

CHAPTER ONE

INTRODUCTION

1.1 THE INSIGHTS GAINED IN THE NEUROSCIENCES ARE RELEVANT FOR EACH OF US

The “decade of the brain” has come and gone, but a century of progress in the brain sciences is on the horizon. Over the past 15 years, groundbreaking research has begun to illuminate the neural foundations of experience and behavior. Several more decades will pass before we will fully comprehend the baffling complexity of the brain’s basic processes, but even the knowledge that is already available suffices to significantly shake up our conventional understanding of ourselves as mind- and soul-bearing beings. The current neuroscientific paradigm shift is not linked to a single person, such as Copernicus or Darwin, but its implications are comparable to those earlier scientific revolutions.

The decade of the brain has massively accelerated the rate of progress in the neurosciences. The main reason for this acceleration has been the availability of new research tools, in particular, the newly available capacity to observe the brain in action, as it were. The recent development of neuroimaging and similar technologies has fueled an exhilarating dynamism in the neurosciences that at times appears truly mind-boggling. Indeed, nearly every month, renowned scientific journals such as *Nature* or *Science* publish neuroscientific research with exciting results that significantly extend our knowledge in this area. The only other scientific domain that can perhaps rival the dynamism and impact of the current neuroscientific knowledge revolution is genetics. Neuroscience overlaps, of course, with genetic research because neural plasticity is intrinsically linked with gene expression, as we shall see later (see chapter 2).

The current breakthroughs in the neurosciences did not emerge in a vacuum. They were preceded by a long series of important findings, recognized by 23 Nobel prizes awarded to neuroscientists in the 20th century. Indeed, these foundational insights reach back to the beginning of the past century. In 1906, the Spaniard Ramon y Cajal and the Italian Camillo Golgi—both neuroanatomists—were the first neuroscientists to be awarded the Nobel prize for medicine. In their day, a common assumption was

still that the nervous system is a seamless network. Ramon y Cajal then developed the idea that the brain consists of single neural cells and that impulses are transmitted between neural contact points, which Sherrington later termed *synapses*. This key insight led many to herald Ramon y Cajal as the father of neuroscience. Until the 1950s, however, the view of the brain as a network of neurons and synapses remained a merely theoretical position. It was not until the development of the electron microscope that this position was confirmed as fact—a fact that we now often regard as self-evident.

Twenty-one Nobel prizes for other outstanding research followed these early insights, and each marked an important step toward 21st-century neuroscience. In the year 2000, Arvid Carlsson and Paul Greengard were given the Nobel prize for their work on the role of dopamine in neural signal transmission, as was Erick Kandel for his groundbreaking work on the neural foundations of learning. With Kandel, we have arrived in the 21st century. His research group at Columbia University in New York remains one of the most productive of our day. Throughout this book, we shall sample often from the exquisite neuroscientific delicacies that Kandel's team serves up seemingly effortlessly and at breathtaking speed.

What exactly are the neuroscientific revelations, then, that have the potential to permanently alter our human self-understanding—our conception of what it means to be human? I would argue that this isn't so much about singular findings but rather about the overall conclusion emerging from the recent neuroscientific research. In Kandel's words: "From these considerations it follows that all the brain processes—from the motoric regulation of movement to the most intimate lines of thought—are ultimately biological processes" (1996, p. 713). The brain scientist Joseph LeDoux has expressed this idea even more poignantly in the title of this last book: *Synaptic Self: How Our Brains Become Who We Are*. The last sentence in this book reads: "You are your synapses. They are who you are" (2002, p. 324).

LeDoux aims to show in his book *how* our synapses make us who we are. The question is no longer *whether* our personality emerges from neural structures and processes but rather, he is concerned with the specific mechanisms determining how we become ourselves. No topic, regardless of how thorny or controversial, is omitted. The question of free will becomes the question of how our brains accomplish the feat that we experience ourselves as the authors of our own feelings, thoughts, and actions. Indeed, conscious awareness has become somewhat of a favorite topic among leading neuroscientists. Their discussions do not concern themselves with the question of whether consciousness emerges from the brain, but rather, *how* specifically one should construe the emergence of consciousness from basic neural processes (Bachmann, 2000; Crick & Koch, 1990, 2003a, 2003b; Dehaene & Naccache, 2001; Edelman, 1989; Edelman & Tononi, 2000; Koch, 2003).

There is indeed a great deal for us to consider, then, if it is true that all that we think, know, believe, hope, suffer, decide, or do, is ultimately linked—down to the most minute detail—to the structures of neurons, synapses, and the processes among them.

If even concepts such as mind and soul are ultimately—in their existence as well as their particular characteristics—a product of neural networks (see chapter 2), then it is indeed time to reconsider our conception of what it means to be human. The process by which other sciences receive and absorb the recent neuroscientific revelations has only just begun. Considerably more time will pass, however, before the new conception of human self-understanding has penetrated societal awareness more generally.

Modern philosophers have quickly recognized the societal relevance and explosive potential of the newly emerging neuroscientific findings and claims. Suddenly, fact-oriented scientists are appearing on the scene with statements about domains traditionally claimed by philosophy—the question of free will, for instance, or that of human consciousness. In her 1986 book *Neurophilosophy*, Patricia Churchland was among the first to articulate how our very conception of the mind–body problem is altered by neuroscientific evidence. Churchland argued that traditional dualistic views had become untenable in light of the new evidence. Such earlier and now outdated views include, for example, the position advanced by brain scientist Paul Eccles (Popper & Eccles, 1977), who argued that the brain causally influences the mind and the mind *as an independent entity* also influences the brain. The new view, by contrast, holds that causality is unidirectional: From the brain to the mind, but not from the mind to the brain.

What are the implications for psychotherapy? Will it become a superfluous anachronism? Must psychotherapists surrender their turf to the psychopharmacologists? Not at all!

1.2 BRAIN, PSYCHOTHERAPY, AND PSYCHOPHARMACOLOGY

If all mental processes are grounded in neural processes, then changes in mental processes should also be linked with detectable changes in neural processes. The evidence clearly indicates that mental processes can be effectively and permanently altered through psychotherapy. Inevitably, the effectiveness of psychotherapy—in cases when therapy *is* effective, that is—is mediated by its effects on the brain. When therapy doesn't alter the brain, it also *cannot* be effective. In LeDoux's words: "Psychotherapy is fundamentally a learning process for its patients, and as such is a way to rewire the brain. In this sense, psychotherapy ultimately uses biological mechanisms to treat mental illness" (LeDoux, 2002, p. 299).

This is quite an unusual line of thinking for most psychotherapists, and not just for them. Let's consider the position of Eric Kandel—who incidentally began his scientific career as a psychiatrist—in somewhat greater detail:

A fascinating association in this context is that psychotherapy, as far as it leads to substantial behavior change, appears to achieve its effect through changes in gene expression at the neuronal level. An analogue line of thinking suggests, then, that neurotic disorders are linked with changes in neural structure and function, just as specific forms of

mental illness include structural (anatomical) brain changes. Consequently, any—successful—psychotherapeutic treatment of the neuroses and personality disorders would also trigger structural changes in the involved neurons. With the improved resolution of neuroimaging methods, we are now at the brink of the fascinating possibility to use these tools not merely for the diagnosis of mental illness but also to ensure the effectiveness of psychotherapies. (Kandel, 1996, p. 711)

To be sure, we are not there yet. But the direction toward which these developments can (and will likely) move is becoming increasingly clear. Indeed, it would seem a most attractive option to replace our current merely descriptive but nonexplanatory diagnostic systems (DSM and ICD)—which apart from their undeniable advantages are also plagued by a number of severe limitations (Beutler & Malik, 2002)—with a more functional taxonomy; one that classifies phenomena based on their pathogenesis. Truly immense progress would be achieved, indeed, if we were to determine with precision which aspects of the brain would have to be altered in order to attain specific desired changes in experience and behavior. The task of neuropsychotherapy research would then be to determine which kinds of events a patient must experience in order for the desired brain changes to follow. The task of the neuropsychologist, ultimately, would be to ensure that such theoretically needed experiences become concrete patient reality.

At this point, all of this remains utopian. To turn the utopia into reality, a lot more needs to be known; the research on the neural correlates of mental disorders has only just begun (see chapter 3). Nevertheless, it is abundantly clear that this knowledge will grow exponentially within the next decade because so many teams are now engaged in this quest. Psychopharmacologists are eagerly translating every knowledge gain into improved medication treatment. It is becoming clear, moreover, that targeted alterations of neurotransmitter balances in specific brain regions can lead to the same kinds of synaptic changes as those associated with learning experiences. The effects of psychopharmacological interventions would be massively improved, however, if they were not applied as indiscriminately—throughout the entire brain—as is currently the case (see Stahl, 1996).

One must remember as well, however, that the brain at all times remains dependent on experiences that are mediated by the senses. Even when the brain is under psychopharmacological influence, sensory experiences continue to have their effects upon the brain. When such experiences are negative, their consequences will be negative. Yet, a person's experiences and their subjective meaning critically depend on his or her motivation and actions. Most experiences, after all, are not simply passively experienced—not even those that create and maintain mental disorders. From the cradle to the grave, human beings are in a state of continuous motivation: constantly desiring to attain but also to avoid certain experiences. This principle holds true just as well for people with mental disorders. Regardless of how excellent their psychopharmacological treatment may be, they will also always benefit from instruction and support to bring about the needed increase in positive— and reduction in harmful— experiences. Once such concrete, positive life experiences are being realized,

self-sustaining and healthier brain structures and processes can fall into place. Irrespective of the rate of pharmacological progress, then, we will continue to need a profession that has as its goal to take the time and develop the specialized expertise required to find out—in the individual patient case—which precise experiences are needed to attain positive change, a profession that aims to guide and support such a patient, to ensure that the needed experiences are turned into concrete reality. Thus, the neurosciences by no means render psychotherapy superfluous. On the contrary, the necessity of psychotherapy results from, and is clarified by, a neuroscientific perspective on mental disorders. I predict that even many of those who previously were skeptical toward therapy will thus come to view it as necessary and important.

Psychotherapy and pharmacological intervention are not just two alternative ways to achieve a largely equivalent outcome—one by a sensory and the other by a biochemical pathway. Their relationship can be characterized as neither alternative nor symmetrical. Without sensory experiences that satisfy their basic needs, human beings cannot live and attain happiness (see also chapter 4). The brain is designed for the purpose of experiencing need-satisfying events; human happiness is more than the right combination of neurotransmitters. An adequate neurotransmitter combination is undoubtedly important, and this biochemical prerequisite is fortunately also met for most people. When this precondition is not in place—regardless of what the causes might have been—it can be very helpful to pharmacologically reestablish this disturbed balance. In some cases, this might even be the only promising path. Once the balance is reestablished, the treated patient is then (again) on an equal level with those who are equipped by nature with the correct neurotransmitter mixture. But this equality is reestablished only in the biochemical aspect; nothing is decided about the future happiness or suffering of the person, which will continue to depend on the sensory events experienced by the person. And again, the principle holds true, even for the person treated with medication, that we are not just passive victims of our life experiences but also to a large extent actively determine them. In turn, the events that are experienced depend upon the person's motivational potentials, on the abilities, knowledge, and situation-specific reactions that have formed in the person over the course of his or her life history.

All of this information is stored on a neural level in distinct memory systems and can be altered through new experiences. But these specific experiences are critical and indeed indispensable. To be sure, neurotransmitters can influence the activation threshold of problematic thought, emotion, action, and reaction potentials, but such pharmacological alterations could not result in the emergence of new memory traces. To create new memory content, which can then change subsequent experience and behavior, the person needs to take in new sensory experiences that change old memory content. Such new experiences do not come about by chance, even when the right neurotransmitter balance is in place. From a neuroscientific perspective, psychopharmacological therapy that is not coordinated with a simultaneous, targeted alteration of the person's experiences cannot be justified. The widespread practice of prescribing psychoactive medication without assuming professional responsibility for the patient's concurrent experience is, from a neuroscientific view, equally irresponsible.

In many cases, psychotherapy alone (without any pharmacological intervention) can achieve neural changes that are linked with positive consequences for the person's experience and behavior. Neurotransmitter imbalances, then, can be corrected not only via pharmacotherapy but also via therapy alone (see chapter 3 for more detail on this point). Long before the advent of our artificially created psychoactive medications, naturally occurring life events were linked with fluctuations in serotonin and dopamine levels. Events that are specifically and professionally designed to bring about certain experiences can, of course, have similar effects. Thus, a neuroscientific perspective provides ample justification for psychotherapy alone, even when used without pharmacological cointervention. This holds true at least for those disorders and problems for which studies have provided solid evidence that psychotherapeutic interventions can effectively lead to improvement.

The use of pharmacotherapy alone—in the absence of the professional and competent structuring of the treated patient's life experience—is not justifiable from a neuroscientific perspective. Such treatment implicitly assumes that the patient will somehow manage to encounter the right kinds of events on his or her own, without professional guidance. Cases in which this happened to work well cannot be used, however, to scientifically substantiate this widespread practice. For instance, when depressed patients are treated only with medication—a current common practice—the short-term effects are often quite good but not really so impressive across all treated patients. Averaging across the different types of antidepressive medication, the effect size of pharmacotherapy appears to be 50% larger than the effect size associated with placebo (Joffe, Sokolow, & Streiner, 1996). The long-term relapse rate, however, appears to be nearly 80% among patients who experienced immediate improvement following treatment (Elkin, 1994). With continued psychotherapeutic treatment, this long-term relapse rate appears to be noticeably reduced (Elkin, 1994; Rush & Thase, 1999). As soon as medication no longer augments or inhibits synaptic transmission, and therefore no longer protects from negative life experiences, the patient's life constellation that originally led to the depression can once again exert its noxious influence. This is even more likely because the patient on pharmacotherapy alone is unlikely to have learned what to do to be nondepressed without the protection offered by medication.

There are additional reasons for considering the patient's life situation when prescribing pharmacological agents. That is, the effect of medication can be completely different in different patients or even within the same patient at different times, depending on the person's particular life constellation. The evidence for this point comes from a study on crayfish, but it is nevertheless quite interesting and notable. Yeh, Fricke, and Edwards (1996) identified a specific crayfish neuron whose response to serotonin—the very neurotransmitter known to be critical in pharmacological therapy of depression—depended to a large degree on the animal's status within the social hierarchy. This neuron controls the tail-flip reflex, which is part of the crayfish's fight-or-flight reaction. Animals that are more dominant within the social hierarchy respond to serotonin with an increased action readiness of this neuron, whereas socially lower animals experienced the opposite effect: an inhibition of this neuron.

When two crayfish that are both low within the hierarchy are kept together, one of them soon takes on a dominant role. As soon as dominance is achieved, the previously inhibitory effect now reverts to its opposite: serotonin now activates instead of inhibits the neuron.

Is it plausible that our nervous system should have lost this sensitivity to contextual change over the evolutionary course of species differentiation? It seems unlikely. In light of the complexity of our nervous system, this context-responsiveness has probably increased rather than decreased over time. The more we find out about the interdependency of our nervous system with its social context, the more specific we will be able to be in our application of individualized pharmacological agents targeting unique patient contexts. The medication's positive effects in individual cases would likely improve immensely, compared to today's status quo. Considering that the decisions for a patient's medication dosage and duration are often still based on trial and error, or at best on uncontrolled clinical heuristics, it is perhaps not surprising that we currently do not exceed an average effect size of .50. But we don't have to be content or resign ourselves to this state of affairs. Pharmacotherapy, even more than psychotherapy, critically depends on the future progress we can expect from the neurosciences.

The neuroscientific view of how synaptic signal transduction can be effectively influenced suggests that psychopharmacologists and psychotherapists ought to work side by side much more than this is currently the case. Targeted pharmacological intervention can facilitate a patient's readiness to learn and can intensify the effects of specific learning experiences. This is evident, for instance, in a study by O'Carroll, Bryslade, Cahill, Shajahan, and Ebmeier (1999). They showed participants a series of emotionally engaging images. After one week, they tested how much participants had remembered. Participants who had been under the influence of a noradrenergic agonist when they first viewed the images were able to recall more details than the participants who had received a placebo. The participants in the placebo condition, in turn, remembered more details than those who had received a noradrenergic antagonist, which inhibits noradrenergic activity. Natural memory capacity (the participants had not been instructed to try to recall as much as possible, so this was not an explicit memory learning task), then, can be biochemically facilitated and inhibited. If patients are pharmacologically induced into such a state of heightened learning readiness, it becomes all the more important which types of events are subsequently encountered and encoded. This increases the responsibility incumbent upon the psychotherapist.

The psychotherapist's task becomes, thus, to clarify and facilitate the occurrence of specific learning experiences that are likely to exert a positive influence on the patient's problems and the neural structures underlying those problems. The efficacy of synapses coding for the learning experience has to be facilitated by the therapist in order to achieve the intended therapeutic effect. This process is quite similar to what happens between the synapses when new memories are formed. Neurotransmitters dock at exactly those locations on pre- and postsynaptic membranes that were

involved in the previous action potential transmission, thereby elevating the subsequent signal transmission at the synapse (see chapter 2). What we know so far about the effects of pharmacotherapy and psychotherapy suggests that these interventions may potentiate each other's effectiveness. If such potentiation does indeed occur, and for whom, remains at this point an open research question. The few studies that have investigated this issue suggest an advantage for combined psychotherapy and pharmacotherapy, especially for patients with more severe symptoms (Thase, 1997). However, the available studies of combinatorial treatments cannot be regarded as adequate tests of the kinds of ideas I am outlining here. Previous studies in this area have been insufficiently specific in examining the reciprocal effects of therapy and pharmacotherapy. In these studies, one intervention is typically conducted in parallel to the other instead of being carefully coordinated so that one intervention could strategically facilitate the effects of the other. Such strategic treatment would require sound knowledge of both medication and psychotherapy, which is probably still rare in most contemporary treatment contexts.

1.3 NEUROSCIENCE AND PSYCHOTHERAPY

Neuroscientists and psychotherapists live in separate worlds that are quite removed from one another. It has only been a short time since they began to develop any degree of mutual interest. An area that could be a natural bridge, however, is their common interest in mental disorders. The interest of the neuroscientists in this area has been stimulated primarily by the discovery of the functional significance of neurotransmitters for mental disorders. This interest initially provided an obvious link to biological psychiatry rather than to psychotherapy, which is especially understandable when considering how psychiatrists quickly invested their hope into, and began to favor, pharmaceutical approaches to treating mental disorders. Psychotherapy was suddenly unfashionable, or at least it became something that could be left to the psychologists (rather than the psychiatrists). The overly simplified idea that mental disorders are largely hereditary further contributed to this changed climate.

Subsequently, however, neuroscientists discovered the enormous plasticity of the brain by environmental influences. It became increasingly clear that the genetic contribution to manifest mental disorders is far smaller than previously assumed, and that individual life experiences play a much larger role in determining gene expression. It also became clear that plasticity functions in two ways: facilitating disorders on the one hand but on the other hand also alleviating or compensating symptoms (see chapter 3). Since these discoveries, neuroscientific articles are increasingly ending with speculations on the possibilities to target neural structures and processes via psychotherapeutic means, or with speculations on how psychotherapy might be further developed from a neuroscientific perspective. Such ideas, however, tend to be found at the end of thick books that otherwise are silent on the topic; they are still unfulfilled visions of the future. One such vision—Kandel's—we have already briefly encountered earlier (p. 3). He further elaborated these ideas in two articles (Kandel, 1998, 1999).

Another example is Nancy Andreasen's (2001) engaging book, *Brave New Brain: Conquering Mental Illness in the Era of the Genome*. After providing a very expert overview of recent neuroscientific research on the major mental disorders, she wrote:

As shown in chapters 8 to 11, we know quite a bit about the brain systems affected by disorders such as depression, panic disorder, or posttraumatic stress disorder. These disorders, which frequently result from the brain's reaction to cumulative stress or unhealthy environments, are well suited for targeted cognitive interventions. Such interventions will increasingly be developed by competent scientists who are able to combine their knowledge about human behavior and its measurement with knowledge about brain systems and their malleability. Such approaches have already been applied successfully in interventions that teach dyslexic children to hear sounds and words more precisely, so that they can rewire their brain anew and write and read more effectively. Strategic attacks on the mood disorders could follow such models and target fundamental disorder aspects, such as reduced flexibility when confronted with a mishap, or the inability to regulate an intensive reaction to such situations appropriately. (p. 401)

When reading the last sentence, many cognitive behavior therapists might note that they are already doing some of the things that Andreasen envisions for the future. However, they would likely have to admit that their skills are not yet strategically combined with "knowledge about brain systems and their malleability." Therapists might also find in other parts of Andreasen's book that their field is somewhat misrepresented; for example, when Andreasen writes "Systematic desensitization is the most common behavioral intervention" (p. 379) or "historically, the development and application of psychotherapy has never been regulated systematically ..." (p. 401). In these formulations it is evident that psychotherapists and neuroscientists truly live in separate worlds. The fact that a psychotherapy oriented on scientific principles has emerged, beyond the psychoanalysis and behavior therapy of the 1960s, is easily lost on scientists working in other fields. This scientific psychotherapy easily remains invisible under the avalanche of nonsense being published on the topic of "psychotherapy" year after year, and it is apparently hard even for people such as Nancy Andreasen, editor of the *American Journal of Psychotherapy*, to detect the signal of this empirical psychotherapy. Fortunately, psychotherapy has continued to evolve far beyond what some neuroscientists sometimes suspect or insinuate. Empirically oriented psychotherapy has more to offer for the realization of the principles envisioned by Kandel, LeDoux, and Andreasen than these authors themselves suspect. Demonstrating this point shall be my task in this book.

Psychotherapists, vice versa, have also become increasingly interested in the neurosciences over the past 6 years. In my previous book (*Psychological Therapy*, published in 1998 in German and 2004 in English), I have attempted to develop an extensive psychological framework for therapy based on the then-extant knowledge in the neurosciences (and also based on extant psychotherapy research and basic psychological research). I had finished writing the book in 1997 and had integrated literature up to 1996. At that time, I had not been aware of any attempts on the part of psychotherapists to systematically review neuroscientific findings and derive

practical implications for therapy. Since then, however, the decade of the brain has had clear effects on psychotherapists as well. There are by now a considerable number of publications that either generally review neuroscientific findings with an eye on potential therapeutic applications or that focus on specific research areas and deduce psychotherapeutic principles from them (in chronological order: Deneke, 1999; Liggan & Kay, 1999; Gabbard, 2000; Beutel, 2002; Bock & Braun, 2002; Förstl, 2002; Storch, 2002; Sulz, 2002; Westen & Gabbard, 2002 a, 2002b; Beutel, Stern, & Silberweig, 2003; Etkin, Cappas, Andres-Hyman, & Davidson, 2005; Pittenger, Polan, & Kandel, 2005; Grosjean, 2005). This movement resembles an emerging tidal wave. At the annual conference of the Society for Psychotherapy in Santa Barbara in 2002, psychotherapy researchers for the first time devoted a special forum to the question of what the implications of “affective neuroscience” (Panksepp, 1998, p. 000) might be for therapy (Grawe, 2002; Hollon, 2002). The presidential address at this conference, given by my long-term colleague and friend, Franz Caspar, was also devoted to the topic of neuroscience and psychotherapy (Caspar, 2002). At the World Congress of Psychotherapy in Trondheim in 2002, a keynote lecture was held on the topic of “The revolution in the neurosciences: Implications for psychotherapy research and practice” (Gabbard, 2002). While writing this section, I am actually supposed to finish the introduction for a book on the topic of *The Neurobiology of Psychotherapy* (Schiepek, 2003). In short, over a very short period, neuroscience has emerged as a hot topic for psychotherapists.

I am all in favor of this development. But I also believe that the implications of neuroscientific research for psychotherapy are more far-reaching than is often acknowledged in publications and presentations on this topic. Sometimes one can already tell while reading or listening that everything will essentially continue as usual. No doubt, Freud’s metapsychology, the concepts of the ego, id, and superego will surely have to be revised; transference interpretations that refer to early-life transactions between child and parents would likely be incompatible with a modern understanding of memory development, but—it is sometimes argued—neuroscience simply provides further evidence for Freud’s essential accuracy with regard to the importance of early childhood experiences and the existence of unconscious processes. Many of those who traditionally distinguish among separate “schools of psychotherapy” will likely maintain their persuasion, regardless of neuroscientific discoveries. New findings that fit within the preexisting perspectives will be integrated; the rest will be gladly ignored. Some have even warned explicitly that our still limited knowledge prohibits a direct translation of neuroscientific evidence into scientifically based therapy strategies (Beutel, 2002, p. 9).

I would also argue that the advent of neuroscience does not necessitate a completely new start for psychotherapy or that all earlier findings will suddenly be outdated. One hundred years of practical experience have left us with a rich fund of knowledge, even if we limit ourselves to those findings that have passed the filter of empirical therapy research. According to the principles described earlier, therapeutic strategies that have proved to be effective for particular problems derive their impact from the

specific changes they achieve in the brain. These effects could not be achieved without the presence of therapists who have the necessary training and knowledge. It would be impossible for a neuroscientist to achieve these effects, except if he or she were to complete the necessary training.

One does not have to be a neuroscientist in order to be able to achieve changes within the brain. Every good teacher, every good football coach, every expert who knows something about persuading others can achieve such effects. What is needed is knowledge about how to persuade or influence people and about the exercises that appear to be particularly effective in the relevant domain. There is little doubt that across various professions, good persuaders are characterized by a set of advantageous “human qualities,” but such characteristics alone do not suffice to make a successful football coach. Beyond these general human qualities needed across professions, what is needed for success is occupation-specific expertise. Would a football coach perform better if he or she acquired detailed knowledge about brain functions? Hardly! Nothing we know suggests that now, after the decade of the brain, football coaches have suddenly become fascinated with neuroscience.

By contrast, psychotherapists have recently become much more interested in neuroscience. Why? Probably because they suspect that neuroscience might improve their domain-specific expertise. This would be a realistic appraisal of the current state of psychotherapy. In this respect, our situation is quite similar to that of the psychopharmacologists. We have a set of effective interventions, but we do not know precisely how they work because we don’t know enough about that which they affect. What, after all, are the causes of mental disorders? If we knew this with precision, we would have diagnostic systems other than the DSM-IV and ICD 10. For good reasons, these classification systems did not include explicit statements about etiological factors. The experts could not reach consensus; questionable assumptions still outweigh the proven facts.

The gain associated with this exclusion of etiological concerns is that different judges can more easily agree on the presence of a diagnosis. This makes it easier to know with precision what the other person means when speaking about panic disorder, dysthymia, bulimia, etc. The current convention requires that a specific set of criteria must be fulfilled in order to make such diagnoses. But conventions are, indeed, *just* conventions, and not scientific facts. A person could memorize the entire DSM but still would not have *understood* the mental disorders. Yet it is a basic human need to strive for understanding (see also chapter 4). Psychotherapists seek to understand mental disorders and to understand how psychotherapy functions. This need to understand is so strong that it sometimes overrides common sense. Thus, many new therapists turn to therapy schools that claim to provide the dearly desired knowledge.

But even—or especially—experienced therapists have a renewed, intensive desire to understand (even more about) mental disorders and the function of psychotherapy. The prefabricated truisms of the therapy schools don’t impress them anymore; they are beyond that stage. They have learned to work with the tools acquired from the

therapy schools—the thought patterns and action repertoires—but they also know about the limitations of these tools. They tend to work either eclectically or they have a pronounced interest in the integration of those methods that they have experienced as valuable and effective. For such therapists, integration attempts that mesh with their experience or that provide entirely “fresh,” not yet overused perspectives are particularly attractive to extend their therapeutic expertise. The recent neuroscientific insights constitute such fresh input. They clearly point to a road away from the well-trodden paths of the traditional psychotherapy schools. This also explains the suddenly growing interest in neuroscientific findings and insights whose relevance to psychotherapy is now becoming clear. It is only now, after the decade of the brain, that the neurosciences truly have something valuable to offer for the field of psychotherapy.

1.4 WHAT IS MEANT BY THE TERM NEUROPSYCHOTHERAPY?

Thus, we have arrived at the core topic of this book. It is about what neuroscience already has to offer for psychotherapy. In this context, it would not make sense to artificially separate neuroscience strictly from other basic psychological science.

The boundary between neuroscience and cognitive science is fuzzy and ultimately arbitrary. It is not a natural boundary of subdisciplines but is indeed based on a lack of knowledge. With increasing knowledge, we see an increasingly common joining of the biological and psychological sciences. At exactly these contact points, our understanding of mental processes will be placed on an increasingly solid foundation. As modern cognitive psychology has demonstrated, the brain produces an internal representation of the perceived world. Neurobiology, in turn, has shown how these representations can be explained at the level of single neurons and their connections. The convergence of these disciplines has revealed entirely novel insights into the phenomena of perception, learning, and memory. (Kandel, 1996, p. 713)

I should add that this joining of disciplines applies not only to cognitive processes in a narrow sense, but that “cognitive neuroscience” has recently been joined by “affective neuroscience,” thus leading to increasingly broad mergers. Indeed, the emotions have become an explicit emphasis within neuroscientific research (Damasio, 1999; LeDoux, 2004). The merging of psychology and neuroscience is expanding to include an increasing number of subfields; soon it will also encompass areas in which purely psychological research still dominates neuroscientific work today. This is the case, for example, in contemporary research on the motivational aspects of mental functioning.

In my book, *Psychological Therapy* (Grawe, 1998, 2004) I have already attempted to link the results of psychotherapy research with recent findings from psychological and neuroscientific research, and to make inferences for the practice of therapy. My emphasis in that book was on basic psychological research. The neuroscientific part had to be considerably smaller because neuroscientific research, at that point, simply

did not offer much for psychotherapy. With the title of that book I attempted to show that psychotherapy today no longer needs to rely on the traditional therapy schools but actually has a fully sufficient conceptual basis in contemporary psychology.

With this book I am taking another step in the same direction. Since the 1998 book, the development in the neurosciences has been almost explosive. Many questions of interest for psychotherapists can now be answered from a neuroscientific perspective. The answers are anything but trivial. In some cases, they suggest conclusions that cast doubt on conventional therapeutic conceptions and practices. In this book, then, the relationship between neuroscientific and basic psychological research is the opposite of that in the previous book. I am relying here primarily on neuroscientific findings, but I include other areas of psychological research as far as they are relevant to the particular issues at hand. This shifting of emphasis is mirrored in the title of the book: *Neuropsychotherapy* emphasizes the neuroscientific foundations of psychotherapy, whereas *Psychological Therapy* emphasized genuinely psychological basic science. Nevertheless, my main concern has remained the same—the scientific justification of psychotherapy on the basis of contemporary basic research findings.

Neuropsychotherapy, therefore, is concerned with the same issues as *Psychological Therapy*. The books together can be viewed as complementary attempts to provide a theoretical foundation for a “generic psychotherapy” (Grawe, 1995, 1996; Grawe, Donati, & Bernauer, 1994).

This generic psychotherapy attempts to utilize the entire repertoire of validated, effective psychotherapeutic processes in order to achieve maximally positive therapy outcomes. Once the various therapeutic strategies and processes have been uncoupled from their original theoretical backgrounds, the question of therapeutic effectiveness can be asked afresh. In this book, I am attempting to explain the effectiveness of psychotherapy by relating therapeutic processes primarily to neuroscientific findings. In this context, I am making the explicit assumption that specific therapeutic strategies have been shown to differ in their relative effectiveness; that is, that psychotherapy research has empirically validated some strategies more than others. These strategies are then explained by relating them to lawful regularities on the level of neural functioning. Such a neuroscientific explanation of already existing therapeutic strategies does not result in the creation of a new form of psychotherapy but instead yields a new perspective on psychotherapy. The original links between intervention strategy and theoretical justification are disbanded and replaced by an integrative view that transcends the boundaries among traditional therapy forms. On the basis of such an independent, new perspective, it is possible to relate to each other, and combine with each other, strategies that previously seemed incompatible because of their mutually inconsistent theoretical justifications.

In my view, an appropriate foundation for such a generic psychotherapy would have to be maximally consistent with current psychotherapy research as well as with basic psychological and neuroscientific research. The problems faced in psychotherapy and the corresponding findings uncovered in psychotherapy research (which is my

primary area of expertise) have served as a guiding heuristic as I sifted through volumes of current neuroscientific research. In this book, I highlight those findings that appeared to have particular relevance for psychotherapy. However, I have not limited myself here to merely summarizing findings but, as a step beyond that, I ask about the implications of the neuroscientific findings for the specific problems arising in psychotherapy. In chapter 5 I draw on neuroscientific research to propose a set of concrete guidelines for therapy planning and the therapeutic process. These implications can be termed *neuropsychotherapeutic* and, as such, they differ from the implications arising from other theoretical frameworks. On the one hand, then, neuropsychotherapy refers to a neuroscientific perspective on the problems in psychotherapy and, on the other hand, to the practical implications that emerge from this perspective.

Before elaborating further on the specifics of neuroscientific research, however, I would like to illustrate with a case example how a neuropsychotherapeutically informed and enriched psychotherapy might look in practice.

Each statement that is made in the following case description is based on the findings of one or, in some cases, several empirical studies. The specific references are of course important, but I omit them here in the introduction in the interest of flow and readability. In later chapters, however, I provide the needed detail to clarify the empirical basis for these clinical claims and strategies.

1.5 HOW MIGHT NEUROPSYCHOTHERAPY LOOK IN CONCRETE CLINICAL PRACTICE?

Let's imagine a therapy situation in which a therapist faces a depressive female patient, Ms. H. As in every therapy session, Ms. H. sits in her chair with a sad, fatigued facial expression, as if paralyzed, making no effort whatsoever to take initiative. Instead, she waits for the therapist's action. The therapist engages with her in a friendly and caring manner, asking her how she feels and if she is able to have the therapy session today. She responds with a bitter, muted tone of voice, stating that she obviously doesn't have a choice, that nothing would change anyway, and that there is no point to begin with. Similar exchanges have occurred in previous sessions; they are typical for this patient. They are also typical in interactions occurring outside of therapy.

Let us assume that the therapist's orientation is of the modern psychodynamic–interpersonal variant. He might relatively quickly have arrived at a conceptualization of this recurring interaction pattern. One of his goals would be to help this patient realize how her behavior repeatedly triggers disappointing experiences by making her interaction partners feel helpless and, ultimately, angry toward her. The therapist would attempt to clarify the fears and wishes that give rise to this self-damaging interactional pattern, and he would come up with strategies that might alleviate her

fears. It probably wouldn't be easy for him to control his own feelings of helplessness and anger, which naturally arise in interactions with this patient, but he knows that this is important in order to avoid a renewed confirmation and strengthening of the patient's fears.

These are typical speculations that a well-trained modern psychotherapist might come up with when faced with such a clinical situation. We could easily imagine other therapists who, faced with the same scenario, would act less competently and sensitively, so that the patient would quickly terminate therapy. This, too, would not be far from current therapeutic reality.

A neuropsychotherapist would also consider all of these possibilities; the general approach would be quite familiar to him. However, other considerations would be added. He would think of the likelihood of Ms. H.'s enlarged and overactivated amygdala, which selectively and overly sensitively responds to negative situations. He would consider how the amygdala has particularly well-developed connections to the ventromedial regions of the right prefrontal cortex, whose activation is linked with emotional states. He would know about the wealth of firmly established projections between this area and the dorsolateral regions of the prefrontal cortex, which is critically involved in the activation of avoidance goals. In addition, he would realize how impoverished the corresponding areas in the left hemisphere are, due to their insufficient activation—areas that play an important role in positive emotions and the pursuit of approach goals (these points are elaborated in detail in chapters 3 and 4). The therapist would envision a wealth of elaborately developed synapses connecting the areas that represent avoidance goals with those responsible for the production and maintenance of negative emotions. These connected areas might be envisioned by the therapist as “brain swellings” because of their rich and elaborate development.

However, we must not envision these “brain swellings” as simply overactivated structures. Robert M. Post has explained the complexity of the situation as follows: “Areas of hypofunction or hyperfunction may involve either excitatory or inhibitory pathways, and may represent either pathological processes or compensatory adaptations triggered by pathology” (as cited in Mesulam, 2000, p. 408). Thus, restoring balance may involve either altering excitatory or inhibitory pathways, depending upon the mechanism of the pathology.

While the therapist is still thinking of the brain swellings and their consequences, he also begins to envision how a chronically elevated cortisol level is often associated with a noticeably damaged and shrunken hippocampus. A hippocampus in this state won't be of much use to Ms. H., even though it is critically important for the learning of new relationships, such as the relationship between her behavior and that of her interaction partners, or for the acquisition of new memory contents more generally. The therapist also considers how, for a large proportion of depressed patients, the anterior cingulate cortex may become difficult to activate. This region plays an important role in the active engagement with difficulties and in the conscious experiencing of feelings. Both functions are therefore only partially available to the depressed patient.

The therapist realizes that it is not sensible to work with this patient directly on her problem behavior. First, he must rebuild the impoverished brain regions because their easy activation will be necessary to enable the patient to pursue positive goals in a self-initiated, self-governed manner; to enable her to experience joy and contentment; and to become open and accessible for the learning of relationships that she must understand in order to consciously regulate her interpersonal encounters in new patterns. The therapist has completely internalized the neuroscientific rule of thumb, “use it or lose it.” He knows that the impoverished neurons and synapses must be activated in order for them to recover. Once this is accomplished, they will be more easily reactivated and ultimately can once again play an important role in the patient’s thinking, feeling, and actions. She will then be reenabled to pursue positive goals and experience positive emotions.

Activating impoverished neurons is not easy, however, because they tend to resist such efforts. The synaptic connections are weak and must first be strengthened; therefore the connected neurons must be activated in order to facilitate the connecting pathway. This is the second rule of thumb, known as Hebb’s principle, that the therapist has internalized: “Neurons that fire together wire together” (based on the Canadian psychologist Donald Hebb, who already in 1949 recognized and anticipated several principles of neuronal functioning that remain valid today). In the case of Ms. H., the neurons in the right dorsolateral and ventromedial prefrontal cortex have already fired together very frequently with those in the amygdala. This has led to a well-ingrained neuronal circuit (a *cell assembly*, in Donald Hebb’s words). This circuit can be very easily activated, for example, by even the slightest sign of impatience in the voice of the therapist. The circuit will also recurrently reactivate in an automatic manner whenever Ms. H. is left on her own or inhibitory control is not maintained. Each activation is accompanied by the experience of depression and depressive behavior. With each activation, the projections among the connected areas are increasingly firmly ingrained.

The therapist thus realizes that he must block the activation of these hyperdeveloped connections and in turn activate the impoverished synapses in the left prefrontal cortex as often as possible. If he succeeds in this quest, he can expect that Ms. H. will once again become more active, that she will experience positive emotions more often, and that her previously dormant positive repertoire will once again move to the forefront—the repertoire that has always been present in the form of memory traces (neuronal circuits), even though excitability of these traces was previously weakened. From the perspective of the therapist, Ms. H. at this point is not able to behave more positively, given the current state of her brain. It is not resistance that prevents her from engaging more constructively in therapy. In her state, she cannot simply plan to view the world more positively or to self-initiate and engage with positive activities. The knowledge about Ms. H.’s neuronally mediated inability helps the therapist to not feel angry toward her, as has been the case with many others in her environment. The therapist also does not feel helpless and incapacitated by her because he knows how he can assist her.

The therapist knows that he must take the initiative and responsibility to become independent of her depressive interactional patterns. He must enable Ms. H. to experience events, as frequently as possible, that trigger positive emotions in her, or that—based on prior case conceptualization—are likely to be highly relevant for her motivational goals (even though these goals might be hard to recognize given her current depressive state). The therapist can trust in the reactivating “power” of these motivational goals because, over the course of Ms. H.’s lifetime, they have become even more deeply ingrained than the synaptic connections corresponding to Ms. H.’s current state. The therapist also knows in advance that his efforts will not be reinforced initially by changes in Ms. H.’s state. Because of this knowledge, however, he does not react with disappointment and impatience when his efforts at first appear to have no effect on her. He knows that the transcription process of gene expression, which is being stimulated by sufficiently frequent positive experiences, requires several weeks to manifest in a noticeably increased number of synapses. The key point to remember at this stage is simply that he must not be discouraged and stop the facilitation of frequent positive experiences. The creation of new and the restrengthening of already present synapses takes time.

It is more easily said than done to facilitate frequent positive experiences in Ms. H. while she is in her depressive state. In his training, the therapist had considerable difficulty translating into action what his mentors and supervisors called “resource activation,” “motivational priming,” or “complementary therapist behavior.” By now, however, he views these as his most important tools, even more crucial than his problem-specific intervention strategies. (I do not elaborate here on this important technical aspect of therapeutic work. More detail is provided in chapter 5.)

Another aspect not to be neglected is the many negative thoughts and emotions that Ms. H. experiences frequently, especially at times when she is alone. As long as these negative patterns continue to take up a large proportion of total mental activity, there is simply not enough room for the positive activation patterns that the therapist wants to facilitate. The negative patterns must be reduced or blocked. On the neural level this means that the neural activation patterns must not be activated as frequently anymore or, should they become activated, that their activation must be disrupted or blocked as quickly as possible.

For this purpose, the therapist solicits the assistance of Ms. H.’s most important reference persons, her husband and her two adolescent children. After having conveyed to them his view of the situation, he explains that their wife/mother is feeling so poorly because three brain areas that chronically produce negative emotions have developed disproportionately. He shows them a picture of the brain that illustrates this process and responds to their questions. He emphasizes that this is not their wife’s/mother’s fault; that she cannot easily overcome this by herself and is not responsible for her state. Equally, he tells them there is much that can be done in order to help her, and that they can actively participate in this process. He notes that the brain cells are like muscles; if they are not used, they wither away, but if they are used continuously they become stronger. The neurons of their wife/mother in those three areas are like

highly trained muscles, with the important difference that she cannot turn them on and off by sheer willpower. This switching must come from the outside, and they can help with it, by including her in as many positive activities as possible, by not letting her just sit there by herself, left with her ruminations, but instead by engaging her in ever new activities. They should feel free to interrupt Ms. H.'s ruminating and worrying at any time. The therapist discusses this with them in great detail and supports the family in translating these principles into action, by speaking with them every couple of days on the telephone and inquiring into how things are going and encouraging them to stick with the program.

A few weeks after the initiation of these resource-activating and problem-behavior-blocking interventions the first clear signs of improvement become evident in Ms. H. After 3 months, her depressive symptoms have largely disappeared. If one were to use functional neuroimaging tools at this point, the initially clear asymmetry in prefrontal cortex activation would have likely resolved. Even the size of her hippocampus may have normalized (see more detail on this point in chapter 3). The therapist now administers Beck's depression questionnaire and notes that Ms. H. scores within the range achieved by normal, nondepressed people.

Many therapists would find it quite obvious that therapy should be terminated at this point. After all, Ms. H. and her family regard therapy as a complete success; all are satisfied with the outcome. Ms. H.'s therapist, however, would not go with this option because he has arrived at a conceptualization of Ms. H.'s case that prevents him from being completely content at this stage. He remembers the scientific findings that suggest that Ms. H., over the course of the next 2 years, has a 60% to 80% chance of experiencing another depressive episode (Elkin, 1994) if he terminates therapy at this point.

Up until now, Ms. H.'s therapy was purely symptom-oriented. The point was to change the neural underpinnings of her depressive symptoms and to move her once again into the range of normal mental functioning. The therapist's intention to continue therapy is related to his understanding of how Ms. H.'s depression originated in the first place.

It had been Ms. H.'s first depressive episode. Everyone had agreed that she had not been depressed a year earlier, even though she had for some time already been nervous, anxious, and somehow more stressed than at other times, but certainly not depressed. Slowly over time everything seemed to become overwhelming for her; she lost all energy, until eventually she did not feel up to anything at all anymore.

Let's translate what we know about Ms. H.'s depression and its history onto the neural level. How did the changes in her brain come about over the course of the last year? New synapses grow and already existing synapses gain in strength when they are frequently activated, and they weaken and disappear when they are not activated for some time, which can be a consequence of an active blocking of the synapse. A year ago Ms. H. had still actively pursued goals and experienced positive emotions. Her left prefrontal cortex had not been as hypoactive as it was at the beginning of

therapy, and her right prefrontal cortex had not been as hyperactive at that time. The neurons in this area must have been recurrently activated since then, which facilitated their synaptic connections. Their activation was linked with negative emotions and with avoidance behavior. Thus, Ms. H. must over the course of the last year have experienced increasingly negative emotions and must have tended to avoid more and more situations. This probably led to an active blocking of left prefrontal cortex activation, such that the synaptic connections in that region got weaker. This, in turn, was associated with Ms. H.'s tendency to pursue fewer and fewer approach goals and her reduced ability to experience joy.

Negative emotions arise primarily when events occur that have negative implications for our goals. The more important the goal, the stronger the negative emotion. There must have been events in Ms. H.'s life over the last year—or even during the longer preceding period during which she appeared anxious and stressed—that constituted a threat or an obstacle to her important goals. There is no other way to explain the overdeveloped state of those brain regions associated with the experience of negative emotions at the beginning of therapy. These threat- or loss-related emotions must not have been consciously experienced by Ms. H. in the same way that she must not have consciously represented the threatened or lost goals. The activation of the corresponding brain areas must not have been linked with consciously represented experience. On the contrary, the conscious awareness that important goals are not being attained, or that something of great importance has been lost, produces in itself a pronounced cognitive dissonance, which, according to Festinger's well-validated dissonance theory, is usually avoided at all costs. Even stimuli and situations that trigger memories (i.e., that activate the same brain areas) are avoided. Because of this, there was no conscious engagement with the events and situations that for Ms. H. constituted a threat or a loss for her implicit goal system. This process led to the emergence of strong avoidance tendencies—so strong, indeed, that the dorsolateral part of the prefrontal cortex, which is implicated in the representation of avoidance goals, was hyperactive at the beginning of therapy because of its chronic activation. At the beginning of therapy, then, Ms. H. was in a state of generalized avoidance. She no longer engaged with her environment and no longer responded to challenges because she expected only unpleasant, overwhelming, and negative events to follow. From this perspective, her depressive state was a generalized protective reaction against the environment. This state is characterized by inactivity only on the level of outward appearances, only in terms of her actual exchanges with the environment. Despite this appearance of inactivity, the avoidance system is highly activated and along with it, the hypothalamic-pituitary-adrenal axis, which responds to stress with increased release of cortisol. Chronic stress is not at all healthy, and certainly not for the hippocampus, which is damaged by this high cortisol level to such a degree that its volume shrinks measurably.

Viewed from this perspective, Ms. H. has experienced over the last year a cascade of neural events, a chain reaction of positive feedback loops that resulted in easily excitable neuronal circuits. Even though the neurons participating in this cascade had

returned to a deactivated state by the end of therapy, as soon as Ms. H.—after relinquishing the sick role and overcoming her acute depressive state, both of which provided some protection—is exposed once again to the same influences and experiences that triggered the cascade originally, we can expect that the synaptic modulations that led to the depressive state are already primed, ready to be reactivated. These synapses are easily activated again when the same stimuli, experiences, and life events are once again encountered. And why should they not? Nothing has changed in terms of her life situation, except that she is now no longer sick and will surely once again be confronted with her old set of demands and challenges. There is a high probability that the same events that led to the first depression will recur in a similar fashion. One difference is that this process should now transpire more quickly than the first time because of the neural priming. This is what happens quite regularly with depression; most depressions are indeed marked by recurring depressive episodes.

This is why Ms. H.'s therapist finds it important to continue with therapy despite her markedly improved state. He wants to build up resistance that prevents her from quickly sliding back into another depressive episode. These considerations of course don't only come up at the end of therapy; they have been contemplated by the therapist since the very first session. Which incongruences (discrepancies between perceptions and goals) have triggered the negative emotions that stood at the beginning of the cascade? Why was she unable to remove this incongruence? After all, she had many other incongruences over the course of her life and has been able to master them without becoming depressed. What was different this time? What was missing for her, which contingencies have prevented her independent mastery? In his search for the sources of these incongruences, the therapist must consider her objective life circumstances, her important interpersonal relationships, as well as her personal resources and deficits.

Could it have helped her if she had recognized and consciously confronted the emerging incongruences much earlier? What was it that prevented her from consciously turning toward these incongruences, making the necessary decisions, and following through with them? Could it be that an unclarified motivational constellation plays a role in this context? Are there motivational tendencies that conflict with one another and that prevent her from making a clear decision and using her powers to pursue positive goals? Did this motivational conflict occur beyond conscious awareness? Could it be that such an unclarified motivational conflict situation contributes to her unconsciously entering recurrent problematic constellations, for which there is then indeed no easy solution, and which is guaranteed to lead to negative emotions? Or does she have a lack of important personal resources and abilities, such as assertiveness, social skills, self-control, persistence, and coping strategies, that would help her to master emerging problems?

In his search for possible sources of these incongruences, the therapist does not rely solely on his personal impressions but uses specific psychological tests that are designed for this purpose. In addition, he completes the picture that he has gained

from his conversations with the patient by consulting with important reference persons; in this case her husband and her children. All these sources of information result in a final composite image. At the very beginning the therapist gave Ms. H. an “incongruence questionnaire” (see chapter 4) that covers the overall range and intensity of mental incongruences. From this test he already knew at the beginning that Ms. H. is characterized by a high level of incongruence. This is, of course, what would be expected in the case of a depressed person. Even more important than this overall level were the clues that the therapist obtained from this questionnaire and from other sources; clues about the specific domains in which there were incongruences between perceptions and goals and about the sources responsible for these perceived incongruences. These sources are important leverage points for the therapist that he can use in his quest to attain change, and that go beyond acute symptom reduction and ensure long-term therapeutic success.

Even after a just a few therapy sessions, the therapist had come up with such a composite image and had made a treatment plan that went beyond the initially described resource-activating and depressive-behavior and experiencing-blocking interventions. The plan intended that the identified sources of incongruence would be tackled one at a time with appropriate interventions, but only once Ms. H. had attained a state that would allow her to engage constructively in therapy. The precise strategy with which such constructive collaboration with Ms. H. could be attained had already been contemplated by the therapist after the first session. The plan was instituted and already after a few sessions the therapist began to address specific sources of incongruence. He began with a rather small and circumscribed problem, which from past experience was known to yield a high probability of initial success. The point here was to facilitate a concrete experience that would convey to Ms. H. that positive change is possible at all. From this, he moved to another incongruence source, one for which Ms. H. would most likely be highly motivated and for which she would have the necessary resources, based on his prior case conceptualization. The rationale for sequencing the interventions in this motivational order—rather than in the order of problem severity—was related to the easy excitability of the involved neurons. The more one could expect that Ms. H. would be able to activate already existing motivational potentials, the more likely she would engage in a persistent, self-motivated fashion. After all, the motivation potentials being activated were her own, and the more these primed abilities were being utilized, the greater the probability that Ms. H. would experience herself as someone able and competent.

In this manner, some of the sources of incongruence had already been addressed by the time Ms. H. recovered from her acute depression, a time at which thoughts about therapy termination might have come up (see previous). Apart from the resource-activating interventions, the work on these sources of incongruence had probably also contributed to the improvement of her depressive state. However, not only the therapist but also Ms. H. realized at this point that their work together was not yet finished.

Thus, they continued to work on the remaining sources of incongruence, and it became possible to address the more thorny issues, which had previously been so

threatening to Ms. H. that she had been unable to engage with them in a conscious, deliberate manner. At this point, however, Ms. H. had become more resilient. Moreover, Ms. H. by now relied on her therapist as a competent person whom she could easily trust with her problems, and she had repeatedly experienced first-hand that she was able to overcome problems successfully. With this foundation, she was now able and willing to expose herself even to experiences that would predictably trigger strong negative emotions. With this entirely altered context, however, this exposure now did not lead to avoidance, which in different circumstances could have initiated the depressogenic cascade. Instead, the exposure to unpleasant events triggered an active, albeit very painful and exhausting engagement with problems from which she had turned away a very long time ago.

In his work on the patient's sources of incongruence, the therapist was also guided repeatedly by neuroscientific principles. He was never content with a single problem solution, with a single instance of successful coping with a difficult situation, or with a single new insight that had been attained. He insisted that Ms. H. continue to expose herself to similar situations in order to cope successfully, to think her newly discovered adaptive thoughts repeatedly and use them in new contexts, even when she felt that she understood already or could do what was required. He realized that the better these new neural circuits were ingrained during therapy, the more easily they would be activated when they are needed later; for example, when Ms. H. encounters again her old demands or perhaps when she is confronted with new challenges. In those situations, the danger exists that the old pathways, whose activation triggered the last depression, will once again be activated. The question then becomes how easily the newly established pathways become activated. The more well-ingrained they are, the more easily they can be activated, and the more they will function as an effective barrier against the cascade leading into depression.

These considerations also contributed to the therapist's plan to not suddenly terminate therapy. Instead, after the most important therapy goals had been reached and Ms. H. began to view the future more confidently and felt that she no longer needed therapy, the therapist made quarter-yearly appointments for the next 2 years with her and made her promise that she would contact him immediately should she notice that she is once again slipping back into her old patterns. He wanted to make sure that the first signs of a relapse would be immediately noticed and addressed by continuing to work on the issues that had been targeted in treatment. The therapist wanted to prevent Ms. H. from becoming severely depressed again and from having to cope with the hassles associated with entering the medical care system. He knew that Ms. H. chances to remain free from future depressions would be greatly improved if she could manage to stay nondepressed for the next 2 years.

After Ms. H. continues to function well 2 years after therapy termination (and indeed even better than at the time of termination), the therapist knows that he has done good work. He has done much more than merely treat the depression. By working with her on the removal of the major sources of incongruence, he has not only removed problems but has set the foundation more generally for solid mental health. Removing

incongruences means that a person's experiences, the perceptions he or she encodes, are aligned with his or her most important motivational goals. The motivational goals—those goals that truly influence a person's experiences and actions, regardless if consciously or unconsciously—that have emerged for a person over the course of a lifetime are his or her individual means to satisfy basic needs (more detail on this in chapter 4). In other words, reaching important motivational goals will be reflected in a low level of incongruence and will be associated with relative satisfaction of the person's basic needs.

Ms. H. completed another incongruence questionnaire—the same one she had completed prior to therapy—2 years after therapy had terminated. This time she scored very low, compared to her previous result. Low incongruence is typically associated with psychological well-being and good mental health, and this also holds true for Ms. H. A person whose basic needs are well satisfied has the lowest relative risk of developing a mental disorder. Because he knows about these processes, Ms. H.'s neuropsychologist generally strives for more than the mere alleviation of the manifest disorder. He realizes that an orderly brain—a smooth coordination or consistency among neural processes—is the best guarantee of good health.

1.6 STRUCTURE OF THE BOOK

Chapter 2 introduces “What Psychotherapists Should Know About the Brain.” The chapter does not require prerequisite knowledge about the brain. It explicates the brain's fundamental functions, from the processes at single synapses and neurons to more complex neural circuits. Such an exposition of basic brain processes could have been structured quite differently, of course. Throughout the chapter, I have tried to keep in mind the concerns of the psychotherapist who wishes to know more about the brain. The chapter is intended to enable readers without prior knowledge so that they can understand subsequent chapters and comprehend the conclusions without undue difficulties.

Understanding the brain's functioning inevitably requires an in-depth appreciation of the processes related to the synaptic transmission between neurons. Changing a person's experience and behavior ultimately requires changes in the activation pattern of neural activity. Learning, as well, is based on modulations in synaptic transmission within the neuronal network. It is particularly important for psychotherapists, therefore, to understand how synaptic connections can be changed effectively and enduringly. This question arises repeatedly throughout the book and is discussed in increasing depth. A first overview of these processes is provided at the very beginning of the second chapter because all subsequent information builds on this foundational knowledge. Understanding the process by which synaptic connections are altered during learning ultimately also requires an appreciation of the biochemical processes related to these changes. I was well aware while writing these sections that many psychotherapists might find such topics rather difficult, and I have therefore tried to describe these processes in a clear, straightforward manner. I would like to encourage the reader to not skip these sections, even if some terms might not be familiar or immediate-

ly understood. Once the basic principles of action potential transfer have been comprehended, all other neural principles and conclusions should be understood relatively easily.

The second chapter also has another goal: to convey to the reader the essential premise of this book, that all mental processes are based on neural processes. To demonstrate the general applicability of this premise, I illustrate this principle also with domains of experience outside the field of psychotherapy, such as the state of being moved by music or of being in love.

Even more relevant for psychotherapy, of course, is the state of anxiety. The neural circuits and brain regions involved in the experience of anxiety will be discussed in some detail. The example of anxiety also serves more generally to demonstrate the central importance of basic neuroscientific research in the context of psychotherapy. For example, the question will be addressed of whether anxiety reactions, once started, can be effectively stopped.

Consistent with the basic premise that all mental processes are based on neural ones, I also address in the second chapter the neural basis of goal-directed action, of consciousness and volitional decision making. I illustrate with some examples showing that specific mental activities covary closely with neural activity in specific, circumscribed brain regions.

The second chapter closes with a discussion of a central question for psychotherapists: To what extent can unfavorable neural structures, once they have developed, be corrected through psychological influence? I will illustrate with many impressive examples that one of the most remarkable characteristics of our neural system is its high degree of plasticity. Well into adulthood, the brain continues to respond remarkably sensitively to recurring stimulation of high intensity, and even in advanced age, the brain retains its ability to form new neural structures. Psychotherapy can utilize this high degree of neural plasticity. In order to do so, however, it is necessary to provide forms of stimulation that are sufficiently intense and frequent, so that new neural structures can be effectively ingrained. The findings from neural plasticity research suggest relatively clear conclusions regarding the necessary characteristics that would allow psychological influences to effectively facilitate the formation of enduring new neural structures.

Two aspects that are particularly relevant for psychotherapy are not covered in chapter 2: the neural foundations of mental disorders and the motivational aspects of mental functioning. These topics are each addressed in their own chapters.

Chapter 3 summarizes our current knowledge about the neural correlates of several mental disorders that are particularly relevant for psychotherapy. The most detail is devoted here to depression, simply because this disorder has generated the most empirical research. These sections also provide the scientific basis for the claims that I made in the case example of Ms. H. Compared to depression, other disorders

continue to be relatively neglected. Four anxiety disorders—posttraumatic stress disorder, generalized anxiety disorder, panic disorder, and obsessive–compulsive disorder—have at least been examined in sufficient detail so that preliminary implications for psychotherapy can be discussed. The research basis for other disorders seemed still too narrow and controversial to draw specific conclusions at this point. Given the intensity of the research that is currently being conducted in this area, the statements in this chapter are necessarily preliminary in nature. It is safe to say that even in 10 years time it will be possible to base one's writings on the neural correlates of mental disorders on a much broader empirical foundation. Such detail will increasingly become an integral part of our disorder-specific knowledge, which every psychotherapist should know about. Today, however, we are still far from this point. And perhaps because of this still limited knowledge, it seemed particularly important to me to illustrate with a few selected mental disorders how such knowledge might look, in principle, and what kinds of implications will arise for the practice of psychotherapy.

Chapter 4 almost constitutes a book within a book, judging by its comprehensiveness. Its emphasis is on the motivational aspects of mental functioning. The chapter explicates how motivated mental functioning can give rise to the formation of mental disorders. In this chapter, as in others, I am assuming a neuroscientific perspective wherever possible. However, compared to chapters 2 and 3, the neuroscientific perspective here is relatively strongly complemented by psychological research findings.

In my book *Psychological Therapy* (Grawe, 1998/2004) I proceeded inductively; that is, I started with a large number of psychological and neuroscientific research findings and arrived at what was then a new perspective on mental functioning. At the center of this perspective was the construct I termed *consistency*, and therefore, I called this perspective *consistency theory*. It emerged as the result of an intensive engagement with all those phenomena related to the simultaneous nature of many parallel mental and neural processes.

The fourth chapter opens with this theory. I begin by summarizing the theory's most important premises in order to convey to the reader the overall context. Next, I discuss each of the premises in greater detail and report what can be said about these premises on the basis of current research. The research findings I summarize here are primarily new and had not yet been available at the time that *Psychological Therapy* was published. In engaging with this new research, I have learned much new and consequently had to revise some of my earlier ideas. However, I have also found a great number of new research findings that support some of the central tenets of consistency theory. Some of these new findings are indeed from empirical studies that were specifically inspired by the formulation of consistency theory. These studies, in particular, have been conducted in recent years by me and my colleagues with the explicit aim of testing certain assumptions of consistency theory. The fourth chapter therefore relies much more heavily on my own research work than the two preceding chapters. Chapter 4, then, reflects more directly my own scientific perspective. I try to make this explicit at the very beginning of the chapter by starting with a summary of the major assumptions of consistency theory.

The research findings that I summarize in the context of basic needs and consistency regulation, however, are also of considerable interest independent of this context. The totality of the research summarized in chapter 4 yields a picture of the emergence of mental disorders that has actually surprised me in its clarity. The research is showing relationships that were new to me and that also were not, as such, integrated in my original formulation of consistency theory. However, these new findings can be smoothly integrated into the theory. Chapter 4, then, can be viewed as a substantially improved new version of consistency theory.

Nevertheless, the theory remains partially incomplete in chapter 4. It contains only the part that speaks about the emergence and maintenance of mental disorders but is silent on the treatment of the disorders. This aspect, then, is addressed in the fifth chapter. Chapter 5 concerns that area of research with which I have long been actively associated and about which I know the most, compared to other areas. This area is known as psychotherapy research. For many years now, my colleagues and I have concerned ourselves with studies on the effectiveness of psychotherapy and the translation of new research findings into improved concrete therapeutic strategies. Apart from doing research, most of us are also actively working as therapists, which allows us to test these improved strategies in the clinic and, ultimately, to test the effectiveness of these strategies on a broader scale. In addition, at the Psychotherapy Outpatient Clinic (“Praxisstelle”) in Bern and at the Institute for Psychological Therapy in Zurich, we provide training based on the current state of our knowledge for about 150 therapists at any given time, and the therapists are instructed to translate the findings into their own clinical practice. All therapies are accompanied by comprehensive assessments, prior to therapy, at therapy termination, at regular follow-up intervals, and at various time points during the process of therapy. Moreover, for over 20 years now it has been standard protocol to record the therapy sessions on video, so that they are available at a later point for process analyses.

For 7 years now, these therapies have been based on our research questions related to the consistency theoretical therapy conceptualization that I articulated in my book, *Psychological Therapy*. Seven years is indeed a long time for a highly motivated team of researchers and therapists. These 7 years have allowed us to test clinically and empirically many aspects of the therapy according to consistency theory, to formulate some of its aspects with greater precision, or to correct aspects that needed updating based on empirical findings or based on clinical experience. I have summarized the conclusions that have emerged from our research work over these years, as well as the conclusions arising from the totality of the preceding chapters, in a section in the fifth chapter entitled, “Conclusions for Psychotherapy.”

The chapter is divided into three sections. The first section contains that part of consistency theory that was still missing in chapter 4. In this part I not only draw conclusions based on what was said in the preceding chapter, but I integrate results from our own therapy process research in recent years. This last part with the conclusions is strongly influenced by viewpoints that have crystallized in me over the past few years through our own clinical and research work.

The second part of the conclusions for psychotherapy, by contrast, has little to do with our own research work and my preexisting views. It is concerned with the neural mechanisms underlying therapeutic change as they can be deduced from the neuroscientific research covered in the preceding sections. I demonstrate that ultimately all therapeutic changes can be linked to the activation of existing and the facilitation of new neural activation patterns. Effective therapy is based on effective neural facilitation. Neuroscientific research, in turn, clearly suggests methods to make this facilitation particularly effective. This part shows, then, that neuroscientific research directly leads to practice-relevant conclusions about how psychotherapy ought to be conducted to maximize its effectiveness.

In the third part of the conclusions, I summarize all that can be deduced from the previously covered material for the practice of therapy. This concerns, on the one hand, guidelines for therapy planning and, on the other, guidelines for the conduct of therapy. Because these guidelines are all based on a substantial empirical foundation, I believe that therapies that are conducted along these guidelines will lead to a particularly good outcome. As long as this is not empirically tested, of course, it will remain an assumption. However, I believe that the foundation underlying these guidelines is already solid enough for these guidelines to be used in current therapeutic practice. Many of the guidelines are empirically as soundly substantiated as many of the traditional intervention recommendations that are offered by psychiatric or psychological associations for the treatment of specific disorders.

The guidelines in chapter 5 do not represent what happens in most current psychotherapies today. They cannot be categorized easily as belonging to any one particular therapy school. Because of this, they demonstrate how much room for improvement still remains in the field of psychotherapy, by showing how therapy can orient itself on current theoretical and empirical findings rather than on decade-old principles. This is all the more true because these guidelines are intended to be general in nature, not specific to any particular disorder. Whereas empirically based, disorder-specific treatment guidelines have become increasingly well established in recent years, the more general, disorder-transcending guidelines for treatment planning and conduct are primarily still oriented on the principles of the various therapy schools. In my view, the guidelines articulated in chapter 5 render such therapy school specific guidelines relatively obsolete. If complemented by disorder-specific knowledge, these guidelines should indeed suffice for most situations arising in therapy practice. Psychotherapists that actively orient their practice around these guidelines can probably expect to increase the effectiveness of their therapies substantially. Therapy training institutes could also increasingly aim to convey such scientifically justified guidelines and thereby contribute to a general updating, so that therapy practice will increasingly be based on current rather than decade-old knowledge.

Chapters 4 and 5 together provide a perspective on what a scientifically founded therapy practice could look like today. In chapter 6 I take a look into the future to speculate on how psychotherapy might be further developed, especially if it uses neuroscientific findings not only for general guidance but also in the concrete process of

diagnosis and therapy. This chapter is necessarily speculative. It shows some of the developments that we can probably expect in the future, but it does not go into great depth. I am primarily concerned in this book with what the neurosciences can contribute to psychotherapy today. It is indeed one of the most exciting questions to ask which aspects of psychotherapy might be completely reinvented based on the continuing influence of the neurosciences, but answers to such questions would likely resemble science fiction. At this point, the available facts appeared interesting enough so that a desire to elaborate on the fictional aspects did not really arise.