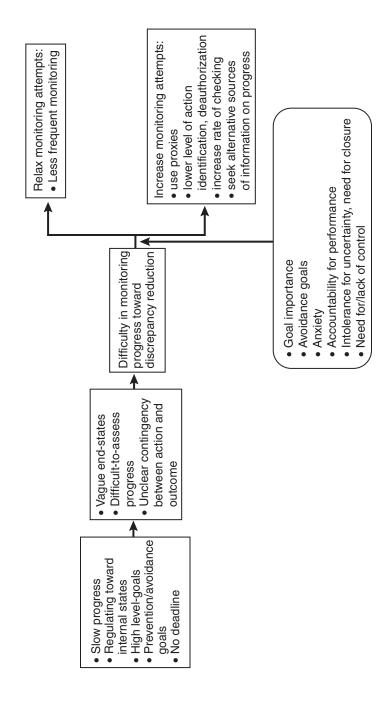
Relax monitoring attempts:
- Less frequent monitoring

Increase monitoring attempts:
- use proxies
- lower level of action
  identification, deauthorization
- increase rate of checking
- seek alternative sources
  of information on progress

Difficulty in monitoring
progress toward
discrepancy reduction

- Vague end-states
- Difficult-to-assess
  progress
- Unclear contingency
  between action and
  outcome

- Slow progress
- Regulating toward
  internal states
- High level-goals
- Prevention/avoidance
  goals
- No deadline

- Goal importance
- Avoidance goals
- Anxiety
- Accountability for performance
- Intolerance for uncertainty, need for closure
- Need for/lack of control

FIGURE 11.1. Causes and consequences of a difficult-to-monitor progress toward goal fulfillment.

to that (relatively clear) end-state. A third source of difficulty in monitoring is when the contingency between one's efforts and progress is unclear. For example, when competing for a job, a candidate may receive positive feedback on his chances along the way but feel uncertain as to what action on his part enhanced his or her prospects. Situations may include different combinations of these difficulties, as we see immediately. Regardless of the exact type of difficulty, it may have important implications for the monitoring process. We will now turn to examine several types of goal-pursuit situations that typically give rise to such difficulties.

Which Goal Pursuit Situations Are Difficult to Monitor?

Sometimes progress is slow and therefore is difficult to monitor. For example, on a diet, weight loss is slow and does not allow hour-to-hour (and even day-to-day) monitoring. Noticeable progress occurs over larger chunks of time, such as weeks or months. Similarly, children may find it difficult to monitor the effect of healthy food on their purported faster growing and increasing strength, which makes it rather difficult for them to pursue this goal.

Difficulty in monitoring may also arise when people regulate toward goals that are internal states and feelings, such as being in love or feeling interested in their job. Even understanding (e.g., understand the study material) is an internal state rather than an observable and easily identifiable end-state. Many times, such situations promote all three types of difficulty: difficulty in identifying the end-state (do I feel love?), difficulty in monitoring progress (am I getting more in love or less so?), and difficulty in understanding the effort–outcome contingency (does reading aloud make me understand the material better?)

To many people, regulating progress toward end-states that are feelings and emotions poses a considerable challenge. It is possible, however, that some people posses a clearer sense of their internal states as well as a better ability to control them (i.e., a clearer contingency between their efforts and emotional outcomes). Indeed, "emotional intelligence" (EI) is defined as the ability to identify and control emotional states (Mayer, Salovey, & Caruso, 2004). People high in EI would be more effective in regulating toward goals that are defined in terms of emotions and internal states. For example, consider a person who tries to feel less angry at the boss after being denied promotion. A person high in EI would be more likely to find strategies to do that and to monitor changes in her level of anger.

High-level goals tend to be vaguer than low-level goals, and "being" goals tend to be vaguer than "doing" goals. For example, "to be a friendly

person" is vaguer than "to go to the party." It is therefore oftentimes difficult to monitor discrepancy reduction toward higher-level goals than toward lower-level goals. As we discuss later, lowering the level at which a goal is identified may be used as a way to overcome the difficulty that often accompanies regulating toward higher-level goals. Thus, instead of pursuing the goal of "being knowledgeable," which is difficult to regulate toward, a person may adopt the goal of "reading at least two newspapers every day," which is more concrete and easier to monitor.

Self-determination theory (Deci & Ryan, 2000) distinguishes between goals that subserve self-determination needs (the goals of competence, relatedness, and autonomy), which people are intrinsically motivated to pursue, and extrinsically motivated or introjected goals. For example, if a student is doing homework because she finds the subject interesting and wishes to master it, then she is intrinsically motivated. If, however, she is doing homework to avoid punishment or in expectation of praise from her mother, then her motivation is extrinsic. In the present context, it is interesting to note that it is difficult to monitor discrepancy reduction toward self-determination needs. Competence, relatedness, and autonomy constitute inner feelings rather than a verifiable objective reality and do not have a clear end-state (in fact, they do not have an end-state at all). We see that some of the characteristics that are often ascribed to goals that subserve self determination needs (e.g., intrinsic motivation, enjoyment of the means rather than worrying about their instrumentality, open-mindedness, less inhibition, and less disengagement after completion) may be conceptualized as the positive consequences of working toward goals that are difficult to monitor.

Prevention and avoidance goals tend to have an end-state that is not clearly specified. Some avoidance goals may allow feedback on progress if progress is measured from the starting point, which is the state one tries to avoid (Brendl & Higgins, 1996). For example, when running away from a fire, one can monitor the distance from the fire and the rate at which it increases. Sometimes, however, one may try to prevent a state that has not yet occurred (e.g., a global epidemic), in which case feedback on progress may become rather difficult to obtain, as neither the starting point nor the end point is clear (e.g., it is not clear how far we are from an epidemic, nor how close we are to the "safety zone"). It is interesting to note that with such goals, feedback on progress may become easier to obtain once the disaster happened (and one is working to overcome it) than before it happened (and one is working to prevent it). For example, after the epidemic outbreak, the course of action is often clear, and the feedback on its efficiency is obtainable; but prior to the epidemic breakout, it is often not clear whether the various precautions indeed help or are taken in vain. It

is perhaps for this reason that hypochondriacs and pathological worriers often function much better when the feared disease or disaster actually strikes. A patient of the second author was chronically worried that some disaster would befall one of her parents, but when her mother was diagnosed with cancer, her anxiety immediately diminished and she took care of her mother rationally and effectively.

Goals that have no specified time point for implementation present a special case of difficulty to monitor progress, at least in comparison to similar goals that do have a deadline. For example, compare the goal of writing a novel to a goal of writing a novel by the end of the 8-week summer break. A failure to make any progress until the last week of the break signifies a potential failure in the latter case but has less clear implications for progress (or lack thereof) in the former case.

It is interesting to consider from this perspective "implementation intentions" (IIs), which are concrete plans as to when, how and where to pursue a goal (Gollwitzer, 1999). It has been demonstrated that forming IIs greatly increases the likelihood of goal fulfillment (for a review, see Gollwitzer, 1999). For example, if students think of how, when, and where they are going to write an assignment before leaving for a vacation, the likelihood that they will complete the goal of writing the assignment during the vacation greatly increases. It is likely that one of the advantages that IIs have is that by providing a clear deadline, they also enable better monitoring of progress.

Coping with Monitoring Difficulties

What do people do when they encounter difficulty in monitoring progress toward discrepancy reduction? We would like to suggest that they adopt one of two general strategies: they either relax or increase monitoring attempts. Below, we describe the consequences of using each of these strategies with different types of goals (summarized in Table 11.1). We then look at variables that may determine the choice of one strategy over the other.

Relaxing Monitoring Attempts in the Face of Monitoring Difficulty

An obvious possible reaction to encountering difficulty in monitoring is to relax one's monitoring attempts. For example, when writing this chapter, we were unable to monitor whether our efforts led us to making a significant contribution. We gave up on monitoring our progress toward this goal and instead adopted a more relaxed attitude that enabled us to enjoy

the process (which probably explains the large delay in submitting the chapter). The expected consequences of more relaxed monitoring directly follow from the effects of monitoring: people would be less concentrated on their goal and would have more resources for non-goal-related stimuli. For example, a tourist who does not have a map and cannot closely monitor her progress toward her destination may feel more relaxed and may be freer to notice other things on the way than a person who closely monitors her progress. Of course, there are less positive consequences of reduced monitoring: A student who studies for an exam and loosens monitoring of her progress may find herself sidetracked by irrelevant activities and unable to prepare for the exam on time.

We propose that relaxing monitoring of progress toward goal attainment would also lead the individual to perceive her actions as being performed for their own sake, rather than as being a means toward the goal. In that sense, the experience of loose monitoring may resemble that of intrinsic motivation (see Kruglanski, 1975, for a definition of an intrinsically motivated action as being performed in end of itself rather than being a means toward another goal). For example, a tourist may enjoy the way to the Eiffel Tower rather than being concentrated on reaching the destination, or a student may enjoy reading the material rather than perceive studying only as a means to passing the exam. Closer, more intense monitoring, therefore, means more task orientation and less experience orientation, whereas loose monitoring faciliates experience orientation but not task orientation. The distinct advantages and drawbacks of task orientation and experience orientation are thus part and parcel of loosening versus tightening monitoring of progress toward a goal.

As noted earlier, it is possible that looser monitoring would reduce the extent not only of goal-related accessibility, but also of postfulfillment inhibition. For example, a tourist who less closely monitors her progress toward the Eiffel Tower would not only have the destination less accessible on her way, but would also inhibit it to a lesser extent after the visit. Similarly, a student who less closely monitors her progress toward preparing for the exam would forget less of the study materials after the exam is over. In a similar vein, intrinsically motivated actions, as compared to extrinsically motivated actions, seem to be characterized by less extensive postaction inhibition and disengagement. For example, more intrinsically motivated students are more likely to remain interested in the course study materials after the course is over (Deci & Ryan, 2000). This suggests once more a parallel between loosely monitored actions and intrinsically motivated actions.

When monitoring is relaxed and information on progress is vague, there is more room for subjective construal of the extent of progress.

Depending on personal tendencies and situational determinants, this may lead to self-enhancement or to self-deprecation. When trying to make a good impression on the interviewer, the lack of clear feedback can lead one person to think highly of her performance, whereas a less confident or optimistic interviewee may feel that she is doing terribly. In addition, relaxed monitoring may enhance the effect of irrelevant sources of input on perception of progress. For example, positive (or negative) mood may mislead one to think that she is making good (or poor) progress, thereby making her reduce (or increase) efforts with no actual need.

Increasing Monitoring Attempts in the Face of Monitoring Difficulty

Difficulty in monitoring progress may lead individuals to increase rather than to relax their monitoring attempts. Below, we examine strategies that people may use in their attempts to increase monitoring in the face of difficulty and the consequences of applying these strategies. Later, we discuss in more detail what makes people increase versus relax monitoring attempts.

Proxies for Progress

Instead of regulating toward goals that pose difficulties in monitoring, people may generate or try to find proxies that would be easier to regulate toward. For example, a person who tries to impress her interviewer and finds it difficult to rely on the vague feelings of internal satisfaction might resort to subgoals, such as sitting straight, smiling, and maintaining eye contact. A person who is trying to understand study materials and finds it difficult to rely on the vague sense of understanding may try to resort to counting pages or rehearsing sentences.

Although the proxies are easier to monitor than the original goals, using them often incurs a cost. One obvious problem with proxies is that they are not the real thing. Counting pages is not the same as understanding the material. If one concentrates on monitoring how many pages he has read instead of monitoring his understanding, this may result in a poorer understanding of the material. Likewise, if one is busy monitoring her posture and her rate of smiling, she may forget to monitor more relevant (albeit vague) aspects of the interview, such as how attentive and how friendly she appears. Darley (2004) referred to the problem of substituting goals with clearer proxies on the level of institutions. An organization that desires to reward performance that is fairly vaguely defined (e.g., academic excellence), in an attempt to provide a clearer, more objective criterion (e.g.,

number of published papers), might end up creating undesirable, counter-productive behaviors (e.g., publishing more worthless papers à la publish or perish) that make its workers and eventually the entire institution drift away from the original goal.

A special case of substituting difficult-to-monitor goals with easier-to-monitor goals is when feelings and internal states are substituted with external signals. For example, a person who wishes to feel loved and finds it difficult to tolerate the ambiguity inherent in monitoring this state might resort to monitoring the rate and price of the gifts her partner gives her, which may shift attention and efforts toward relatively less important aspects of the relationships.

Another problem is that at closer examination, proxies may lose their apparent clarity and engender further substitution. For example, on a date, a person may substitute the goal of impressing his partner, which is difficult to monitor, with a goal of sounding professional. The latter goal, however, may also prove to be difficult to monitor, leading to further substitution with the goal of using a great deal of professional lingo. As this example demonstrates, the process of goal substitution, if used repeatedly, may lead further and further away from the original goal.

Lower Level of Action Identification and Deautomatization

We mentioned earlier that in response to encountering a difficulty in goal pursuits people adopt a lower level of action identification. If the action in question is automatic, this would mean deautomatization (e.g., if encountering a difficulty in driving to the office). This strategy may also be adopted when encountering a difficulty in monitoring progress to the goal. For example, a person that cleans the house may find it difficult to monitor progress toward the overall goal of achieving cleanliness, and monitor, instead, progress toward the means of vacuuming each square inch of the floor, a goal that is much easier to monitor. Typically, lower-level goals are more concrete and thus allow for better monitoring than higher-level, abstract goals (Vallacher & Wegner, 1987).

Increased Frequency of Checking for Progress

When feeling uncertainty as to one's progress toward discrepancy reduction, one may simply attempt to monitor progress more closely. For example, a student may decide to check her understanding of the study material more frequently. A public health worker who wishes to prevent an epidemic may repeatedly check whether no disaster has yet occurred.

Increased frequency of monitoring attempts may incur various costs. In the case of avoidance goals, increased monitoring is likely to increase

anxiety. For example, checking more frequently if one has cancer would increase anxiety, despite repeated negative findings, by increasing attention to and accessibility of this possibility. When progress is naturally slow, increased frequency of monitoring may engender frustration and disappointment. For example, a dieter who repeatedly weighs herself is likely to feel more frustrated than a dieter who checks her weight less frequently.

Close monitoring is especially counterproductive when the goals are feelings and internal states. When these feelings and states are desirable, attempts to increase monitoring are likely to make them disappear. For example, a person that wishes to feel in love and frequently checks the extent to which she has achieved this desired state may ironically reduce her chance of experiencing love. A person who repeatedly asks herself if she is happy diminishes the prospect of experiencing genuine happiness. Conversely, when the goal is to avoid negative feelings or states, such as distressing thoughts or unpleasant sensations, increased monitoring is likely to facilitate exactly the thoughts and feelings one is trying to avoid (Wegner, Schneider, Carter, & White, 1987; Wegner, 1994). We elaborate on these ironic processes when we discuss the relevance of this perspective to obsessive–compulsive disorder.

Alternative Sources of Information about Progress

When sufficient feedback on progress does not come from the feedback loop, one may attempt to receive it from other sources. One may seek the opinion of experts or friends or rely on social comparison and other sources of information. For example, a student who does not know if she is making sufficient progress in studying for the exam may ask other students or consult her teacher. Whether or not this strategy proves useful depends, of course, on the quality and relevance of the information obtained in that way. For example, the fellow students who are used for social comparison may or may not be a relevant comparison standard and may or may not provide correct information. In addition, when the goals are internal states and feelings, there may be very few, if any, alternative sources of information on progress other than one's own monitoring system.

In discussing many of the above strategies of increasing monitoring, we described how increased monitoring efforts may have unintended, negative effects. This is not always the case, of course. Increased monitoring can sometimes have the intended positive effect. Lowering level of action identification, more frequent checking, and social comparison may sometimes supply the desired feedback on progress. For example, counting the number of pages read in preparing for an exam may sometimes be an effective means of monitoring progress and could actually help the student remain task oriented and focused.

Relaxing versus Increasing Monitoring Attempts: Moderating Variables

When difficulty is encountered in monitoring progress toward discrepancy reduction, what makes either alternative, relaxing versus increasing monitoring, more likely than the other? In the following, we consider potential moderators of the reaction to difficulty in monitoring progress, including personality variables, situational variables, and goal characteristics. We then illustrate how these factors join to explain the development of repetition, rules, rituals and other symptoms of obsessive–compulsive disorder.

Importance of Goal

Obviously, it is more difficult to loosen monitoring of more important, relative to less important, goals. For example, it is more difficult to relax monitoring of how one is doing during an interview if the interview is to determine one's professional future than if it does not have crucial importance.

Prevention and Avoidance Goals

It is generally more difficult to relax monitoring of prevention and avoidance goals relative to promotion and approach ones. Research has shown, for example, that prevention goals call for more immediate action than do promotion goals (Freitas, Liberman, Salovey, & Higgins, 2002; Pennington & Roese, 2003). It is reasonable to assume that a need for more immediate action also means a need for tighter monitoring of progress because assigning positive value to immediacy implies the need to monitor whether progress is sufficiently fast. In addition to fostering more immediate action, prevention goals typically necessitate pursuit of all possible means (e.g., all the doors must be secured to ensure safety), whereas promotion goals typically have interchangeable means, any of which may suffice for goal achievement (e.g., any way of earning big money suffices to make you rich). The need to pursue all means is likely to necessitate closer monitoring as compared to a situation in which any means is sufficient.

Anxiety

Anxiety is closely associated with increased monitoring; in fact, the main evolutionary role of the anxiety mechanism may be to increase vigilance and monitoring. According to Gray (1982), for example, anxiety is a state of increased vigilance and extensive monitoring of the environment in response to potential anticipated danger (as opposed to fear, which is

the response to actual perceived danger). In case of monitoring difficulty, anxiety should therefore be associated with increased rather than relaxed monitoring.

Accountability for Performance

Sometimes, people are accountable for their performance to another person, often a person of higher authority. Accountability and external monitoring would make relaxed monitoring less likely. A worker who is being closely supervised by her boss would be less likely to relax monitoring when she faces difficulty in monitoring compared to a worker who is not being closely supervised.

Authority may be internalized, in which case it would be difficult to relax monitoring even without the physical presence of another person who supervises one's actions. Sometimes the process of internalization remains incomplete, and although goals are pursued in the absence of the authority figure that originally introduced them, they are not fully integrated with one's self, and one feels coerced when working toward them (e.g., a child might tidy her room in the absence of her parents but still feel forced to do that). With such introjected goals (Deci & Ryan, 2000), as compared with internalized goals, it may be more difficult to relax monitoring. For example, imagine a child who is doing her homework and finds it difficult to monitor her progress (e.g., she does not know if she is fast enough in solving the math problems). We would predict that if she does homework to please her mother (an introjected motivation) she would be more eager to resume monitoring of her progress (e.g., by repeated checking of the number of pages completed) and would be less likely to relax monitoring compared to a child who does her homework because she thinks that studying is important (an internalized motivation). This prediction represents yet another way in which relaxed monitoring is related to intrinsic motivation.

Intolerance for Uncertainty and Need for Closure

People vary in their tolerance for ambiguity or uncertainty, and situations vary in the extent of tolerance for ambiguity that they foster. "Intolerance for uncertainty" is defined as the tendency to have negative emotional, cognitive, and behavioral reactions to uncertain situations and events (Dugas, Buhr, & Ladouceur, 2004). Related to intolerance for uncertainty is need for closure (NFC; Kruglanski & Webster, 1996), which is the tendency to seek definite answers and dislike for situations of indecision and uncertainty. People high in NFC, compared to people low in NFC, prefer to reach an early decision and stick to it longer in the face of disconfirming

evidence. We would expect people who are intolerant for ambiguity and people who have high need for closure to be less tolerant for situations of ambiguous feedback on their progress. Thus, they will be less likely to relax monitoring in the face of monitoring difficulties.

Need for and Perception of Personal Control

Difficulties in monitoring progress toward discrepancy reduction may induce a sense of lack of control. Relaxing monitoring may be seen as accepting lack of control. Therefore, high need for personal control and low perceived personal control should be associated with attempting to increase monitoring (rather than relax it) when confronted with monitoring difficulties.

Interrelations between the Moderators

Our list of moderators of increasing versus relaxing monitoring of progress includes goal importance, anxiety, prevention versus avoidance goals, accountability, intolerance of ambiguity and need for closure, and need for and perception of control. It is easy to see that these various moderators are closely related to each other. As it is beyond the scope of this chapter to review all these interrelations, we would only note that all these variables were shown to be related to anxiety. For example, NFC was related to increased anxiety in a decision task that involved uncertainty. Moreover, this distress increased gradually as long as the situation remained ambiguous and a decision had not been reached. Research conducted in the framework of regulatory focus theory documented that failing a prevention goal, more than failing a promotion goal, produces anxiety. Low perceived control, which relates to one's perceived ability to affect the outcome of situations and events, has been associated with high levels of anxiety (Endler, Macrodimitris, & Kocovski, 2000). In the same vein, experimentally increasing individuals' perceptions of control leads to reduction in levels of anxiety (Sanderson, Rapee, & Barlow, 1989; Zvolensky, Eifert, Lejuez, & McNeill, 1999). It is easy to see also how accountability increases anxiety over one's performance (e.g., Mero, Guidice, & Anna, 2006). It appears, therefore, that many of the antecedents of increased monitoring involve the experience of anxiety.

Let us also emphasize the important role of need for control in increasing monitoring attempts in the face of monitoring difficulty. Monitoring is an essential part in control. For example, to control our food intake, we need to monitor it. In fact, it is possible that mere monitoring, with no actual control of outcomes, may sometimes satisfy the need for control. For example, if we closely monitor another person's actions, we may

feel that we control them. It is possible that some of the moderators we mention, such as goal importance, accountability, and prevention goals, enhance monitoring efforts by increasing need for control.

To conclude this section on moderators of increased monitoring, we would like to note that some of these moderators, including anxiety, prevention focus, need for control, and intolerance of ambiguity, describe characteristics of situations and stable individual differences (i.e., personality traits). We think that both aspects of these variables are relevant to our framework. Obviously, the nature of the goal people pursue affects the importance they attach to monitoring progress—whether it produces anxiety, whether it fosters ambiguity, or whether it involves prevention. Stable individual differences may bias some people to perceive situations in personality congruent ways. For example, an anxious person or a prevention-focused person would be more likely to experience a situation as anxiety provoking or as involving prevention, respectively. It is for that reason that we anticipate both situational variance and stable individual differences in the tendency for increased monitoring of progress towards goals.

In the final section of this chapter, we illustrate how the analysis of difficulties in monitoring progress can be applied to the understanding of obsessive–compulsive disorder (OCD).

Obsessive–Compulsive Disorder

Obsessive–compulsive disorder (OCD) is defined by the presence of repetitive and distressing obsessions and compulsions, which tend to increase in severity during the natural course of the disorder (American Psychiatric Association [APA], 1994). One of the principal symptoms in OCD is persistent doubt, which can invade many domains of actions or feelings. It is well established that people with OCD distrust their memory (e.g., Brown, Kosslyn, Breitler, Baer, & Jenike, 1994; Dar, Rish, Hermesh, Fux, & Taub, 2000; Foa, Amir, Geshuny, Molnar, & Kozak, 1997; MacDonald, Antony, MacLeod, & Richter, 1997; McNally & Kohlbeck, 1993), a finding that has been associated with the common symptom of repeated checking. But theorists of OCD have observed that these patients also doubt their own perception, feelings, preferences, comprehension, and other internal states (e.g., Rapoport, 1989; Reed, 1985; Shapiro, 1965). For example, a patient with OCD may feel uncertain that she feels attracted to her partner or doubt that she fully understands the meaning of a simple word even if she cannot find any objective reason for these doubts. Such pervasive doubts may lead to a variety of pathological behaviors typical of OCD, including excessive self-monitoring, checking, mental reconstruction, incessant questions, and requests for external validation or reassurance.

According to the classic description of obsessive–compulsive (OC) style by David Shapiro (1965), people with OC tendencies have lost "the experience of conviction." These individuals have diminished ability to access their own feelings, wishes, and preferences directly and must resort to external indicators to infer these internal states. To use a metaphor by Shapiro, individuals with OC tendencies can be likened to pilots flying at night, who must rely on flight instruments instead of their vision. When asked whether they like someone, believe in something, or prefer one thing to another, most people usually feel that they simply "know" the answer. In contrast, individuals with OC tendencies, according to Shapiro, must deduce their answers from external indicators or base them on general rules or norms. A similar model was advanced by Reed (1985), who proposed that the clinical symptoms of OCD should be seen as manifestations of a functional impairment in the spontaneous organization and integration of experience. According to Shapiro and Reed, individuals with OCD are able to function well despite this deficit by using various compensation strategies, such as adopting rules and norms to guide their behavior. For example, a man with OC tendencies may conclude that he must be in love with his partner because she possesses all the "right" attributes (Shapiro).

The idea that OCD is related to a disturbance in the subjective experience of conviction has been adopted in a recent model of OCD (Szechtman & Woody, 2004). This model suggests that OCD is related to a disturbance in the "feeling of knowing," defined as "a subjective conviction functionally separate from knowledge of objective reality (p. 115)." In a recent study, Woody and colleagues demonstrated that hand washing in nonclinical participants was intensified by hypnotic suggestion that blocked the sense of satisfaction usually associated with washing (Woody et al., 2005). In a related vein, Joel and Avisar (2001) developed and tested an animal model of OCD that is based on the proposition that obsessions and compulsions result from a deficient response–feedback mechanism. In several studies, Joel and her colleagues demonstrated that attenuation of external feedback for operant behavior leads to excessive emission of this behavior in rats (see Joel, 2006, for a review). In the context of this chapter, we examine the symptoms of OCD from the perspective of feedback control systems. We suggest that OCD and its psychological correlates, including anxiety and compulsion, can be understood in terms of a difficulty in monitoring progress combined with a tendency to increase monitoring attempts in the face of this difficulty.

We begin by noting that the goals that individuals with OC tendencies typically pursue present difficulties in monitoring. The great majority of these goals are prevention or avoidance goals, such as not running over a pedestrian when driving or not contracting AIDS. As shown above, progress with this type of goal is difficult to monitor, as a minor error or a

momentary lack of attention is sufficient for disastrous failure. This state of affairs necessitates monitoring of all possible ways of failing to achieve the goal, which are practically infinite. Other goals that people with OCD pursue may not be avoidance goals but still lack a clear end-state. A prime example is hand washing, the most common ritual in this disorder: Cleanliness is an ambiguous goal which lacks a clearcut end-state. Finally, in many of the goals that individuals with OC tendencies pursue, there is no feedback on the contingency between their acts (e.g., hand washing or repeated checking) and progress toward the desired goal (avoiding contamination or preventing harm to loved ones).

As discussed above, when individuals are faced with difficulties in monitoring progress, they can either relax or attempt to tighten monitoring (Figure 11.1). Individuals with OCD, however, do not have the option of relaxing monitoring. First, their goals are extremely important to them: No one can accept what feels like a high risk of a hit-and-run accident or of contracting a serious illness. Second, as our model suggests, a high need for control as well as high need for closure leads to increased rather than decreased monitoring attempts in the face of monitoring difficulties. As OC tendencies are associated with high need for control (Moulding & Kyrios, 2006; Reuven-Magril, Dar, & Liberman, 2008) and high NFC (Mancini, D'Olimpio, Del Genio, Didonna, & Prunetti, 2002), individuals with OC tendencies are unable to relax monitoring. Third, OCD is classified as an anxiety disorder and anxiety is believed to be the main motivation for the performance of rituals (APA, 1994). From the perspective of the present model (Figure 11.1), anxiety would be expected to increase vigilance and tighten monitoring, which in turn would enhance the accessibility of the avoidance goal. In the absence of clear progress, this would lead to a cycle of ever-increasing anxiety and monitoring. Finally, we suggested that accountability would also lead to enhanced, rather than to relaxed, monitoring. In OCD, accountability takes the form of exaggerated guilt and "inflated responsibility" concerning one's actions (e.g., Rachman, 1993; Rhéaume, Ladouceur, Freeston, & Letarte, 1995), which would also lead to increased monitoring attempts.

In our model, the symptoms of OCD can be conceptualized as the consequences of intensified monitoring attempts in the face of monitoring difficulty. As Figure 11.1 shows, these include increased checking, deautomatization, using proxies for progress, and seeking alternative sources of information on progress. Repeated checking, as mentioned above, is one of the most common symptoms in OCD. Patients may check again and again that doors are locked, that light switches and turned off, or that appliances are unplugged. In conducting these checking rituals, as well as other rituals like hand washing, patients with OCD monitor their actions very closely, attempting to be as focused and attentive as possible.

Tight monitoring, however, becomes a challenge when these actions are repeated many times, as normal learning mechanisms tend to make these actions habitual and automatic. Such automatization poses a threat for a person with OCD, who perceived it as a loss of control. Presumably as a response to this threat, OC rituals, including checking and washing, tend to become more and more elaborate, thus preventing automatization and enabling continued close monitoring (see Boyer & Liénard, 2006, for a similar point).

Similarly, an important function of rituals in OCD may be to serve as proxies for progress when monitoring is difficult. Counting the number of times each line or page is read, for example, may serve as a proxy for progress toward a higher-order goal of understanding the text. A washing ritual may serve as a proxy for avoiding contamination or preventing harm to others. Finally, patients with OCD often seek alternative sources for feedback on progress. Examples include relying on rules and norms or asking for reassurance or "objective" information from others. For example, a patient with OCD with a fear of driving may only be willing to drive with a close friend or a spouse who can serve as a reliable witness to reassure the patient she has not accidentally run over someone.

Checking may get especially tricky when the goal is a specific internal state, rather than an external goal. Patients with OCD may repeat an act many times until a specific subjective state (commonly a reduction in anxiety or a feeling of "just right") has been achieved (Dar & Katz, 2005). As people with OC tendencies appear to have a deficient sense of their own subjective states, as postulated by many models of OCD (see above), they encounter difficulties in monitoring these states. Coupled with the low tolerance for uncertainty associated with OCD (Tolin, Abramowitz, Brigidi, & Foa, 2003), these difficulties lead people with OC tendencies to increase monitoring of their own subjective experiences. As discussed above, such increased monitoring is likely to further undermine confidence in these already vague and fleeting internal states. Some of the rules and rituals common to OCD may serve as proxies aimed to compensate for the attenuation of direct experience. For example, a young patient with OCD of the second author began to worry that he did not fully understand the material he had learned in school. The more he questioned and attempted to monitor his own level of understanding, the more his uncertainty about his understanding grew. To compensate, he developed the rule that he should know the material by heart, which has become his proxy for understanding.

This model can also account for the subjective experience of people with OCD, including vigilance, anxiety, and a sense of compulsion. As noted above, vigilance and anxiety are endemic to tight monitoring. Compulsion, a defining feature of OC experience, can be conceptualized as an

extreme form of extrinsic motivation and is also a consequence of tight monitoring (see Table 11.1). As in the case of introjected goals, this sense of compulsion, in turn, leads to even tighter monitoring and a further increase in the sense of compulsion. According to this analysis, then, anxiety and sense of compulsion can be antecedents as well as consequences of close monitoring.

Finally, we should note that the perspective suggested here may contribute to the understanding not only of OCD but of other psychopathological conditions. Most anxiety disorders involve avoidance goals without clear end point. As a result, people with these disorders often develop elaborate "safety behaviors" that may be seen as proxies for progress toward achieving the vague goal of safety. For example, a patient with agoraphobia may map out every emergency room on her route to work, and a patient who panics may respond to increased heart rate by sitting down and resting to avoid a heart attack. Rituals are found in many disorders other than OCD, perhaps for similar reasons. Examples are developmental disorders, including autism and Asperger's syndrome (e.g., Russell, Mataix-Cols, Anson, & Murphy, 2005). This analysis would suggest that in these disorders, rituals would also be associated with a deficient accessibility of internal experiences, higher need for control, and lower sense of control, intolerance of ambiguity, and anxiety.

Notes

1. Of course, oftentimes goals are not fulfilled but just become irrelevant, or forgotten, or are pushed away by other more urgent goals. Moreover, sometimes we fulfill a goal only to discover that the superordinate goal has changed. In our chapter, we address only the relatively simple case of stable goal hierarchies and do not examine more complicated cases of goal disengagement or dynamic hierarchies.

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