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Chapter 1

The volitional basis of Personality Systems Interaction Theory: applications in learning and treatment contexts

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Abstract

This chapter discusses the volitional basis of Personality Systems Interaction Theory (PSI), and applies it to the improvement of conditions for learning and psychological treatment. The theory explains motivational and volitional phenomena, including concentration, coping with failure, identification and intrinsic commitment to personal goals, persistence, and implementation of intentions. Patterns of interactions among four cognitive systems, viz., thinking and intention memory, feeling and extension memory, discrepancy-sensitive object recognition, and intuitive behavior control, are shown to be modulated by affective change. Self-regulatory abilities support affective change in learning and in therapy, while developmental and educational risk factors compromise it. Educational and clinical treatment applications are discussed in terms of the functional mechanisms involved. © 2001 Elsevier Science Ltd. All rights reserved.

Kurt Lewin (1951) said, “There is nothing so practical as a good theory” (p. 169). One way a theory becomes practical is through opportunities for intervention. In this article, I describe the volitional core of a broader, personality systems interactions (PSI) theory, and discuss its implications for interventions in situations involving learning and motivation, including training and clinical therapy.

This task requires movement between complex concepts, linkages between concepts, and potential examples. Consider some problems of the sort that PSI theory addresses: There is 10-year old Samuel, a student who has difficulty getting down to work on projects soon after they are assigned, and tends instead to leave most of his work for the last night. Or consider Candace, a 13-year old student who often helps

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classmates but then struggles later to finish her own work. Her teacher has the impression that, in her efforts to please others, she often pursues goals she does not really identify with (although she thinks that she “must pursue those goals”). There is also a group of older students to consider, all of whom have so many issues in their lives that schoolwork and homework have become low priorities. They are at serious risk for dropping out of school. PSI theory can help explain these and many other self-regulatory difficulties, suggesting specific interventions to help with each problem. Later in this article, I offer a tour through a typical cycle of learning and motivation using the language of PSI theory.

PSI language is distinct in that its emphasis is on connections between cognitive and personality systems and their functional properties operating at different levels. In addition, the theory emphasizes affect, and the person’s ability to transition between affective states. Because the use of functional language for describing theoretical connections between psychological systems is still rather new in personality and social psychology, I will provide examples at various stages of the model. The discussion begins with an explication of some central aspects of the broad theory.¹

1. An overview of PSI theory

Perhaps the most important difference between PSI theory and traditional explanations of motivation and self-regulation is its focus on functional relationships among affective and cognitive macrosystems, i.e., the dynamic processes that underlie human mental functioning. Other theories focus primarily on cognitive or emotional *contents* to explain motivation and self-regulation. Cognitive contents include knowledge and beliefs; for example, beliefs about the controllability of desired events or of behaviors required to accomplish goals (Bandura, 1986; Heckhausen, 1977; Peterson, Maier & Seligman, 1993). Emotional contents involve “feelings” concerning the difficulty of a task, or satisfaction with one’s own performance (Boekaerts, 1996; Efklides, Papadaki, Papantoniou, Kiosseoglou, 1997). The set of determinants to which PSI theory calls attention are functional characteristics of the systems involved, including their dynamic properties. These characteristics affect functioning over and above the effects of cognitive-emotional contents (see also Klinger, 1977, 1996).

PSI theory shows how biased activation of affect in relation to key cognitive systems can lead to inflexible cognitive and self-regulatory styles. An understanding of how affective bias operates in relation to cognition and self-regulation suggests opportunities for altering personal styles through new targets of training and therapy.

¹ The theory is simpler than it seems at first glance. In my courses on PSI theory, I tell students that the core of the model includes fewer boxes than a diagram of electronic circuits for a television set and yet, those who repair televisions deal with this level of complexity all the time. Many difficulties beginners experience derive from the fact that functional explanations are counterintuitive and different from the content-based explanations to which we are accustomed. When a person decides some task is beyond reach, it seems compelling to attribute the problem to a belief that one has little control. This information is more accessible than the interaction of mental macrosystems of which the person remains unaware.

Whereas content-based theories lead to modifications of contents such as controllability beliefs, or the types of goals students pursue (e.g., learning versus performance goals, Dweck, 1999), PSI theory suggests changing cognitive and self-regulatory mechanisms for instance, by changing the way a person regulates affect.

According to PSI theory, each of four cognitive macrosystems participates at various levels in information processing. These four systems are labeled analytical thinking and a memory for explicit intentions (IM), holistic feeling and a memory for extended semantic fields (EM), intuitive behavior control (IBC), and a system specialized on discrepancy-sensitive recognition of “objects” (OR). The theory holds that the effectiveness of motivation and self-regulation is influenced by the relative activation or strength of each system, as modulated by affect. It is beyond the scope of this article to repeat the experimental and neurobiological evidence from which functional profiles of the four macrosystems have been constructed (see Kuhl 2000a, in press, for more details). Rather, I discuss the most central functional characteristics of each system and how they operate in the context of self-regulatory mechanisms.

Two modulation assumptions of PSI theory form its volitional core, that aspect of the theory related to the implementation of intentions and followthrough (see Fig. 1). Dashed lines depict inhibitory (antagonistic) interactions among systems whereas solid lines denote facilitating connections. Following discussion of the modulation assumptions, I describe how the theory can be used to explain eight steps in a cycle of motivation and self-regulation and how it relates to learning and therapeutic treatment alternatives.

1.1. First modulation assumption: volitional facilitation

The First Modulation Assumption (1st MA) explains how a person facilitates volition through an upregulation of positive affect: Positive affect ($A +$) facilitates intentions and releases inhibitions associated with them whereas the inhibition of $A +$ facilitates maintenance of difficult intentions in intention memory and inhibits their enactment (see the connection between intention memory and intuitive behavior control in Fig. 1). When positive affect is inhibited, the person will have trouble enacting difficult intentions.

This can be an adaptive mechanism. Difficult intentions include goals that require some forethought such as problem solving. When a difficult problem has to be solved or when one has to wait for a good opportunity before it is feasible to enact an intention (e.g., asking a question when the teacher has finished her explanation rather than interrupting), it is adaptive to inhibit premature enactment (see the dashed line between intention memory and intuitive behavior control in Fig. 1). As soon as a good opportunity arises (or the problem at hand has been solved), positive affect is aroused as an emotional indicator of the appropriateness of enactment.

According to the first modulation assumption, the release of previously inhibited positive affect now activates connections between the two cognitive systems of intention memory (IM) and intuitive behavior control (IBC). IBC is the system that provides routines for performing an intended action, thereby controlling behavioral

Theory of Volitional Action (Core of PSI Theory)

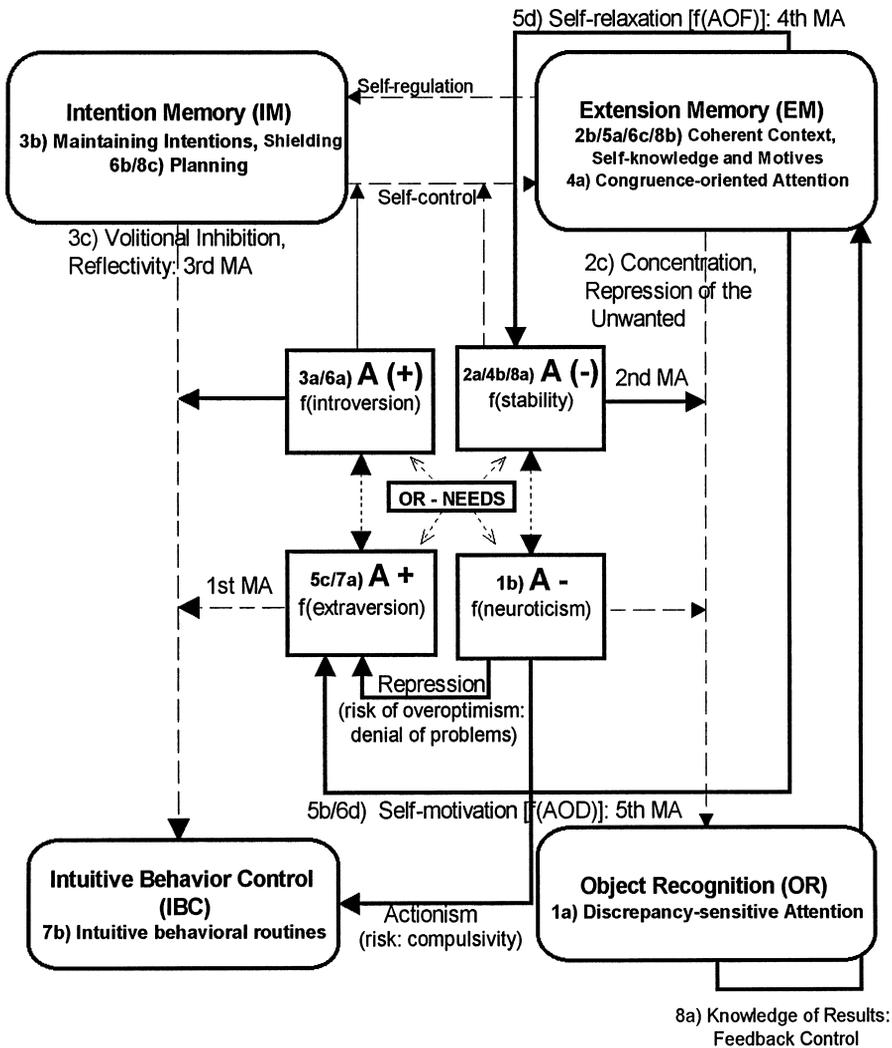


Fig. 1. The volitional core of Personality Systems Interaction Theory. Dashed arrows indicate inhibitory relationships between systems; solid arrows indicate facilitating relationships. Numbers refer to eight phases of a motivation-self-regulation cycle as explained in the text. AOF = failure-related action orientation; AOD = decision-related action orientation. A + = positive affect; A - = negative affect; A(-) = reduction/downregulation of A - ; A(+) = inhibition of A + .

implementation of intentions. Intention memory is a memory structure for encoding rather abstract, explicit representations of future actions. IM can be separated from cognitive concepts of working memory, both on experimental (Goschke & Kuhl, 1993; Kuhl & Kazén, 1999) and neurobiological grounds (Fuster, 1995).

Upregulation of positive affect terminates an active phase in IM in which the person attempts to maintain a difficult intention (i.e., one that cannot be carried out immediately). As long as intention memory is active, the connectivity between IM and IBC is inhibited (dashed line in Fig. 1). Explicit intentions are then difficult to carry out and the system is susceptible to other routes of intuitive behavior control. For example, external control of behavior may take over (affecting IBC directly), a conditioned response could occur, or the person could be guided by stored representations of external demands called “introjects”. With upregulation of positive affect, the maintenance function of IM is released and the person can begin to implement intentions.

The inhibitory relationship between IM and IBC may be one reason why students like Samuel can have problems getting themselves to study. Good intentions do not always help. Being reminded of one’s intentions or reminding oneself may even aggravate the problem. The activation of intention memory inhibits behavioral enactment, which may be experienced subjectively as a loss of “energy” to do what one intends to do (Fig. 1). Without the ability to counterregulate this loss of energy, procrastination and external rather than internal control can occur.

A recent series of experiments by Kuhl and Kazén (1999) validated the first MA with a task that is considered a lab analog to natural settings in which difficult intentions need to be enacted (as with Samuel who has trouble getting himself to work): In the familiar Stroop color-word interference task, one has to name the color of the ink in which an incongruent color word is printed. For example, naming the color of the red ink in which the word “blue” is printed is more difficult than simply reading the word because words normally elicit an overlearned reading response.

We were able to counter the Stroop effect (i.e., increased reaction time for naming the color of ink in which incongruent color words are typed) by loading intention memory with the color-naming intention and by announcing each incongruent color word with a positive word. This intervention presumably elicited brief, unconscious bursts of positive affect. In manipulations without loading intention memory, positive affect ($A +$) failed to facilitate volition (Kuhl & Kazén, 1999). PSI theory predicts that when intention memory is not loaded, $A +$ will result in behavioral rather than volitional facilitation. Behavioral facilitation refers to simple routines that can be initiated without volitional guidance. If positive words would have produced behavioral facilitation in our experiment, they should have facilitated the intuitive but false response of reading the word rather than responding to the color of the ink. In addition, reaction times should have increased rather than decreased.

Note that, according to our theory and evidence, positive affect, which often produces behavioral facilitation (Gray, 1987), leads to *volitional* facilitation only when an explicit intention is formed and maintained in intention memory. To extend these predictions to a molar behavior relevant to education, one can predict that students will implement a difficult intention to learn some designated material if steps are taken to activate intention memory. This might be accomplished by making the student dwell on the difficulties to be overcome to implement the goal (i.e., by loading IM), while also increasing positive affect (e.g., by inviting the student to indulge in pleasant fantasies of having accomplished that goal). Exactly this pattern of results was obtained in several experiments across a variety of goal domains by Gabriele

Oettingen and her associates (Oettingen, 1997; see also Oettingen and Gollwitzer, this volume).

PSI theory explains the mechanisms underlying Oettingen's findings. Because there is an inhibitory relationship between IM and IBC, dwelling on difficulties does not facilitate implementation. Indulging in positive fantasies does not increase the likelihood of implementation either; positive fantasies only facilitate simple goals (i.e., goals that do not require maintenance in IM and do not require self-regulatory support for implementing difficult intentions). What caused Oettingen's results was the intervention that loaded IM with a difficult intention and concurrently supported the affective basis for mobilizing the energy necessary for implementation. It was the interaction of cognition and affect together that led to followthrough.

1.2. Second modulation assumption: suppression of the unwanted

To compliment volitional facilitation, the *Second Modulation Assumption* involves the downregulation of negative affect: *Toning down negative affect [A(–)] activates the inhibitory connection between the macrosystem specialized on discrepancy-sensitive object recognition (OR) and that labeled extension memory (EM); in contrast, perseverating negative affect (A–) inhibits the inhibitory impact of EM (including the integrated self) on unwanted or unexpected object perceptions* (see dashed arrow between EM and OR in Fig. 1). The latter aspect of the 2nd MA explains why a self-regulatory deficit to reduce negative affect results in uncontrollable rumination about unwanted “objects” (i.e., isolated perceptions). Extension memory is the repository for extended networks of remote semantic associations such as meaningful experiences, options for action, personal values, and many other aspects of the “integrated self”. EM also allows for (1) multiple meanings of verbal communications, (2) the “meaningfulness” of a given action (or outcome) in terms of its connectedness with needs, values, and other aspects of self and others, and (3) options for action based upon prior experiences that form the basis for expectancies or feelings of controllability. The extended feature of this memory structure also applies to goal representations. It does not contain abstract (IM) or concrete (IBC) representations of single goals or intentions that are isolated from their motivational and self-defining context. Rather, it contains extended goal representations that can be characterized by large networks of potentially acceptable outcomes (i.e., an implicit network of standards) and their embeddedness in extended self-representations.²

²The extendedness of semantic associations attributed to EM has been associated with functional characteristics of the brain's right hemisphere. The right hemisphere seems to be better equipped than the left to respond to multiple meanings of words or configurations of words (*summation priming*: Beeman, Friedman, Grafman, Perez, Diamond, & Lindsay, 1994), as well as to perception and regulation of emotions (Davidson, 1993; Dawson & Schell, 1982; Wittling, 1990). A direct confirmation of the assumption that negative affect impairs right-hemispheric processing of an extended network of associations was provided in a series of elegant experiments by Bolte (1999). An example of the summation priming task used in these experiments as an operationalization of EM is the priming effect obtained for the word “cry”. The effect occurs when the word “cry” is preceded by three words such as “glass-cut-foot” which are weakly interconnected, but which create a surplus meaning related to the target word “cry”.

Without this extended goal representation, behavior can become inflexible. In the case of failure, the extended goal representation provides many alternative routes for action. Without access to extension memory, behavior loses much of its positive emotional support because the relevant goal is disconnected from extended networks of self-aspects that provide meaning and emotional support for that particular goal. Because the extension memory system offers the best overview of what a person wants (i.e., thoughts, emotions, behaviors, outcomes etc. sought on the basis of the general goal representation), it can inhibit “unwanted” thoughts (see dashed arrow from EM to OR in Fig. 1). A system cannot remove “unwanted” processes unless it has access to an extended data base representing what is “wanted” in the first place. Inhibition of the unwanted leads to the ability to “concentrate” on task-relevant information rather than ruminate about unwanted contents provided by the object recognition system. The inhibitory path connecting EM with discrepancy-sensitive object recognition is thus the functional locus of *concentration* (Fig. 1: 2c).

An *object* is anything that can be recognized or categorized, including objects in the external world. Affects, thoughts, concrete goals, needs and other internal events can also be objects, so long as they can be recognized on a later occasion and are isolated from their contexts (i.e., are segregated entities rather than dynamic representations). Object recognition occurs when the person perceives any internal or external entity as a discrete figure segregated from its context. It should be noted that the second modulation assumption does not exclude the possibility that recognition of “objects” (OR) can be facilitated by positive affect as well, but negative affect especially facilitates the recognition of objects that are unexpected or unwanted. In functional language “unexpected” and “unwanted” perceptions can be described in terms of a discrepancy between high-level self-representations (e.g., expectations or needs) and elementary perceptions, that is in terms of a mismatch between perceptions (in OR) and expectations (in EM). To the extent that an expectation is not confined to the subjective probability of a single event, but to a variety of possible events, it should be supported by extended semantic networks of EM rather than by OR. This is why general expectations are linked to EM in the context of PSI theory (Fig. 1).

Because of its extendedness and holistic (parallel) nature, extension memory is an *implicit* representational system. The term *implicit* refers to knowledge that the person is not aware of and cannot fully communicate verbally. Both IBC and EM are implicit systems; however, IBC and EM differ with regard to conscious accessibility. In contrast to most contents of IBC, some contents of EM can be transferred to analytical, even verbal consciousness, depending on the person’s explanatory skills. Whereas explicability of EM is constrained by the limited capacity of conscious awareness, most contents of IBC cannot reach conscious awareness at all. One cannot become aware of the concerted activation of all muscles (controlled by IBC) involved in the enactment of an intention (e.g. to open a door), but one can become aware of portions of one’s implicit self-representations in EM. These would include various needs, extended goal structures, feelings, motives, and so forth.

A final characteristic of EM is the particular type of attention with which it is associated. It is supported by an implicit, congruence-oriented type of attention that monitors the internal and external environment continuously for information.

Specifically, the monitor seeks information that is congruent with its currently activated content, and is much akin to the concept of “vigilance” in attention research (Posner & Rothbart, 1992). This type of attention helps a person to discover cues in the environment, and opportunities to enact intentions and attain goals. Without access to EM, a student may have the right goals and intentions for studying, but keep missing opportunities for enacting them. EM then fails in the vigilance aspect.

The vigilance aspect of EM specifies another functional locus for procrastination. Some people keep “forgetting” their intention, not because they lack the energy, are inhibited volitionally, or because they are motivated by extrinsic introjects that provide no positive emotional support (1st MA). They delay because they do not “see” opportunities for enactment that arise. The academic procrastinator does not, for example, think of the possibility for studying when an extra hour becomes available unexpectedly (see DeWitte and Lens, Chapter 3).

Vigilance may be seen as *congruence-oriented* because perception amplifies cues that match an implicit goal representation in EM. This type of attention is to be distinguished from the type of attention I mentioned in connection with negative affect and OR (i.e., discrepancy-sensitive or incongruence-oriented attention). As mentioned, the latter form of conscious attention is activated when object recognition includes negative affect. The negative affect emphasizes objects that are *incongruent* with current expectations, needs, extended goals or other active contents of EM.

Discrepancy-sensitive attention is useful, for instance, when performance requires precision (as in spelling) and errors are costly. An excessive amount of sensitivity for discrepancies can also impair concentration, as is the case with some unwanted emotions about a subject such as mathematics, or mismatches between an outcome and some standard contained in an extended goal representation. Excessive discrepancy orientation can even cause underachievement, as for example when concentration on some task becomes impaired by intrusive thoughts about possible failure and its consequences. In general, the more strongly EM is activated, the better negative affect can be downregulated (2nd MA), and the stronger the inhibition of discrepant objects. In other words, EM facilitates efficient concentration on task-relevant information (see the dashed arrow between EM and OR in Fig. 1).

The second modulation assumption predicts that how a person characteristically handles failure will be associated with the ability to downregulate negative affect. Kuhl and Beckmann (1994) operationalized the dispositional response to failure using self-reports of *action versus state orientation*. State-oriented individuals (SOF) report having uncontrollable ruminations following failure experiences. In contrast, action-oriented individuals (AOF) have no difficulty disengaging from (i.e., “downregulating”) unwanted thoughts and emotions even following aversive experiences. Our empirical findings support the hypothesis that AOF facilitates suppression of unwanted thoughts and goals. The functional explication of “unwanted” relates to the type of discrepancy mentioned: Information from OR that is inconsistent with the activated part of EM is inhibited through EM activation, which, in turn, is facilitated when negative affect can be downregulated (Fig. 1).

A series of experiments demonstrated that this phenomenon even extends to goals that have not been generated by the “integrated self”. In this case, the mismatch

between an expectation and a perception relates to goal states one implicitly expects to attain and the conscious perception of one's goals. An example is our student, Candace, whose explicit goal to please friends differs from her implicit goal to do something for herself. Compared to action-oriented participants (AOF), those who were state-oriented made more errors when asked to recall which goals had been assigned to them and which had been self-chosen in a prior phase of the experiment (Kuhl & Kazén, 1994). SOF participants misperceived more assigned goals as self-chosen (false self-ascription of assigned goals or *self-infiltration* effect). According to PSI theory, this effect is due to inhibited access to integrated self-representations (in EM) resulting from an inability to downregulate negative affect (2nd MA). If this interpretation is correct, self-infiltration should be pronounced after phasic or tonic induction of negative affect, as when participants are confronted with unpleasant activities or placed in a negative mood state. This prediction was corroborated by recent findings (Baumann, 1998; Kazén, Baumann & Kuhl, 1999).

Attributing self-infiltration findings to inhibited EM access explains why some students like Candace have problems enacting their study goals. When students do not realize that their goals lack self-system integration, they are more likely to pursue non-integrated goals (“extrinsic introjects”) that lack the supportive EM functions. According to PSI theory, EM supports include identification and detection of opportunities for enactment, self-motivation when confronted with difficulties, and self-relaxation when anxieties arise (Kuhl, 2000a).

Another implication of self-infiltration relates to influences on external control versus self-determination. PSI theory and the findings just reported suggest that many of the observed detrimental effects of coercion and control on effort investment, creativity and goal attainment (e.g., Deci & Ryan, 1991; Sheldon & Elliott, 1998) are mediated by negative affect that cannot be downregulated. Presumably, negative affect (conscious or not) reduces all functions that are dependent on uninhibited access to integrated self-representations. According to PSI theory, most action control mechanisms (Kuhl, 1984) are mediated by the integrated self that is part of extension memory (Fig. 1). These include attention control (congruence-oriented attention), motivation control (self-motivation), emotion control (self-relaxation), and coping with failure (feedback control such as using failure for improvement rather than being emotionally overridden by it). If this assumption is correct, conditions of coercion and control (presumably inducing negative affect) should not only impair these self-regulatory functions, they should also enhance self-control for enacting goals even if those goals are incongruent with the self. When a teacher uses coercion to shape student behavior, there is increased risk of inducing negative affect and an increased likelihood of overcontrol, thereby causing the student to pursue self-incongruent goals.

Fig. 1 depicts self-control in terms of an inhibition of the self-system (EM) through activation of intention memory. According to PSI theory, this system configuration should be facilitated through inhibition of positive affect [$A(+)$] and perseverance of negative affect [$A -$]. Self-infiltration is one phenomenon presumably caused by the self-control configuration. As long as access to the integrated self is inhibited, the system cannot decide whether the self (EM) has participated in the decision to generate a particular goal or enact a specific activity. Recall that EM contains implicit

knowledge abstracted from episodic, autobiographical experiences involving the self. To the extent that Candace feels obliged to please people, negative affect that presumably is associated with feelings of obligation (“musts” and “oughts” in Higgins 1987) inhibits access to integrated self-representations (in EM) and, as a result, renders it difficult for her to distinguish which goals are congruent with her true self and which are introjected goals based on others’ expectations.

Impaired access to self-regulatory functions such as attention control and self-motivation does not mean that goals cannot be pursued in the self-control configuration. The self-infiltration findings (Kuhl & Kazén, 1994; Kazén et al., 1999) even suggest that, when they are not self-congruent, unpleasant goals can be implemented more efficiently in the self-control configuration. In addition, persons who are unaware of the self-incongruence of a goal (presumably indicated by misattributions of externally controlled goals to self-choice) should be better able to shut off more pleasant or more self-congruent alternative goals and activities that may be tempting. Thus Candace may even outperform her more self-determined friends when unpleasant goals need to be enacted; for example, she may take time to summarize a text that other students fail to summarize because it is too boring. A molar analog of misperceiving self-incongruent goals as self-congruent may be tenacious persistence at unpleasant activities.

Fuhrmann and Kuhl (1998) examined whether the microanalytic self-infiltration effect had this type of a molar counterpart, and found that it does. Participants who displayed strong inclinations toward self-control, as measured by a Volitional Components Inventory (VCI) assessing more than 30 functional components of self-control and self-regulation, enacted more of their intentions to change nutritional habits after being exposed to a self-punishment treatment than they did in a self-reward treatment. Self-punishments involved reporting failures and dwelling on the negative implications of failure in a diary. Self-reward involved training oneself to take small steps, to focus on successes rather than failures, and to indulge in positive fantasies about the progress made positive thinking.

As can be seen from Fig. 2, the widely recommended “positive-thinking” strategy had the expected effect only for those participants who manifested a dispositional style towards self-regulation. That is, they fit a self-report profile in which they scored high on scales measuring (a) self-determination, (b) self-motivation and prospective action orientation, (c) self-relaxation and failure-related action orientation, and (d) feedback control.³

The interpretation of this finding using PSI theory illustrates the advantage of a holistic, systems-oriented approach to personality functioning. Rather than suggesting a reductionistic interpretation such as, “self-disciplined people need punishment to enact their goals”, PSI theory suggests that people with a self-controlling style in which the self is the target rather than the origin of control may not take advantage of a self-reward intervention until additional efforts are made that enable them to

³ The dashed arrow for “self-regulation” in Fig. 1 denotes the inhibition of explicit intentionality (IM) in favor of implicit self-determination (EM) as a function the combined effect of all self-regulatory mechanisms mentioned (i.e., self-motivation, self-relaxation, and feedback control).



Fig. 2. Volitional efficiency (the number of intentions enacted) as a function of preferred mode of volition (volitional style) and affective focus of training.

integrate explicit goals and intentions into their self-system. Thus, participants scoring high on the self-control scales of the VCI (Kuhl & Fuhrmann, 1998) could not integrate many nutritional goals (recommended or selected) in their self-system because self-control was associated with inhibited access to EM and the self (Fig. 1). Self-compatibility checking and integration (in the case of self-congruence) should be impaired under these conditions.

To the extent that positive affect reduces negative affect, negative affect, which presumably inhibits EM access in self-controlled individuals, should be reduced by the self-reward procedure. Induced positive affect in the self-reward condition (2nd MA) unleashes many competing desires and self-congruent inclinations (stored in EM) that override the nutritional intention (presumably stored in IM) as long as it has not been integrated in the self system (EM). Overcontrolled students cannot take full advantage of any sort of intervention stimulating self-reward and positive thinking until they learn to develop access to their holistic feelings. Once accessed, these feelings can be used to check whether a goal can be readily accepted, whether it has to be modified to become self-compatible, or whether it has to be rejected. Without self-compatibility checking, difficult or unpleasant goals are unlikely to be integrated in the self and represented in EM.

The theory of volitional action (Fig. 1) describes the most important part of PSI theory. In its full version, the theory elaborates seven levels of personality functioning (Kuhl, in press). An especially important elaboration of the broad theory concerns the

relationship between affect and its motivational basis: The dependence of affect generation on need satisfaction specifies the motivational roots of affective change. As indicated in Fig. 1, the difference between a perceived actual state (e.g., represented in the OR system) and a subcognitive need state (e.g., a standard defining the amount of closeness to another person needed at the moment) determines the quality of affect (e.g., positive discrepancies activate $A +$ whereas negative discrepancies activate $A -$). Fig. 1 does not depict the details of this relationship, which may differ for various needs. The thin arrows merely point to the fact that PSI theory explains affect on the basis of degree of need satisfaction without specifying the details of affect–need relationships for each particular need.

2. The dynamics of systems interactions in learning: a tour through PSI

To learn how to work with PSI theory in educational and clinical settings, it is useful to follow the course of changing systems activations. We can do this by mapping eight steps of a hypothetical cycle of motivation and self-regulation (Fig. 3) onto the assumptions of Fig. 1. Readers are invited to join me on a tour through personality systems that are activated and deactivated when students engage various phases of a cycle of motivation and self-regulation. A similar model of volitional phase transitions was described by Kuhl (1983, Fig. 5) and subsequently by Heckhausen and Kuhl (1985) and Gollwitzer and Heckhausen (1987). Successful operation at each step in this conative (motivational and volitional) cycle is seen as a prerequisite for efficient performance in many learning and instructional environments (see also Stanford Aptitude Seminar, in press).

Fig. 3 illustrates the eight steps of the conative cycle and the cognitive and affective systems activated during each step. The numbers in Fig. 1 denote the phases (Fig. 3) during which the cognitive and affective systems are activated. The succession of the eight phases is shown in Fig. 3. Success in academic learning situations typically requires (1) sensitive perception of opportunities for learning (problem perception), (2) realistic goal setting and identification with the goal (through successful self-compatibility checking), (3) persistent goal pursuit, (4) attentive monitoring of available cognitive, emotional, and situational resources, (5) effective self-management of emotional and motivational states, (6) planning and problem-solving, (7) energetic initiative and implementation of plans, and (8) effective use of performance feedback. Each of the eight steps on this list depends on motivation and volition. It is, in fact, hard to imagine how learning could occur without these two resources. As long as learning proceeds successfully, one might be tempted to ignore the role of motivational and self-regulatory processes, and focus on cognitive aspects. However, researchers interested in understanding the functional basis of students' failure to study will find it useful to investigate how well a particular student performs at each step of the motivation–self-regulation cycle.

Recall that the arrows between systems depicted in Fig. 1 do not denote information exchange, but energetic inhibition or activation of a target system as a function of the activation level of the corresponding source system. To simplify the presentation,

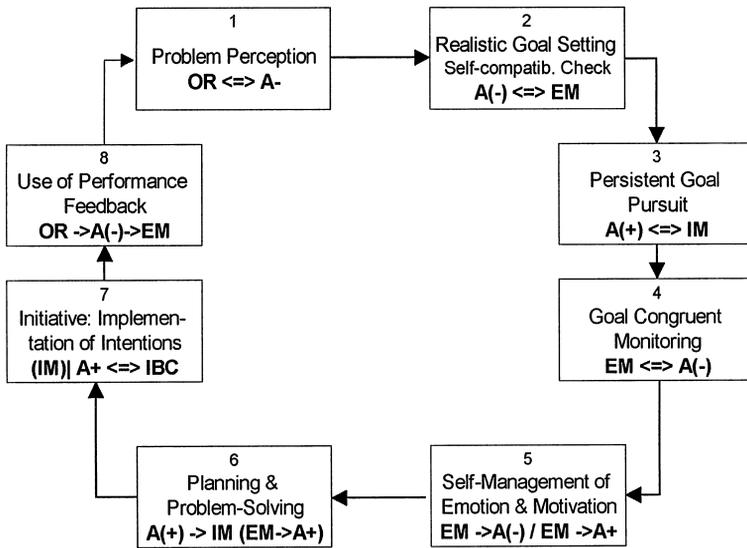


Fig. 3. Conative cycle. Sequence of 8 motivational and volitional phases and cognitive-affective systems (Fig. 1) activated during each phase (EM = extension memory; IM = intention memory; IBC = intuitive behavior control; OR = discrepancy-sensitive object recognition; A + = positive affect; A - = negative affect; A (-) = downregulation of negative affect; A (+) inhibition of positive affect).

connections among the subsystems providing information exchange are not depicted (Fig. 1). It can be assumed that each macrosystem can communicate with another macrosystem via direct and/or indirect pathways. Fig. 1 also illustrates how various personality constructs such as extraversion, neuroticism, repression versus sensitization, and action versus state orientation can be defined functionally and distinguished in the context of PSI theory.

Fig. 3 illustrates one possible temporal sequence in which the systems could be activated. It should be noted, however, that the theory is not confined to this temporal sequence. Depending on personality dispositions, task demands, and other situational constraints, any subsystem can be activated at any time. Any subsystem can take the lead by generating constraints for other systems, become inactive, or passively await instructions from other systems. In short, each person, in combination with particular situational demands, can be described in terms of a characteristic configuration of these subsystems, based upon specific patterns and sequences of interactions among them (Kuhl, 2000b). The full cycle of motivation–self-regulation consists of eight phases (Fig. 3), which are now described in detail.

2.1. Problem perception

The first step in the cycle (Fig. 3) involves elementary sensation and discrepancy-sensitive object recognition (OR). A student or learner recognizes a potential or actual

problem. In functional terms, recognition involves noticing a discrepancy between some expectation or standard (provided by EM) and a perceived state (provided by OR: Fig. 1a). For example, “I failed the math test” or “I did not study as much as I intended to.” Negative affect [A –] facilitates perception of this discrepancy, according to the 2nd MA (Fig. 1). Any condition facilitating the generation or maintenance of A – should intensify problem recognition, for example, a high sensitivity for negative affect on the part of the student (see Fig. 1: “neuroticism”). Another example is the presence of situational factors that induce stress or lead to aversive anticipations associated with failures. Any condition, situational or dispositional, that increases A – is expected to increase the likelihood that problems, errors and unexpected discrepancies are detected. In contrast, a student’s inability to tolerate periods of negative affect would result in impaired problem recognition.

PSI theory explains the positive correlation between the personality constructs of neuroticism and state orientation (SOF), as well as the differences between these constructs. Both constructs contribute to heightened levels of negative affect; however, despite the significant positive correlation between state orientation and neuroticism, the two processes can dissociate: A student can respond to even weak aversive stimuli with strong A – if he displays high neuroticism or trait anxiety (Kuhl, 1984). That student may still be able to downregulate negative affect if his self-relaxation or failure-related action orientation is sufficiently strong: (AOF in Fig. 1).

Although excessive dwelling on problems may be dysfunctional, too little sensitivity for A – (i.e., a low score on “neuroticism”) may entail the risk that necessary problem-solving behaviors are not even attempted because the student does not perceive the need for them. This would also be true in the case of excessively fast downregulation of A – through subcognitive shortcuts into positive affect (Fig. 1: *repression* as indicated by social desirability orientation, “denial”, or “embellishment”). For example, a student who is overly optimistic may “repress” or “embellish”. Another student may identify a problem quickly and do something about it. In other words, sensitivity to negative affect is not necessarily dysfunctional (as the term “neuroticism” suggests), so long as the person can avoid extended periods of negative emotionality through the effective regulation of affect (see “self-relaxation” and AOF in Fig. 1).

2.2. *Setting a realistic goal and self-compatibility checking*

Adaptive problem-sensitivity degenerates into dysfunctional dwelling unless a person forms realistic goals. Figs. 1 and 3 assume that this phase of the conative cycle requires activation of extension memory and — to accomplish that — the downregulation of negative affect (Fig. 3: Step 2). Access to extension memory is needed for the formation of *realistic* goals because EM provides an extended number of relevant experiences that provide a “feeling” of the outcomes that have been associated with various routes of action. A student may fail to improve her study habits if she remains stuck in Phase 1, problem awareness. The sequence of events can start as depicted with downregulation [number 2a in Fig. 1: A(–)] and result in EM activation (2b in Fig. 1) or vice versa. For many practical purposes, causal direction is not essential here or in other phases. The relationships between systems involve reciprocal causation,

which renders the two sequences virtually equivalent. Irrespective of whether an individual has learned to respond to arousal of A — or problem awareness with downregulation of A — (resulting in EM activation according to the 2nd MA), or with EM activation (resulting in downregulation of A —), formation of realistic goals is facilitated after a problem has been encountered. Thus, a well-developed integrated self, as well as a capacity to downregulate negative affect (even without EM intervention), should help form realistic goals for problem-solving, according to the 2nd MA.

EM activation is essential for setting realistic goals. As mentioned previously, “realism” may be explained functionally in terms of a goal’s connectedness to an extended network of possible (“realistic”) actions based on autobiographic experience. Since EM is an implicit memory structure, only part of which may be brought to the level of analytical, verbal awareness, setting an extended goal may be a tacit process. Nevertheless, this process may be accompanied by a holistic *feeling* that the goal will somehow be achieved, even if the complete network of possible actions provided by EM is too large to be explicated.

PSI theory assumes that EM is based on a high-level type of parallel-distributed processing. That is, the person integrates relevant abstractions from episodic memories, relevant self-aspects, and various emotional experiences associated with each network component. This is why *extended expectations* are attributed to the operation of EM. The phrase “*extended expectations*” refers to expectations based on implicit knowledge from an extended network of past experiences concerning the outcomes of various action alternatives or successful attempts to perform a particular behavior. Concepts of expectations used in personality and motivation research can be considered extended expectations; for example, action-outcome expectancies, self-efficacy expectancies, optimism, and controllability beliefs. Constructs such as these satisfy the extendedness criterion, in contrast to simple expectancies (like the anticipation in the motor control system, IBC, that a specific muscle will contract when an efferent signal has been generated).

The coordinating hypothesis assuming a link between expectations and EM operation explains beneficial “effects” of expectancy variables (e.g., Bandura, 1986; Peterson et al., 1993; Scheier & Carver, 1992). The beneficial effects of positive expectations are not only the result of the cognitive content of such expectations and their beneficial effects for motivation; they are also the result of the functional properties of EM. EM provides an implicit and fast overview of possible actions facilitating confident initiative and, in the case of failure, flexible switching to alternative routes of action. Moreover, the strong connectedness between EM and high-level representation of somatic and emotional states (i.e., feeling and self-awareness) suggests a functional explanation for expectancy effects on mental and physical well-being (see Footnote 2; Kuhl, in press, chapter 11). If the functional characteristics of EM have beneficial effects, such as control of emotion, stress regulation, and increased immune functions, then the contents of EM would not necessarily have causal status. EM contents would merely be concomitants of the causal mechanism that is based on EM operation (e.g., motivation and emotion control). This is to say that it is not always the content of what somebody believes (e.g., “I will be able to succeed at this task”), but the functional characteristics of the system that is activated when this or other contents

are experienced (e.g., extended networks of EM and its affect-regulation capacity providing intrinsic emotional support even for difficult tasks).

Linking expectancy to EM operation provides an explanation of one aspect of Oettingen et al.'s (2000) findings that have not yet been discussed. When participants were made to shift from positive fantasies about goal attainment to thoughts about the difficulties of goal enactment, it was not the particular index related to implementation that increased (e.g., preference for specific goals, taking responsibility, feeling energized, immediacy of action initiation). Rather, what increased was the degree to which those indices could be predicted on the basis of subjective expectancy of success. According to PSI theory (Fig. 1), perceiving a problem (activating OR in Phase 1) and feeling good when fantasizing about its successful solution (which may have a facilitating effect in Phases 4, 5, 7, and 8) does not suffice. Whether the cycle eventually results in persistent implementation of goal-relevant activities also depends on the activation and result of EM structures underlying subjective expectancies. If sufficient options for successful actions exist (according to the extended network of relevant experiences with similar situations in the past), then the person makes a *decision* to select a single goal for action from the extended network of possible and realistic goals. The functional locus of complex decisions is EM because this system provides an instantaneous, albeit largely implicit overview of a huge variety of information relevant for decisions, including the connectedness of the extended knowledge base with somatic and emotional experiences. This particular connection seems to be essential in complex decision-making (Damasio, Tranel & Damasio, 1991).

Oettingen's (1997) evidence for the moderating role of expectations confirms the implication of the present analysis that a student can also decide against setting any goal related to the problem at hand (e.g., when EM does not provide a sufficient number of possible options for action that are associated with positive affect on the basis of prior experience). Dwelling on difficulties (presumably activating IM) and indulging in positive fantasies (presumably activating EM) only facilitates goal commitment and implementation if goal-oriented action is justified according to the contents of EM. That is, expectations for success must be positive on the basis of actual prior experiences. If expectations are negative (i.e., the task or goal is considered unrealistic), then dwelling on difficulties (IM) and indulging in positive fantasies (EM) should even intensify the rejection of any goal-related intention. This reasoning explains Oettingen's (1997) interaction between difficulty focus, positive fantasies, and positive versus negative expectations.

The foregoing discussion shows that the process of setting a realistic, attainable goal involves a complex decision process that includes an implicit positive feeling based on an extended network of possible routes of action and acceptable associated outcomes. This decision process also includes what I call *self-compatibility checking* (Fig. 3). A student checks for self-compatibility by matching a goal under consideration with the extended network of needs, values, and other aspects of his or her extended self (including a more or less extended integration of the social or academic environment in terms of others' needs, expectations, and norms). This matching process is important for recruiting motivational support for a goal because a positive outcome of self-compatibility checking results in connecting the particular goal with

many needs, values, and other self-aspects associated with an extended network of positive affects. I consider this process of self-motivation to be the functional basis for intrinsic motivation, identification with and emotional commitment to a goal (Deci & Ryan, 1991).

The classical concept of *motive* can also be coordinated with this phase of EM operation (Atkinson, 1958; Heckhausen, 1991; McClelland, 1985; Winter, 1996). A motive is defined as an implicit representation that connects a need (e.g., for achievement, affiliation, or power) with past experiences related to outcomes that can satisfy the need and possible actions that can bring about satisfying outcomes. This description perfectly matches the functional profile of EM. In accordance with the implicit nature of EM, operant rather than self-report measures are needed to assess the extent to which a particular need is connected to an extended network of satisfying outcomes and probably successful actions (McClelland, Koestner, & Weinberger, 1989).

The classical TAT is an operant method for assessing the connectedness (i.e., the motive status) of various needs with implicit representations of action alternatives and their emotional consequences. In fantasy stories invented in response to various pictures, the number of spontaneous thoughts about how needs can be satisfied (by the protagonist in the story) are used as an index of the extent to which a need is linked with a representation of an extended network of options for action and associated emotional consequences.

Linking motives to PSI theory generates interesting empirical hypotheses concerning motive operation. For example, dispositional and situational conditions that help downregulate negative affect should facilitate motive operation (2nd MA). For students, this would include translating a motive into an appropriate goal commitment. Brunstein (in press) reports confirming results. In contrast to their action-oriented friends, state-oriented students who had difficulty downregulating negative affect did not commit themselves to goals congruent with their dominant motive. They were unable, for example, to form the goal to make friends when the need for affiliation was strongest according to operant measures of motive strengths.

2.3. *Persistent pursuit of a difficult goal*

Being “realistic” not only means that one sets goals associated with a sufficient probability of success. A second meaning of “realistic” is based on taking into account expected difficulties that have to be overcome before one can attain a goal. If a student is unable to face difficulties (e.g., if frustration tolerance is low or impulsivity is high), her self-regulatory system will be ill equipped to support the pursuit of difficult goals. From a functional point of view, coping with difficulties is one of the conditions for activating intention memory. According to the 1st MA, activation of IM is facilitated through the inhibition of positive affect [A(+)], which is depicted as the starting condition for Phase 3 in Fig. 1(phase 3a).

As with other transitions among the four cognitive systems, the transition from EM to IM requires an affective change. In the case of a difficult goal, the student needs the capacity to tolerate a phase of low positive affect to be able to select a single action

from the extended network of possible goals and actions (i.e., from EM). The student also needs this to maintain an abstract representation of the intended action in the memory system that is specialized for explicit representations of difficult intentions (step 3b in Fig. 1). Note that the term *intention* refers to a representation of an envisaged action whereas the term *goal* refers to the representation of a desired outcome. The 1st MA implies that the ability to inhibit positive affect and tolerate a prolonged period of inhibited positive affect is a prerequisite for the pursuit of difficult intentions and their maintenance in intention memory. Therefore, one possible cause of students' avoidance of difficult tasks is the inability to generate and maintain inhibition of positive affect (e.g., frustration intolerance).

It can be inferred from the definition of difficulty that difficult intentions are typically encoded in an abstract format in IM. For example, difficulties arise when specification of an action attaining a desired outcome is not yet possible. An appropriate action has to be developed through problem solving or in a future situation that cannot yet be specified. A student may know that she needs to study more, but she expects a new schedule for the next week. Consequently, she can only form the abstract intention "I will spend more time studying" without being able to specify exactly when she is going to do what. Another example relates to a situation in which it is not possible to specify a concrete action one could perform to enact an intention. A student may intend to explain to his teacher why he has a particular problem, but specifying where, when and what he is going to tell the teacher would entail the risk that the student will use the wrong words at the wrong time (e.g., perhaps when the teacher happens to be busy or in a bad mood). Forming abstract rather than concrete intentions permits greater flexibility and adaptability to future conditions that cannot be fully anticipated.

2.4. *Goal-congruent monitoring of internal and external environment*

The psychological situation of establishing a difficult intention involves many uncertainties. Often one does not know when an opportunity to enact the intention will arise, or what it will be like. Besides these external ambiguities, there are internal ambiguities: Will I be able to think of my intention at the right moment, when the opportunity arises? Will I be able to keep up my motivation to stick to a goal? Will I be able to relax and stay calm despite aversive consequences that I might experience if I fail?

Self-regulatory strategies relevant in this situation cannot be used unless a monitoring function signals when a specific strategy needs to be activated. Even highly efficient strategies such as attending to relevant cues in the environment, increasing one's motivation, or relaxing from a stressful emotional state do not help unless one knows when to employ them. Efficient self-regulation of the external and internal environment requires self-monitoring (Kanfer & Scheff, 1988).

Self-monitoring can be coordinated with extension memory because EM is associated with the type of attention necessary for efficient monitoring. Efficient monitoring involves attention to goal-congruent (or self-congruent) information (4a in Fig. 1) in the internal or external environment, and is supported by the vigilance function of

EM. Recall that vigilance does not require constant conscious awareness or a concrete specification of what one is looking for, but works from the “background” of conscious attention.

This type of attention has been investigated systematically in experiments showing that the part of the brain that is active when participants are consciously paying attention to a specific target is *inactive* when they are engaged in a vigilance task. A vigilance task is one that requires attention to rare and/or underspecified events from the “background of attention” (Posner & Rothbart, 1992). From a functional point of view, the term “underspecified” may be related to conscious awareness: goals that appear “underspecified” on a conscious level may be specified by an extended, but unconscious, network of many acceptable outcomes defining an extended or global goal. Vigilance is the type of attention that detects anything that matches any of the components of an extended network of goal-relevant facts. According to the 2nd MA, this attention for goal-congruent (or self-congruent) material can be facilitated through downregulation of negative affect (Phase 4b in Fig. 1). It can also be elicited directly through appropriate task-related cues that signal that vigilance is needed (as suggested in the sequence from 4a to 4b in Fig. 1). In either case a reciprocal enhancement of A(–) and vigilant monitoring of goal-relevant cues is expected. Some cues signal particular self-regulatory strategies, such as the feeling of a temporary reduction in motivation (a cue that self-motivation is necessary), or the awareness of an increase in negative affect (a cue that self-relaxation is needed).

In sum, an impaired ability to downregulate negative affect not only interferes with generation of realistic long-term goals, but also impairs the monitoring function of self-regulation. It should be noted that the phase model leaves the possibility open that downregulation of A – might work efficiently during the goal setting phase whereas it does not work as effectively during the monitoring phase. For example, a student may not have developed a link between the specific monitoring function associated with EM and self-relaxation. She may be aware of increased negative affect during a task, but may not have learned that reduction of negative affect is required for self-monitoring one’s motivational or emotional state. The practical implication of the possibility that A(–) is impaired during the monitoring phase relates to the specificity of training that might be necessary. In the case of a specific downregulation deficit in the monitoring phase, training procedures have to focus on linking self-relaxation to vigilance functions.

2.5. Self-management of attention, motivation, and emotion

Self-monitoring and self-management are closely intertwined components of volitional functioning (Kanfer & Schefft, 1988; Heggstad & Kanfer, this volume). PSI theory specifies conditions under which these regulatory functions are especially relevant, as well as conditions that improve their effectiveness. For example, self-motivation is a form of self-management that can counterbalance the loss of positive affect resulting from loading intention memory with a difficult intention (3rd MA = inverse of 1st MA).

Self-regulatory deficits were studied in a group of jobless trainees learning to improve their job-hunting skills (Kuhl, in press, Table 12.6). We used the technique developed in the Stroop-removal study (Kuhl & Kazén, 1999) to assess the degree to which intention memory was activated when participants were confronted with words reminding them of a difficult intention. One finding was that these trainees frequently avoided forming difficult intentions and loading them into intention memory. Further analysis of this phenomenon suggested a reason why trainees avoided loading intention memory; they tried to avoid becoming depressed. In other words, the functional locus of the self-regulatory deficit in this group could be identified in Phase 5 of the motivation and self-regulation cycle. Because these jobless trainees were unable to use self-motivation to counterregulate the loss of positive affect resulting from an activation of intention memory, they avoided forming difficult intentions altogether.⁴

Fig. 1 depicts one possible sequence of systems transitions related to self-motivation (i.e., Phase 5 in Fig. 3). It starts (5a) with activation of pertinent self-knowledge (e.g., recalling past successes in similar situations and the personal importance of realizing this goal), proceeds to activating self-motivation mechanisms (Fig. 1: 5b) that restore $A +$ (Fig. 1: 5c) and, finally, supports the activation of self-relaxation mechanisms if necessary (Fig. 1: 5d). Self-relaxation downregulates $A -$ that might be aroused by anticipation of aversive states associated with failure. Students who have not learned to counterbalance the inhibition of positive affect that results from forming a difficult intention through self-motivation are likely to develop *difficulty aversion* in order to avoid negative feelings associated with difficult tasks. Training procedures for developing the self-regulatory skill of self-motivation are discussed later in this chapter.

2.6. Planning and problem-solving

Phase 6 is necessary when the enactment of a difficult intention cannot be initiated quickly, as, for example, when problems to be solved require considerable investment of time and effort (Fig. 3). This phase involves swinging back from self-motivation or self-relaxation to inhibition of positive affect (Fig. 1: 6a) and activation of IM (6b) resulting from it (1st MA). This is tantamount to another affective change, in this case entering a phase of $A(+)$ from a phase of $A +$. Inhibition of positive affect can occur, for example, as a result of frustration (nonreward), when a student confronts an unexpected failure (Gray, 1987; Higgins, 1987). According to PSI theory, long periods of difficult problem solving and planning probably require some degree of tolerance

⁴ An important methodological implication of the interconnectedness of intention memory, volitional inhibition (i.e., $A(+)$ caused by activation of IM), and self-motivation (i.e., $A +$ generated by EM activation) relates to the conditions under which the antagonism between IM and $A +$ should be observable. Null or even positive correlations between measures of IM activation and $A +$ do not necessarily contradict the assumption of IM- $A +$ antagonism (dashed line from IM to IBC in Fig. 1). Self-motivation can restore inhibited $A +$ (resulting from IM activation) so quickly that the negative correlation between IM and $A +$ does not show up. We found this to be the case for participants scoring high in action orientation whereas state-oriented participants showed negative correlations between IM activation and $A +$ (presumably showing up because of their low capability for self-motivation).

for low positive affect or even frustration. There is a risk that positive affect will drop so much that planning and problem solving will require repeated shifts back and forth between Phases 4–6. That is, whenever positive affect goes down for too long (as perceived in the monitoring Phase 4), some counterregulation is performed (Phase 5). Intertwined phases of self-motivation during planning and problem-solving maintain balance between the reduction of A + necessary to avoid premature termination of planning (impulsivity), and inserting little periods of A + to keep up a minimum amount of motivation to avoid passivity (Gray, 1987) or even helplessness (Seligman, 1975).

One practical implication of this analysis derives from its focus on phase transitions or systems interactions. It will be insufficient for teachers or therapists to try to train optimism or simply improve problem orientation in students. Instead, training should teach smooth transitions from optimism to problem awareness and vice versa. Self-motivation enables people to shift in this way as needed between difficulty focus and encouragement even without external support.

In a difficult creativity task, we found self-motivation as assessed by the VCI (Kuhl & Fuhrmann, 1998) to be a crucial moderator of performance (Biebrich & Kuhl, 2000b). Even a high degree of emotional sensitivity (“neuroticism”) was associated with superior performance when sensitivity correlated positively with self-motivation. Presumably, emotional sensitivity supports problem awareness and difficulty focus. This in turn facilitates performance if it is combined with the self-regulatory skills that mediate the stamina necessary to stay motivated when trying to solve very difficult tasks.

2.7. Initiative and implementation of intention

Self-motivation keeps the individual from turning too much in the direction of depressed affect when confronted with difficulties. Even more pronounced positive affect is required for the student trying to take specific actions to implement a difficult intention (Phase 7 in Fig. 3). Implementation of difficult intentions requires more positive energy than easy intentions because the inhibitory component associated with difficult intentions (Fig. 1) has to be overcome. By “pronounced” I mean that the system not only prevents excessive drops in positive affect (as during the self-motivation Phase 5), but also provides enough A + (Fig. 1: 7a) to connect IM with IBC (7b). Sudden increases of positive affect (conscious or not) seem to facilitate the connection between IM and IBC (i.e. enactment of a difficult intention), provided IM is activated in the first place (Kuhl & Kazén, 1999).

In the sequence depicted in Fig. 1, A + could come from an encouraging remark offered by a parent or teacher, or from the joy of discovering a possible solution to a difficult problem. Other cases are possible and can be described in PSI language. An example would be the case (not depicted in Fig. 1) in which the amount of A + necessary to implement a difficult intention results from a self-management process. For example, a student could think about the satisfaction derived from previous successes in school (as in 5a), and make a promise to reward herself with some free time after passing a particularly difficult test (as in 5b). This act of self-motivation would help her maintain a difficult intention without losing the stamina necessary to stick to it.

It should be noted that the process of volitional facilitation (i.e., connecting IM with IBC through arousal of A +) describes only one route to behavioral facilitation: *Volitional facilitation* concerns the implementation of difficult intentions. This route to action should be distinguished from other routes designed for easy goals and intentions. The term “easy” does not refer here to the amount of effort necessary, but to the person’s ability to specify the context of implementation (i.e., place, time, specific behaviors that are available). Whenever specification of the implementation context is feasible, then Phases 1 to 6 of the motivation-self-regulation cycle may become unnecessary.

Gollwitzer (1999) (see also Oettingen, Hönig & Gollwitzer, Chapter 2) demonstrated that specifying the implementation context (training implementation procedures) can increase the rate and efficiency of performance. Behavior specification procedures may be especially helpful for students having an excessive focus on difficult goals, or even unrealistic ideals, provided those procedures do not violate self-congruence needs. For sensitive students, however, the need for self-congruence seems to be so important that premature behavior specification may not help them at all. In a recent study based on structural modeling (LISREL), Biebrich and Kuhl (2000a,b) found that a subgroup of students with an elevated sensitivity for negative affect (“neuroticism”) strongly relied on self-activation as assessed by the self-determination scale of the VCI (Kuhl & Fuhrmann, 1998). They did this in coping with stress, preventing depression, and when attempting to master difficult problems that required cognitive flexibility and creativity. Teaching optimism to such students (the “repression” route from A – to A + in Fig. 1) or even behavior specification (the “actionism” route from A – to IBC) may do more harm than good.

This important warning requires further explanation. For practical purposes, it is essential to be able to identify individuals that can take advantage of interventions enhancing optimism or an implementation orientation. When a student is faced with any sort of life stress and has to cope with anxieties or other negative feelings, some forms of training or instruction can distract the student from emotional concerns. Training optimism or implementation procedures (see Oettingen, Hönig & Gollwitzer, Chapter 3) are two examples. The study by Kuhl and Biebrich (2000a) showed that this sort of distraction is not beneficial for all students, however. Emotional sensitivity seems to be a critical condition. According to our findings, many sensitive individuals experience an intensification of negative states when attempts are made to distract them from their preferred coping activity (i.e., they prefer to focus directly on the negative experience and to find a sound solution rather than to ignore the problem through premature optimism or actionism). Findings reported by Showers and Kling (1996, Experiment 2) further elucidate this point. In this study, inviting participants to engage in a distractor activity after inducing a negative mood was comparable to the “repression” or “actionism” route in Fig. 1. This strategy was helpful only for participants who had an embellished (“compartmentalized”) self-concept. The distractor activity even aggravated the negative mood state in participants that had expressed sensitivity for negative sides of the self (comparable to the “neurotic” group in the Biebrich and Kuhl study). These findings suggest that careful pre-testing for individual coping and self-regulation skills can prevent negative side effects with otherwise useful interventions.

Again, it must be recalled that there are many situations, not only in education, in which it is not possible or feasible to specify place and time and concrete behavioral routines for implementing a goal. To maintain a global (extended) rather than a fully specified goal can turn out to be advantageous in cases where actual events run counter to expectations. Then having extended goals (maintained in EM) becomes the basis for creativity and flexibility: Extended goals “roughly describe”, albeit on an implicit level, a *variety* of possible options and times or places for action. Explicit specification of the details of execution (e.g., when and where a student intends to study for a test) can turn out to be disadvantageous when the intention cannot be carried out as planned.

Without implicit, extended goals, a student can rely too heavily on the conditioned responses of IBC (similar to specific S-R associations, such as, “When I see my desk this afternoon I will start studying for the math test.”). Some students learn to connect anxiety, defined as negative affect aroused by fear of imperfection or fear of making errors, with excessive attention to the details of specifying task-relevant behavior. PSI theory explains why these and other types of anxiety may lead to overreliance on specification. Because negative affect inhibits EM accesss (2nd MA), implicit, extended goals cannot be formed or cannot guide action after being formed. Overreliance on behavior specification can become an emergency measure in this case. When the operation of implicit goal representations is continuously thwarted by latent anxieties (cf. 2nd MA), the advantages of flexible and creative goal pursuit must be sacrificed to maintain the desired level of activity. This condition may be characteristic of certain types of “actionism” such as the Type A personality (Friedman & Rosenman, 1974). Its functional locus is depicted by the short cut from A – to IBC activation in Fig. 1.

Pathological cases of short-circuiting the self (EM) and intention memory provide vivid examples of the risk of excessive reliance on behavior specification. Compulsive symptoms (Fig. 1) reduce behavior control to routines that can be carried out immediately (like checking, cleaning, or obsessively repeating the same thinking patterns), and yet fail to satisfy extended networks of one’s own and others’ needs and values (i.e., these efforts lack “meaning”). Excessive reliance on behavior specification can also entail the risk of *difficulty aversion* that we observed in the group of jobless academics. Scholastic achievement, and many other concerns in life, includes long-term goals that cannot be achieved immediately. To the extent that these concerns are confined to easy goals whose implementation can be specified immediately, the person is deprived of important, albeit difficult guides for long-term satisfaction of a variety of needs and self-interests.

There is a simple way to develop behavior specification (Gollwitzer, 1999) and positive-thinking procedures (Seligman, 1991) that minimize the risks of self and difficulty avoidance. Evaluation of success in learning or in training should not be confined to short-term indices assessing attainment of single goals, it should also include indices of long-term adjustment of the entire organism in terms of the variety of needs, values, goals and other self-aspects. Assessing the effects of education or training on total adjustment rather than on implementation of single goals is simpler than one might expect. Indices of well being (Brunstein, 1993), freedom from psychological and somatic symptoms (Linville, 1987), and measures of self-congruence

(Sheldon & Kasser, 1998) all provide promising indicators of the overall (“organismic”) effects of intervention procedures.

2.8. *Feeling success and failure: feedback control*

The final phase of the cycle concerns feedback control (Fig. 3). Performance outcomes have to be fed back into the system or reflected upon. Effective use of feedback has been discussed as a crucial condition for motivating new efforts and improving one’s strategies in the case of failure (e.g., Carver & Scheier, 1981). PSI theory spells out the cognitive and affective conditions for optimizing feedback use. From a cognitive point of view, it presumably makes a difference whether feedback perception stays limited to the object recognition level or is advanced to extension memory. When a student perceives success or failure feedback as an isolated event (i.e., an “object” in PSI terms), it is difficult to connect that event with an extensive network of personal values and action alternatives. The connection with an extended network of personal values (stored in EM) is particularly important following success, whereas connecting feedback with an extended network of action alternatives (stored in EM) is important after failure. In the case of success, making connection with an extended network of personal values, needs, and other aspects of the self should create more extensive feelings of satisfaction than perceiving success as an isolated event (i.e., on the OR level). The flexibility with which alternative actions are found after failure should be facilitated when failure feedback is forwarded to EM because only this system provides alternative routes for action through its extended knowledge base.

What are the conditions that facilitate or impair feedback of results into extension memory and into the integrated self? According to the 2nd MA, isolated rather than extended perceptions of success and failure are activated when the system responds with negative affect. This may seem unlikely after success, but it can happen for anxious students when a single success is insufficient to remove their negative affect for a sufficiently long period. If the student fixates on inhibited positive affect (i.e., if success cannot even cheer up the person for a moment), PSI theory predicts insatiable elevation of aspiration levels. Success does not bring even a pause to a student’s striving for more and more difficult goals. IM, the system specialized on difficulties, is activated by A(+), and failure does not provide much corrective potential because the extended networks of action alternatives are unavailable. In clinical jargon, this behavior is sometimes attributed to a “try harder” script. PSI theory’s functional explanation would even work without particular cognitive contents such as “try harder”: When success is not fed back into EM it cannot make contact with the extended network of values, goals, and attitudes that are satisfied by the success. This is tantamount to the individual not really *feeling* the success and being stuck with an activated IM, the system that selectively responds to difficulties in the environment.

Phenomena observed in everyday settings can sometimes be better understood by looking at their pathological exaggerations. According to a recent behavior analysis of clinical patients, it is the absence of an impression for the outcomes of an action that causes the inability to feel satisfaction about an outcome and stop a problem behavior (such as drug or alcohol abuse). Patients suffering from compulsive disorders also

show such symptoms (Hoffmann, 1998). Because the self-system contains the standards for deciding whether an obtained outcome belongs to the extended range of personally acceptable outcomes, the motivation to repeat a successful behavior is difficult to detect unless there is feedback into the self-system (the self-portion of EM) (see Carver & Scheier, 1981, for a similar view).

There are students who have similar, though less severe problems. For example, some students are unable to focus on the meaning of a text or a task because they are excessively preoccupied with details such as correct spelling and punctuation. One might think then of interventions that facilitate access to the self system to bring behavior more in line with internal standards. Self-awareness can be increased, for example, by simply putting up a mirror. In one study, Carver (1975) showed that participants having a positive attitude toward physical punishment used more punishment when exposed to a mirror than students in a control condition. However, according to PSI theory, stimulating self-awareness should work only in participants who are able to downregulate negative affect. The procedure may backfire if it stimulates self-awareness on the fragmented level of OR which is likely to happen in anxious or depressed people.

2.9. Summary

The tour through a cycle of motivation-self-regulation in learning situations shows how adaptive regulation of behavior through personality systems interactions heavily depends on affective change. Any external or dispositional condition that impairs affective change will render system interactions difficult. Socialization or teaching styles leading to affective bias are risk factors with regard to adaptive control of behavior. An excessive bias toward negative affect impairs Phases 2, 5, and 8 (i.e., forming self-congruent and realistic goals, recruiting intrinsic motivation for their support, and utilizing feedback in an adaptive way). On the other hand, an excessive bias toward positive affect (e.g., over-optimism) risks difficulty and self avoidance and insensitivity for problems. A person who generates strong amounts of A + too quickly may circumvent the high-level systems of IM and EM including the integrated self, even when these systems would be useful (Fig. 1: short-cut from A – to A +).

Compared to biased affective sensitivity, impaired affective transitions are even more problematic. The relevance of affective transitions is illustrated in Figs. 1 and 3. Without the ability to change from A – to A(–), isolated representations of others' expectations or introjections (i.e., "object" representations) cannot even be checked for compatibility with the self, let alone integrated and supported by the self because EM access is impaired by perseverating A – (see the transition from Phase 1 to Phase 2 in Fig. 3). Without the ability to change from A – to A(–), a student cannot form realistic goals (i.e., goals that are based on an extended network of possible options for action that are validated by past experiences), without that ability to downregulate negative affect, a student cannot concentrate on task-relevant material, terminate unwanted ruminations, or set priorities (which also requires an EM-type implicit overview of uncompleted goals to compare and weigh them). Without the ability to change from A(–) to A(+) as necessary for the transition from Phase 2 to Phase

3 (Fig. 3), implicit goals, wishes or motives cannot be translated into explicit intentions (i.e., EM cannot talk with IM). Such cross talk is necessary when difficulties arise. Without the ability to change from A(+) to A+ (i.e., self-motivation), a student will remain focused on unrealistic thoughts and ideas without having the energy for implementation (see the transition from Phase 6 to 7 in Fig. 3). Finally, without the ability to change from A(–) to A– (i.e., without tolerance of painful experiences), the self system cannot grow and its functions remain underdeveloped because integration of new and discrepant experiences (from OR) requires pain tolerance (i.e. A–) according to the 2nd MA. Self-system functions include self-motivation, self-relaxation, decision-making, identification, and creativity, all of which are important for effective learning in school. PSI theory views self-regulation as the most important generator of affective transitions because self-regulation helps the person make these transitions autonomously. This is another example of the reciprocal nature of interactions among mental systems described by PSI theory. Self-regulation is facilitated by downregulation of negative affect at the same time that it supports this downregulation.⁵

3. Suggestions for teaching, training, and therapy derived from PSI theory

What are some practical implications of the foregoing analysis? At what points of intervention in training, instruction, or in clinical therapy might an understanding of PSI principles be useful? One avenue of psychological practice concerns the assessment of individual differences. PSI theory can help to identify individual difference measures that should be obtained in various practical situations to optimize teaching and intervention outcomes. The theory then suggests individualized training or instructional procedures based on such assessments (see Heggstad & Kanfer, this volume).

With regard to teaching behavior in classroom settings, PSI theory provides many suggestions concerning a more individualized communication with students that differ with regard to crucial characteristics of personality functioning. For example, PSI theory specifies the parameters provided by new assessment procedures that help decide which students' performance may be optimized by direct instructions and which students may benefit from a less direct approach to teaching. PSI theory also suggests that students who may show short-term benefits from a given approach to instruction may show some long-term progress in their development when exposed to the opposite treatment. For example, students characterized by strong analytical thinking, IM activation, or inhibition of A+, should show short-term benefits from direct instruction or communication by a teacher, but may benefit from a more indirect teaching style in the long run. Personality systems testing can also identify

⁵ The reciprocal nature of systems interactions may appear "circular" and unmanageable from the traditional linear view of psychological functioning. Today non-linear modelling has been so successful across various fields of science that the circularity argument does not pose serious problems. Computer simulations of a non-linear mathematical model of PSI theory have shown that reciprocal interactions postulated by PSI theory produce psychologically meaningful and testable predictions (Kuhl, in press, chapter 19).

students that need a period of self-monitoring and responsive encouragement before they can benefit from explicit goals regarding their study behavior. This is because responsivity to feelings expressed by the student helps him or her to develop skills of self-compatibility checking, the basis for identification with self-congruent tasks and activities (see also Perry and VandeKamp, *International Journal of Education Research*, 33(8)).

Finally, successful teaching can be optimized by orchestrating the affective transitions that are necessary for the phase transitions to be made at each particular point in the teaching process. For example, before initiating a difficult segment of curriculum, the teacher can explain to students that this work will be harder than usual, and try to generate some positive feelings to counterbalance the expected drop in positive affect. Monitoring students' affective states and teaching them self-monitoring skills can be another useful step toward teaching affect regulation. A teacher can, for example, promote students' ability to switch back and forth from difficulty awareness [A(+)] and self-motivation (A+) when faced with difficult tasks. She can encourage students to come back from the negative affect associated with failure experiences and think instead, "What benefits could this experience have for me?" Finally, students can learn to form realistic goals that are based on extended networks of routes for action (e.g., "Can I think of at least three different things I could do to reach this goal?").

3.1. Individualized training based on systems-interactions testing

Consider the mechanism that explains why reward can sometimes undermine self-determination and intrinsic motivation (Deci & Ryan, 1991). According to my earlier interpretation, intrinsic motivation requires access to the integrated self of EM as a prerequisite for self-motivation for a task and for the perception of its need-satisfying potential. PSI theory further specifies the conditions under which undermining effects are expected. The personality dispositions and situational factors that should intensify undermining effects of reward include (a) dispositions associated with the short-cut from A- to A+ (e.g., excessive extraversion, repression, or optimism: Fig. 1) and (b) task conditions capable of inducing a short-cut to the generation of positive affect (e.g., strong material incentives providing immediate reward).

The mechanisms presumably undermining intrinsic motivation through reward are to be distinguished from mechanisms causing a loss of intrinsic motivation through coercion or other controlling conditions. According to PSI theory, the latter conditions operate through negative affect, which does not circumvent, but inhibit access to the integrated self.

The difference between these two routes that short-circuit or inhibit the self is testable through different methods of intervention. Conditions that support relaxation should be especially useful for people who easily enter and/or have difficulty leaving negative states; it is these people who are most likely to have their intrinsic motivation undermined through coercion or control. So, the teacher, trainer or therapist might reduce persistent negative states by downplaying the personal consequences of failure (e.g., "I would like to have a better idea of how difficult this task really is; when you try

it and tell me what it is like it helps me to improve it next time”). Another technique would be to actually teach such persons how to cope with anxieties or pressures. However, anxiety-reducing training will be less useful for people whose intrinsic motivation is more easily undermined by external rewards rather than by conditions of coercion. Because these persons are likely to focus on positive incentives without integrating them into the self, they would not be expected to benefit from procedures that target and reduce anxiety. They might even benefit from an opposite strategy, which is teaching them to become more sensitive to their latent anxieties. This would slow them down in their self-circumventing pursuit of positive incentives and create time windows for deeper self-compatibility checking.

PSI theory also suggests that personality dispositions associated with inhibited sensitivity for positive affect (e.g., introversion) or enhanced sensitivity for negative affect (e.g., neuroticism) are not as problematic as dispositions impairing affective change, such as state orientation. Even strong affective sensitivity can be beneficial for adaptive action control as long as the person can employ well-developed self-regulatory functions to counterregulate affect — e.g., self-motivation and self-relaxation.⁶ My previous discussion of Oettingen’s findings implies that a predisposition to inhibit positive affect can make a good basis for the type of affective change that is optimal for enacting difficult intentions. This is provided that the disposition towards A(+) is combined with an ability to restore positive affect when the moment for enactment arrives (i.e., self-motivation and prospective action orientation: AOP).

A similar argument can be made with regard to negative affect. Even a strong sensitivity for negative affect can be beneficial for creativity and personal growth, provided it is combined with the self-regulatory ability of self-relaxation (or AOF: Fig. 1). The reason for this, again somewhat paradoxical, advantage of a disposition such as “neuroticism” is based on the neurotic’s potential to support what I call *emotional dialectics* (that is, self-regulated shifts among positive and negative states). Specifically, sensitively responding to aversive experiences is a good condition for accommodation. Without the problem awareness facilitated by negative affect (Fig. 1a), the integrated

⁶ The distinction proposed here is not contradicted by empirical findings (Derryberry & Reed, 1994) that dispositions related to sensitivity for positive or negative affect such as extraversion and neuroticism (Gray, 1987) may also have an affective change component. For example, extraversion seems to be associated not only with increased sensitivity for reward (Gray, 1987), but also with a decreased ability to terminate positive affect or leave positive locations (Derryberry & Reed, 1994). On the other hand, action orientation is related to the ability to leave an aversive state or location (Kuhl & Beckmann, 1994). A practical example illustrates the significance of this subtle distinction. Extraverts should have difficulty entering the problem-awareness and the difficulty-focus phases of the cycle (because of their low sensitivity for negative affect or for the inhibition of A+), whereas action-oriented individuals are not expected to have this problem (because they do not have a high threshold for entering A- or A(+) states, but a high ability to leave those states once they are aroused). Since AOF implies the capacity to leave a negative state (e.g., to move from Phase 1 to Phase 2 in Fig. 1) an action-oriented person’s ability to enter Phases 2, 4, 5 and 8 should be facilitated (i.e., realistic goal-setting, self-compatibility checking, self-monitoring, self-motivation, self-relaxation and optimal use of feedback). Extraverts do not necessarily have this capacity once they have entered a negative state (which can, of course also happen to them despite their strong attraction to positive states).

self would have little chance to learn new things and integrate discrepant (unexpected or unpleasant) experiences. However, to integrate discrepant experiences into EM structures, the self-related portions of EM have to be activated at some point. This requires downregulation from A – .

An excessive bias toward downregulating negative affect may make for a cool and assertive personality, but it fails to allow the integration of more discrepant sides, for example one's weaknesses, dark sides, or simply unexpected or unwanted experiences that would be permanently shut off from conscious awareness in an over-assertive personality. Integration of unexpected or unwanted experiences seems necessary to support personal growth. Antisocial personality disorder is an example of the dissociation of self-assertiveness and self-development predicted by PSI theory if the capacity for affective change is impaired as a result of an inability to focus on one's own and other's anxieties, painful experiences, and weaknesses [i.e., a fixation on A(–)].

3.2. *Training phase transitions for affect regulation*

If the capacity to terminate affective states is even more important than the capacity to enter affective states, the question arises as to what kinds of teacher behavior, training or therapy could most improve affect-regulating skills. Space limitations do not permit detailed description of my model of the development of self-regulation of affect (i.e., the systems conditioning model) that has some interesting implications for classroom behavior and training (Kuhl, 2000a,b). Most notable, however, is the point that, to enhance connections between the self-system and subcognitive mechanisms of affect generation or inhibition, there is a critical role for what I call interaction partners. These include parents, teachers, friends, spouses, and therapists who respond on a daily basis to an individual's self-expressions of affective states.

When a person expresses affect, such as loss of energy or hope, an unsatisfied need, or a feeling of pain or anxiety, it is important that close interaction partners promptly and adequately respond. For example, the mother who responds with soothing behavior at the moment when her baby expresses distress, strengthens the baby's link between the system that controls self-expression (i.e., the self and EM) and the system that controls affect (subcortical affect generation networks of the limbic system: LeDoux, 1995). This learning process is akin to strengthening conditioned stimuli and responses, even if the "stimulus" is defined by the activation of one system (e.g. EM) and the response is defined by the activation of another system (i.e., subcortical inhibition of A –); at some point the conditioned stimulus (activation of the self-system) is sufficient to elicit the response (inhibition of negative affect).

This *systems conditioning model* has important implications for classroom behavior and intervention. If an impairment of interactions among personality systems is attributable to a deficit in an affect-regulation function, it will not suffice to counter-regulate the predominant affective state. The teacher who is consistently friendly and encouraging, or who uses positive thinking or humor, for example, may provide a good basis for enhancing students' self-motivation, but this behavior alone will be insufficient. The ability to *restore* positive mood is a prerequisite for students to accept

difficult challenges without running the risk of depression. And this ability again develops when interaction partners such as teachers and peers respond attentively with encouragement *once discouragement has been expressed*.

An indiscriminate positive attitude may improve general mood (it may even turn an introverted student into more of an extravert), but it does not improve the ability to restore a loss of positive mood without external encouragement. Loss of positive mood can happen even to the most optimistic or extraverted individuals. Likewise, a cool style of communication in the classroom or even systematically working with a client to learn self-relaxation during therapy fails to help the person cope with painful experiences once they are aroused. Even people who score extremely low on neuroticism or anxiety scales, or people that have successfully completed many yoga and meditation courses, will have painful experiences in their lives. In situations that are serious enough to elicit negative emotions even in robust people, adjustment depends on the degree to which they have developed the ability to relax without external support once negative affect has been aroused. Low sensitivity for negative affect is no guarantee for good coping skills. Individuals with low coping skills, no matter whether they have high or low sensitivity for negative affect, need a period of training in self-expression where externally supported relaxation is made contingent on self-expressing negative affect. Students or patients who have problems with self-awareness or self-expression would need some self-awareness or self-expression training before they can even take advantage of the contingent encouragement provided by an interaction partner.

3.3. Training guided by microanalysis of systems interactions in self-regulation and motivation

Other interventions may be indicated for individual students, depending on which function is impaired at which stage of the motivation-self-regulation cycle. In collaboration with therapists and teachers, we are developing techniques applying PSI theory in combination with PSI-based assessment procedures to develop individualized interventions. Our hope is that these efforts can help move psychological intervention beyond the unsatisfactory state of affairs in which any new treatment is recommended indiscriminately as if it would be good for everybody.

Our approach involves development of assessment procedures that identify the functional locus of an individual deficit. In light of the abundance of techniques developed for training and therapy, there seems to be little need to invent new training techniques. Many techniques described in the clinical literature could be adapted for educational settings. A major challenge for the future would remain even if sufficient techniques have been adapted for educational purposes. This challenge is to coordinate existing techniques with new assessment methods in ways that identify the type of intervention that would promise the fastest progress in light of the individual profile of the functional components of motivation and self-regulation described by PSI theory.

I referred previously to the Volitional Components Inventory (VCI; Kuhl & Fuhrmann, 1998) that assesses more than 30 volitional functions (for a different example,

see Husman, McCann & Crowson, this volume). The VCI decomposes some of the functional loci depicted in Fig. 1. Teachers and psychologists should find it easier to adjust their behavior to individual needs, or to design an intervention program for a particular student or client, because this inventory informs them about whether the individual problem is a deficit in self-motivation or self-relaxation and which microcomponent of these or other macrofunctions is impaired. Individualized interventions can be developed to the extent that one can proceed to deeper and deeper levels of analysis.

Consider a client whose VCI shows adequate self-relaxation skills, but an inability to access them under stressful conditions. The client's profile also shows trouble applying self-relaxation when there is a tendency toward external control. By understanding the client's volitional profile at this micro-level, the therapist can target specific procedures to remedy external control tendencies, as well as ways of using self-relaxation when exposed to stress.

Further examples of functional loci assessed by new methods relate to the measurement of needs and motives. Classical motivation theory has had limited practical success. According to PSI theory, this is not because motivation is a derived phenomenon and can be better handled by focusing on its alleged cognitive basis as some have contended (e.g., Norman, 1980). Instead, the major limitation of classical assessment procedures in motivation research is the lack of information about systems interactions. The assessment of motives using operant (or "projective") techniques reveals reliable (Kuhl, 1978) and valid (McClelland et al., 1989) indices of the strengths of achievement, affiliation, and power motives. Classical methods do not, however, provide information concerning the degree to which individual needs are linked to specific cognitive systems that mediate enactment of need-satisfying goals.

We have developed a new scoring key for a parsimonious operant method for assessing the three basic motives mentioned. This scoring key assesses the connectivity of each of the three motives with positive and negative affect and the degree to which the self-system participates in the motive-affect coalition that is characteristic of an individual (Kuhl & Scheffer, 1999). In addition, we constructed a questionnaire for assessing the degree to which an individual's perceived needs are associated with each of the four cognitive macrosystems.

These two instruments have proven especially useful for trainers and therapists who wish to proceed to deeper levels of understanding causation, including their clients' affective biases and dysfunctional forms of need satisfaction and action control. Research using the instruments has shown that biased affective responding does not always seem to be based on inherent or acquired dispositions for levels of affect generated. Instead, the causes of many symptoms of dysfunctional interactions among psychological systems can be traced to inflexible and maladaptive coalitions between perceived needs and personality systems. Among such symptoms are procrastination, rumination, alienation, depression, impaired identification with personal goals, and somatic complaints.

Consider the procrastinating behavior of one student who showed quite positive affective dispositions, according to our personality assessment. Further evidence showed that her procrastination could be attributed to a strong connectivity between need for achievement and intuitive behavior control. This contrasted with her

comparatively weak connectivity between thinking, her achievement motive and planning, and IM. It was her overall pattern of personality systems interactions that explained this student's particular problem. In contrast to other cases of procrastination, this student did not excessively focus on difficult goals, or display a lack of energy to enact them; nor did she have an inability to cope with anxieties associated with the possibility of failure. Instead, she tended to put things off because her achievement motive (which was sufficiently strong) was connected with her intuitive and impulsive temperament (whereas her power motive was not as strongly connected with intuition and impulsivity). This connection activated achievement-related behavior only when tasks and circumstances made learning easy. Closer analysis confirmed that the student's procrastination was confined to difficult tasks. Obviously, she needed a different type of treatment than students whose procrastination symptoms were resulting from a lack of energy, an excessive difficulty focus, or poor self-relaxation skills (see also DeWitte & Lens, this volume).

Another student's high sensitivity for negative affect, which took the form of a generalized anxiety concerning performance at school, could be attributed to the strong association between his need for affiliation and intention memory (i.e., to a motive that was only indirectly related to scholastic performance). In this case training and instruction would focus on the assumed cause of the high level of anxiety and subjective stress. The student was trying to establish satisfying relationships with others but his interaction partners perceived his efforts to be manipulative ("he always has a goal in mind when he is being friendly"). The link between IM and the need for affiliation is not optimal in typical situations requiring the use of intuitive behavior programs supporting social interaction. In contrast, a high connectivity with IM is considered the preferred system configuration for the enactment of achievement needs, largely because achievement means reaching difficult goals. This case description suggests that IM and explicit planning can disrupt social interaction because the lack of spontaneity makes the actor appear manipulative or not sincere. Frustration, stress, and negative affect can result from an inappropriate coalition between a motive and one of the cognitive macrosystems. Elevated levels of stress and negative affect impair access to EM and its self-regulatory functions (e.g., self-motivation, self-relaxation, etc.). In this case, our assessments uncovered a hidden source of negative affect impairing access to EM and its self-regulatory functions that was not directly related to scholastic issues.

According to the 2nd MA, the semantic content of negative affect does not matter as far as the impairment of EM access is concerned. *Any* condition that raises the general level of subjective stress can impair access to EM, with the effect that self-regulatory and motivational mechanisms that depend on this system cannot be employed effectively. The person is unable, for example, to generate the extended goals that provide feelings of confidence and satisfy basic needs, or is unable to self-monitor, self-motivate, relax, or effectively use feedback. To the extent that a need is not associated with the holistic feeling aligned with the representation in EM (i.e., when the need has not attained the status of a motive), it should be difficult to form realistic goals that satisfy that motive. It should also be difficult to recruit the emotional energy necessary for identification with and commitment to implement

need-congruent difficult goals (see Wolters & Rosenthal, *International Journal of Education Research*, 33(8)).

Findings by Brunstein (in press) confirm these predictions. Students who had a low ability to downregulate negative affect (i.e., state-oriented students) felt less committed to goals that matched their dominant motives as assessed by TAT. Moreover, their commitments were less dependent on the subjective probability of success (i.e., they set less realistic goals). PSI theory explains these findings on the basis of reduced EM access resulting from perseverating negative affect.

3.4. *What training for this person at what time?*

What intervention technique can be used to modify dysfunctional connections between needs and personality systems? Aside from interventions aimed at changing affective sensitivity, or, more importantly, self-regulation of affect, training can focus on whatever system needs some enhancement. Existing approaches to training and therapy can be coordinated with functional loci described by PSI theory (Fig. 1). Behavior therapy is open with regard to which functions are selected for treatment. Treatment effectiveness can be improved when therapists are better informed about functions that throw the system out of balance, or that lead to more specific types and loci of problems.

For example, techniques derived from hypnotherapy (Erickson & Rossi, 1979) can be coordinated with feeling functions (EM). Many hypnotherapy techniques stimulate extension memory, such as when the trainer invites a client to replace dichotomous judgments (“This teacher is a mean person” or “I am always too stupid to get things right”) with a graded judgments such as “In your diary, rate on a ten-point scale how mean the teacher was on that particular day” (de Shazer, 1985). These and similar techniques can be used by teachers in a classroom setting to individualize instruction. Individual testing can also identify cases in which the global recommendation of graded judgments has to be reversed. For example, a student who indulges in positive affect excessively and tends to have impressionistic intuitions may benefit more from repeated encouragement to express clear-cut, dichotomous rather than graded judgments.

A teacher can also stimulate a student’s extension memory by requesting more than one or two options for action (or by asking the student to think about more than one or two potential meanings of a communication). When the student has more than two options in mind, it is difficult to maintain an active object recognition system specialized on selecting one object at a time. It is also hard to maintain a bias toward analytical thinking, which is specialized on comparing two units of information at a time it is. In severe cases of underdeveloped EM functions, teaching awareness of bodily sensations (as in some relaxation procedures) can help because EM is closely connected with somatic and emotional representations (Damasio et al., 1991). Somatosensory processing seems to be one of the most rudimentary functions of EM that can be taught, even when more sophisticated cognitive EM functions overtax the individual’s available capabilities. (According to the systems conditioning model, perception and expression of bodily states is considered the earliest function of EM and the developing integrated self.)

PSI theory also proposes a functional explanation for the application of various sorts of creative exercises in classrooms and in therapy situations (painting, listening to or making music, dancing, etc.). These stimulate extension memory because creative exercises typically require access to remote associations and affectively toned non-dominant behaviors. According to the 2nd MA, these and many other techniques for training EM can strengthen a person's ability to downregulate negative affect, even without any direct training of self-relaxation skills, especially when microanalytic assessment suggests that the individual who needs some support has a well developed connectivity between EM and A(–), but that EM structures are underdeveloped.

Despite the seemingly general utility of interventions that coordinate with EM functions, they will not provide the most efficient options in all cases. For example, if inhibition of positive affect has been identified as the functional locus of a learning problem, then a teacher should employ techniques that stimulate individual resources rather than EM functions (e.g., repeatedly calling a student's attention to his abilities and to the small, but discernible progress he or she is making). Students suffering from energy deficits (with or without an excessive difficulty focus) do not need self-relaxation training, but self-motivation training instead. The procedure investigated by Oettingen and Gollwitzer (this volume) may help build up connectivity between difficulty focus (dwelling) and energy focus (indulging), but it should be elaborated if self-motivational skills are to develop. Students will need to become independent of encouragement and other forms of support in the long run. According to the systems conditioning model, self-motivation develops when the trainer or teacher assumes the role of a coach or mentor that accompanies difficult activities and gives support and encouragement contingent upon *expressed* lack of energy or a loss of interest. In severe cases, this training may have to be postponed until self-monitoring and self-expression skills have been developed (because the mentor cannot respond contingently to self-expressions unless self-expressions occur frequently enough).

The focus on stimulating positive affect directly or indirectly is a characteristic shared by techniques derived from several approaches to training and therapy. People with characteristically low positive or high negative affect may be easily identified (and likely to identify themselves) as needing help more than people having a bias toward positive affect. Nonetheless, overly positive people may also develop affective deficits that can cause dysfunctional biases in personality systems interactions. For example, an overly optimistic student might need a treatment that is described infrequently in training manuals, i.e., training that supports tolerance of reduced positive affect, which is a prerequisite for pursuing difficult goals. Or that student may need to learn tolerance for ambiguity, and be given support for focusing on painful experiences or personal weaknesses. I have described such support as a prerequisite for growth of the very system that mediates confidence, identification, flexibility and endurance when confronted with failures — the integrated self.

4. Concluding remarks: the need for interventions that practice systems interactions

Most psychological interventions limit their focus to one particular state or function. Similarly, therapists and teachers tend to address problems one at a time

— seeking, for example, to reduce negative affect or to help their students learn how to generate more than one or two alternatives when approaching tasks. Focusing on isolated subsystems or functions can restore an upset balance in the macrosystems. However, if, as PSI theory holds, personality dysfunction is frequently attributable to biased personality systems *interactions*, then we should seek interventions that strengthen underdeveloped connectivities among systems. Without procedures that strengthen systems interactions, the new methods for assessing systems interactions cannot be applied effectively.

One intervention technique that supports systems interactions is *focusing therapy*. In this type of therapy, the therapist stimulates continuous exchanges between feelings (i.e., implicitly represented in EM) and explicit representations (“labeling”). Labeling is a prerequisite for representing an intention in IM because intention memory requires explicit representations (Gendlin, 1978). One could think of similar techniques for strengthening connectivities between needs and affect (as when a reserved student fails to experience positive affect when his latent need for belongingness is being satisfied) or between needs and cognitive systems (as when a conscientious student cannot really *feel* success because she is fixated on discrepancy-sensitive OR).

The many examples discussed in this article provide a glimpse of new perspectives opened by a functional-design approach to training and therapy. Readers may also have discovered how difficult and sometimes unusual it is to talk about personality in functional terms. Why is personality development important for high-level cognitive and emotional functioning? Why is openness, not only to ideas but also to people, prerequisite for self-development? Why is it sometimes difficult to have an open exchange with another person about deep feelings on a personal level?

According to PSI theory, the extent to which EM can be activated depends on the amount of negative affect that can be downregulated (2nd MA). The deeper the negative experiences to which a person attends (first on the OR level), the deeper and the more extended are the feelings that one can activate on the EM level if one succeeds in coping with those feelings [A(–)].⁷ This is tantamount to a trade-off between the wish to grow and become an open and creative person and the risk of arousing negative affect with which one cannot cope. Therefore, the risk involved in deep personal relations relates to the possibility of failing to cope with the emotions aroused. Is there any antidote to this risk? Optimal development of perhaps the most powerful computational network of the brain (i.e., EM) requires sensitivity to negative affect because EM access depends on downregulation of A – and one can only downregulate A – if one is sensitive to it and can tolerate it. If this is so, the question arises as to how one can teach people to tolerate the risk of confronting their anxieties and other negative affects.

According to a recently developed approach to therapy (Gilligan, 1997), there is one powerful condition that enables people to focus on intensive negative feelings without getting overwhelmed. A *loving relationship* provides continuous reassurance that one

⁷ PSI theory explains the relationship between depth of self-activation and intensity of negative affect that is expressed and coped with on the basis of a spread of activation model. The greater the affective energy that is aroused, the deeper or more extended are the associative networks that can be activated.

can dare to focus on negative feelings, express them, and still have the chance to cope. Self-relations therapy (Gilligan, 1997) not only emphasizes the “courage to love”, it connects this emotional basis of the therapist–client relationship with cognitive-emotional exercises that consist of tolerating cognitive and emotional contradictions. From a functional point of view, Gilligan’s approach supports systems interactions, especially between the profound human need for love and the highest level of personality functioning. This highest level is the integrated self and the capacity of EM to accommodate extended networks of affect and cognition, even if they seem incompatible from the perspective of other psychological systems such as logical thinking or object recognition. Interestingly, Gilligan’s argument for therapy is highly consistent with the writing that educator Nell Noddings (see Tappan, 1998) provides on the role of caring in teaching practice.

Explaining the highest level of personality functioning from a functional-design point of view, as unusual it may seem, has one interesting advantage. Even scientists who are reluctant to acknowledge complex phenomena such as love and self-growth as topics that can be investigated with scientific methods can begin to understand why this complex level should be investigated even more systematically than other levels in psychological science. The highest computational power of the human system (i.e., EM with the integrated self) is indispensable for complex decision-making, problem solving, and the most advanced forms of creativity. However, this power can only be optimized when a person learns to accommodate more and more new experiences through emotional dialectics. The person has to learn to perceive sources of pain and anxiety and to cope with them through advanced strategies, exchanging or reflecting feelings on a personal level.

Applying PSI theory to the highest levels of personality functioning is a great challenge. This involves explaining the highest levels of personality from a functional point of view without destroying the integrity of personality. We hope ultimately to control the risks of any functional approach that makes contact with the most complex levels of personality, and to avoid pursuing a reductionistic and cold view of human beings. Improving our skills to help students and clients recover from dysfunctional states that keep them from actualizing their full potential remains the highest of goals.

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