

Chapter 2

Below the Surface: An Introduction to Mental Organization

Our aim in this chapter is to get a feel for the mind as it appears through a neuro-psychological lens. This background perspective will be of great help as we delve deeper into the learning process.

Our focus in our introductory study will be on a particular realm of mental functioning – that of unconscious cognition. One of the most profound and enduring truths concerning the way our minds work is that the vast majority of mental activity takes place below the level of our conscious awareness. Here we are not speaking about arcane psychological formulations such as say, deep-seated wishes and conflicted motives, but rather everyday cognitive activities such as perception, problem-solving, and understanding.

If we visualize the totality of our mental activity as an iceberg, the amount that we are generally aware of can be thought of as proportional to the proverbial tip of the iceberg that juts out above the water. Just as the iceberg's visible tip is supported by a much larger mass below the surface, so too are the conscious aspects of our mind supported by a vastness of unconscious processing. If our brain's total processing load were suddenly made the job of consciousness, we would be stopped dead in our tracks, completely unable to function. Our unconscious mind simply does too much, and far too rapidly. It is precisely the efficiency and speed of unconscious cognition that allows our conscious mind – slow and deliberate in comparison – to do what it does so well.

What we might call the iceberg concept is a widely accepted and well-documented principle of mind among neuroscientists and experimental psychologists. The logical question, then, is what exactly takes place below the surface? What is the nature of unconscious processing? How does it function and what does it do for us?

The unconscious processes of essential interest to us in this book accomplish what, in neuropsychology, is often referred to as organization. Organizing processes give structure and intelligible meaning to our experience, allowing us to make sense of what we encounter, and, therefore, to learn from it. Organizing processes are profoundly active. The mind is constantly sifting, selecting, and structuring new

input – making meaning of increasing complexity from the concepts and sensations it encounters. Moreover, the precise way our mind organizes the input it receives is unique for each of us. We process and integrate new input in an inherently personal and idiosyncratic way, based on what we've experienced, what we know, what we value, how we learn, and what we are intending to accomplish at a given moment. And all of this takes place without us being aware of it.

In the rest of this chapter, I offer some basic principles of unconscious cognition, which will lay a foundation for our discussion as we move forward. These principles represent a way of understanding how these organizing processes work, and taking some time to contemplate them will give us a more elaborated sense of just how active and pervasive these processes are. As we'll see, their contribution is fundamental across the spectrum of human cognitive functioning, from constructing meaningful perceptual experiences out of the raw stimuli we take in through our senses, to assimilating the new and difficult concepts we encounter in our intellectual lives.

Principle 1: Our Mind Gives Meaning and Intelligibility to Our Perceptual Experience

In the course of everyday life, nothing seems more passive than simply recognizing objects, words, or even concepts. Imagine yourself walking down a city street. What your eyes take in as a dimensionless blur of lines, colors and shapes, you experience as a familiar visual scene populated by discrete objects with depth and spatial relations relative to each other and yourself – a stoplight *here*, a storefront *over there*. A blast of noise is immediately recognized as a car horn and the stream of vocal sounds emitted by your fellow pedestrians are automatically registered in your mind as speech.

You do not have to *determine* what the objects or phenomena are by consideration of the evidence (“That has a red hue, it is circular, it is adjacent to a green hue, and a yellow hue...it appears to be a stop light.” “Similar patterns of lines, light and color have proven to be buildings...this may well be a building as well.”) In our conscious experience, these things simply are. However, underlying these experiences is a great deal of unconscious organizing. Organizing processes are responsible for the effortless comprehensibility of our basic perceptual experience. It is precisely because they operate so efficiently outside of consciousness that we are apt to mistakenly conclude that the orderliness of our perception does not depend on mental processes but is simply pre-given. In fact, we might say that seeing the world as it is given *requires* mental processes which order our perceptions.

The phenomenon of what is called “object constancy” is one illustration of the organizing function such processes play in our basic perception. Consider that, if you hold this book up and turn it clockwise, rotate it or extend your arm, you will

notice that the shapes presented to you from various angles and distances are actually quite different. Such changes alter the visual data your eyes receive. Yet none of this disorients or disrupts your perception in the slightest – there’s no sense that the object you’re looking at has itself changed. You’re not under the illusion that the book has grown larger, smaller, thinner, or wider. The reason is that our mind’s unconscious organizing processes “understand” the dependable correlations between our position relative to other objects and the data our eyes receive. (“If the book rotates *this* way, it will look like *that*. If it instead rotates *that* way, it will look like *this*.”) By automatically accounting for these predictable changes, these organizing processes – inherent to our perception – give us the experience of a stable object. Moment to moment, our coherent experience of objects we recognize is the end result of our mind’s unconscious and ceaseless organization of sensory input.

Principle 2: We Do Not Consciously Perceive All the Stimuli That We Take In

Our senses receive far more stimuli than we could possibly attend to consciously. This flood of data moment by moment must be filtered somehow, enabling us to make sense of it. We do not experience being bombarded by a dizzying barrage of sensation because this vital filtering function efficiently triages all the input we receive and delivers to our consciousness only a small fraction. This filtering of attention occurs outside of conscious awareness and is an ongoing part of our interaction with – and organization of – the world. It is difficult to imagine what it would be like, or how we could function at all in our day-to-day life, without this ability.

At this very moment, as you are reading this book, your mind is filtering all kinds of sensation from your conscious awareness. Take a second to tune in to some of the feelings and sounds that are available to you as soon as you widen your attention. The feeling of the book in your hands, of your clothes on your skin, of your feet on the ground, the sound of a ticking clock perhaps. As you’ve been reading, your mind has been filtering these out so that you might concentrate on understanding what you are reading.

You don’t have to do any of this screening consciously. Have you ever had the experience, when around strangers having a conversation, of your ears suddenly perking up at the mention of some familiar word or phrase – your name, school, or company, for example – even though you have no idea what they were talking about prior to that moment? Your unconscious mind was in a sense monitoring surrounding conversations, but alerted your consciousness only when something seemingly important or relevant came up.

In instances where something suddenly grabs our attention, it can feel as though aiming our mind’s spotlight is a deliberate, conscious choice. That’s true in part. Imagine, for example, that you are doing some housework with the radio in the background. You’re not really listening – you’re thinking about something that came

up at work that day. Abruptly, you stop thinking about work and attend to the radio when you become aware that they are about to give some bit of information you had been wondering about – say, the outcome of an election. The question is, how did you know that the information you wanted was about to be conveyed? You decided to direct your attention to the radio, but why at that moment? What preceded your decision? As this example shows, when we volitionally decide to attend to something, it's often *after* our unconscious attention has made it available in our field of awareness. Our consciously directed attention depends on our unconscious filter, which is always at work in the background.

Principle 3: What We Perceive Is Influenced by Our Goals at the Moment

A remarkable aspect of this type of attention is that, while it is unconscious and rapid, it is also “smart.” How it functions depends on our momentary goals and priorities. A person walking down the street who suddenly feels the stirrings of hunger will likely find that the restaurant signs practically jump out. One need not look at each storefront searching for clues which would indicate that a restaurant is housed behind. To one's awareness, the restaurant simply presents itself.

This kind of attention can also be responsive to less biological priorities. Once just before 5 PM, I realized that I had failed to send in my tax return, which was due that day. As I ran down the stairs, intending to walk hurriedly to the post office a number of blocks away, I noticed a mailbox located within a half block of my office. This mailbox had escaped my notice up until that moment because I wasn't in the habit of mailing documents from work. Consider the fact that, because I believed the nearest mailbox was blocks away, I wasn't consciously scanning for one so close to my office. Nonetheless, my unconscious attention was primed with my goal, and the mailbox that I had never before noticed was suddenly right in front of me.

The unconscious yet logical judgments which guide attention are facilitated by our overall familiarity with the situation. As we become more familiar with a particular situation, we can more efficiently filter what we perceive in relation to our goal. We are able to automatically, unconsciously ignore well-known aspects of the situation and assess what new information is most important, based on how it fits into the framework of our previous knowledge. Consider the experience of driving around looking for a particular address in an area you have gotten to know well over time. Because you know, without looking or consciously considering, what many of the businesses are, there is less area for you to scan. Contrast that with circling a block in a neighborhood you are unfamiliar with. Because the address you're looking for might be anywhere, there is much more visual data that requires your conscious attention.

Principle 4: Prior Experience Also Influences What We Perceive and Understand in the Present

Let's say, for example, you are driving down the street and see an octagonal red sign partially obscured by a branch that, to you, reads "ST." Having seen countless stop signs before, you will in all likelihood never even question what you're seeing and what you're supposed to do. As this illustrates, what we perceive in the present is powerfully shaped by what we've encountered in the past. In fact, the past is the basis upon which our mind's organizing processes operate. When we are presented with incomplete data concerning something we've experienced in some form before, our mind's unconscious organizing processes tend to complete the picture, giving us no indication that anything was missing to begin with. Early motion pictures made it possible for experimental psychologists to clearly observe our capacity to complete the image, to fill in absent data. If looked at by hand, frame-by-frame, one could see that early movies had short but noticeable time gaps. They did not represent each moment and therefore did not play back fluid and continuous motion. But they *appeared* far more fluid than was represented in frame-by-frame analysis. The viewer knows what this sequence would look like in real life and perceives it in reference to that experience.

Just as prior experience influences what we *perceive*, prior knowledge shapes what we *understand*. Let's say that, while at home in the evening, you pick up a novel that you'd been reading and open to your bookmarked page. Within moments, the substance of what you've read so far – the plot, setting, characters, style, etc. – suddenly and effortlessly appears in your mind, almost as if you had never put the book down. Prior to resuming the novel, you might not be able to say exactly at what point in the story you had left off, but after the first sentence or two, you're likely to feel a flash of recognition, a sense of knowing where you were. If you've ever flipped to random page in an unfamiliar book and started reading, you have an intuitive sense of what a difference it makes to have a mental context available in order to help you make sense of what's happening in the present. Without it, you might understand what you're reading in some limited way – the concrete meaning of each word or sentence – but you would likely lack a sense of orientation, of knowing what is going on.

Countless times throughout the day we change what we're doing, and with these changes in activity, whatever prior knowledge or skills we possess that might be relevant to the new task are brought to mind. You answer a ringing phone, for example, and at the other end is a coworker asking about a specific project and an upcoming deadline. It may be instantaneous – or may take a second or two if you're preoccupied or exhausted – but the relevant knowledge is suddenly there to help you follow the conversation and answer the questions you're asked. The ability of our unconscious mind to spontaneously reconstruct a mental context of prior knowledge is another facet of organization. The way we understand some new bit of information or experience depends to a large extent on this process, by which our minds organize new experience in relation to, in the context of, what we already know.

Principle 5: Meaning Organizes Long-Term Memory

When we think of excellent memory, we may think of someone who seems to recall almost everything he or she sees or hears. People sometimes comment with wonder that someone is “like a sponge.” However, this common way of speaking about memory can be profoundly misleading, as it suggests that remembering means we merely absorb episodes of past experience, and that what we remember includes a certain completeness of detail.

For the most part, learning and remembering – and especially the ability to make optimal use of what one remembers – is far from a matter of passively soaking up or “recording” what one encounters and later simply “playing back” what our minds have stored. A great deal of unconscious organization is responsible for turning experience into memory. From the perspective of unconscious cognition, memory is a highly active process of selection and organization, which has little in common with the popular metaphor of recording experience through a video camera. Much to the contrary, an astounding amount of directing and editing is going on outside of awareness, even as the material is captured. Certain details are rendered significant, while others are left out of the shot.

What guides this directing and editing is the meaning that your mind gives to the experience. The very nature of long-term memory is that details are organized around a meaning or meanings. These can take virtually any conceivable form – a story, narrative, concept, theme, principle, or whatever else. The meaning around which a memory coheres serves a number of critical functions. It connects thematically related details; it determines which will be remembered most clearly; it serves to tag the memory, assisting later recall; and, finally, it gives the memory significance and therefore durability. Without some sort of meaning to organize the memory, it is likely that the unconnected details will soon be forgotten.

Consider a long anticipated evening at a well-known restaurant. If everything goes just so, the night might be summarized in your mind as “a great meal and highly enjoyable evening.” You might have the sense of remembering this wonderful experience in considerable detail, but as real as this impression may be, you won’t have remembered every aspect and every detail as if on video tape. Rather, you will tend to remember details that had the most to do with the success of the evening. In recounting the experience, you might remember that the service was excellent for particular reasons – the waiter was knowledgeable, paced the meal nicely, made good recommendations – but you won’t recall everything the waiter said, nor his or her every appearance at the table. Or, one might experience a beautiful ambience and some special features, but it is highly unlikely that you will have remembered every decorative object you laid eyes on.

What if, on the other hand, the experience had a different meaning? Suppose it was experienced as almost great but marred by too many near misses. The details of the misses – an overly salty dish, junctures when service was inattentive or awkward – will probably be well recalled. The couple sitting at the adjacent table, however, may have the same waiter and the same food but a completely different organizing

meaning. If, for example, they became engaged to be married during the course of the evening, their memories will probably include more specifics of their interaction and less about the food. They will walk away with a different theme, and though there may be some overlap, a different set of details will comprise the memory that their minds construct.

This type of long-term memory – memory that results from the process of organizing details through meaning – stands in contrast to what we can call rote learning and rote memory. In the case of rote learning, the approach to memory formation is different – it is more passive, more closely analogous to the metaphorical video camera. In rote learning, one remembers a portion of what was seen or heard much as it was presented, as in remembering a list, learning the alphabet, or recalling as much of a conversation or lecture as possible.

Of course, this type of memory has its own place and uses – certain things can be learned effectively by rote. Also, rote learning may sometimes contribute to the formation of more meaningfully organized knowledge over time. But most of what is learned *only* by rote will gradually fade over time. While rote learning is often what we first think of when we think of a strong memory, the importance of such memory for our general functioning can easily be exaggerated. Because details are stored in isolation rather than more deeply organized around meaning and embedded in a context of connected information, rote memory is quite limited, both in capacity and usefulness. Without an organizing meaning, we can only hold onto so much information for so long.

Principle 6: Long-Term Memory Depends upon Mental Boundaries

We've seen that the formation of long-term memory depends upon organizing related details into a coherent whole. The results of this process are "packets" of meaningfully connected elements of experience, and the formation of these packets depends upon an organizing process by which our minds create mental boundaries.

Mental boundaries give structure to our memory and greatly aid our ability to recall specific information. Consider an analogy: if you've ever looked up something in a large reference book, such as a textbook, you know how useful it is that the text has structure: chapters, sections, headings, paragraphs, and even punctuation. Imagine how difficult it would be to find a particular piece of information if the entire book were one continuous sentence.

One of the primary functions of mental boundaries is to maintain clear separations between things we might otherwise confuse with each other. Let's say you have two computers, one at your house and one at work, both of which have been giving you problems lately. You describe the different problems to your tech-savvy friend, who gives you two different sets of steps to take, which your friend thinks will take care of the issues. Assuming you'll remember them – possibly overestimating your own computer skills – you neglect to write either of the procedures

down. Of course, when you go to sit in front of one of the computers, you have to keep both sets of steps distinct in your mind and remember which one applies to which computer. What was presented to you as two distinct procedures might easily become – if you don’t maintain a mental separation between them – a mishmash of individual steps, no longer organized according to the problems they were meant to address.

A common neuropsychological test of memory illustrates this function of mental boundaries. The test begins with the examiner reading the subject a brief story. The subject is then asked to recall as many details as possible, which is known as free recall. The examiner then reads a second story, again asking the subject to repeat back as much of the story as possible. The second phase of the test begins after a delay of a half an hour or 45 min. As before, the free recall task is repeated in order to see how much of each story the subject retained over the course of the delay period. Finally, the examiner reads a list of details, asking the subject to decide if each came from the first or second story. Among other aspects of memory, this test measures one’s ability to keep information distinct. Throughout, one must not only link together the details of each story so they can be recalled as a unit, but also, in the final task especially, partition these sets of details so that what one remembers from the first doesn’t interfere with one’s memory of the second, and vice versa.

Principle 7: Remembering Means Integrating Memories, Not Merely Retrieving Them

Like attention, memory recall is flexible and strategic – fluidly responsive to our momentary situation. For one, the content of what we remember is influenced by our surroundings or context. To get a sense of how context affects memory, think of an occasion when you returned after some years to a childhood home, your old high school, or a former place of employment. Most people find themselves flooded with memories of events or experiences they hadn’t thought about since they occurred. The details of such familiar surroundings serve as memory cues, allowing us to remember things we had seemingly forgotten about.

On the basis of our momentary context or goals, recall is flexible in *form* as well as content – not just in what we remember, but how. If we want to remember specific events, we can do so, provided it was important enough at the time. We can recall – from the start to finish, as it were – the night we went to a Broadway show, the morning we hiked to the rim of Yosemite Valley, or the weekend we were in the wedding party of a close friend. And we can do more than recite a list of details from the experience. A remarkable characteristic of human memory is that we have the capacity to re-live the past to a significant extent, to remember how it *felt* to be there. This is so despite the fact – or perhaps, from the point of view of cognition, because of the fact – that we don’t remember every detail.

But there are other forms in which memory comes to us. We don’t always remember in terms of events, or remember all the related material we learned at one time, recalling the “packet” as a whole. Our ability to organize material into distinct packets

allows us to later recall material learned on a great number of occasions. It might be said that our memory can search any number of experiences to bring to mind a collection of information, as if it has access to a massive film library, and can search by subject, then splice and edit the material instantaneously into a coherent whole. What then comes to mind is a well-integrated presentation without the slightest hint of the staggering amount of work involved in its creation. You do not have to consciously scroll through meaningless experiences or find yourself thinking about elements of your stored knowledge that are irrelevant to your goal, but what you will recall will be what you were looking for. Cutting edge computer search engines, as remarkable as they seem, do not even approach the human mind in this capacity.

To get a sense of this, think now about an area of professional or personal interest, a field you have been pursuing for some time. Now think about the most important ideas you have learned over time – three or more observations or pieces of advice that you would offer to someone new to the field. Once you have mentally outlined your answer, ask yourself where all this information came from. Where and when did you learn these lessons? Can you pinpoint a specific time and place for each? Almost certainly, these ideas represent the integration of a great many experiences. Your mind drew upon accumulated experience and selected ideas most important in light of the whole of your experience in the field. This is quite a trick!

As we've seen, the content and form of memory can vary from one situation to the next based on the context we find ourselves in and what we are trying to accomplish in the moment. This is equally true – we might say – of the *mode* in which we process memory. That is, consciously or unconsciously. We know, of course, that past experiences can be consciously recalled and that information we once learned can be brought to mind such that we can communicate it explicitly. However, the mode of memory can also be unconscious, guiding us in what we perceive, how we behave and what we understand without our being aware of it.

Have you ever noticed the subtle differences in the way you talk depending on whom you're talking to – the differences in greeting, tone of voice and mode of expression? If the person is someone you already know, the way you talk will reflect your history with the person – in other words, the sum total of your experiences with them. Though you don't have to recall any of these memories consciously, they nonetheless influence how you act. In fact, it has been observed that amnesic individuals behave toward people they have come to know over time in a way that reflects an awareness of having met them before – subtly demonstrating an unconscious knowledge of what that person is like and what their interactions have been like – even though they cannot consciously bring to mind any particular memories.

This mode of memory is also a large part of what makes us skilled or knowledgeable in a certain area. Our expertise is certainly not based on what we learned at a single, specific point in time nor are we fully conscious of its influence. Rather, expertise comes from the aggregate of accumulated experiences, which guides and informs our judgment about new situations. Veteran teachers, for example, are highly adept at “reading” students – their temperament, areas of strength and weakness, learning style – and intuiting what they need. These insights and intuitions come from unconsciously comparing new students with their memory bank of those they have taught over the years.

Principle 8: Integrating New Learning Is a Process of *Reorganization*

We know intuitively that new material, once learned, can become progressively more organized in our minds. From experience, we know that a certain amount of clarification takes place after we're initially exposed to something new – that it can take time for new material or experience to sink in. But this ongoing integration does not merely add to our store of knowledge, leaving the rest unchanged, as if we are adding an additional chapter to a book, or placing another book on our mental library shelf. As we learn, the effect is more like making ongoing revisions to relevant chapters and volumes in order to make them reflect our new understanding.

When we consider how memory is consolidated, how new information becomes a part of our knowledge base, we may consider learning as a process involving ongoing organization *and* reorganization. Integrating new with existing knowledge entails reorganizing what we already know.

The literary figure T.S. Eliot referred to this phenomenon when he wrote that every new work of literature one reads must necessarily change one's understanding of every work read before. In reconciling, accommodating and integrating new ideas and experiences, reorganization actually “changes our mind,” interweaving new knowledge with what we knew before, building on – but also *building into* – what is already known.

Concluding Remarks

Though I have long been familiar with the principles covered in this chapter, I still find myself experiencing something like a sense of wonder in summarizing them and contemplating them as a whole. It is remarkable how complex, active, and dynamic our mind appears when viewed from the perspective of these organizing processes – and how completely foreign this picture is to the way most of us commonly think about how we learn.

I recently listened to a news story which recounted that the first sound recordings involved making a direct impression into a cylinder of wax. It struck me as a perfect metaphor for one common sense view of learning – that our mind is essentially a passive, pliable substance on which information can be inscribed. To this way of thinking, learning is a fundamentally simple process, requiring only the direct conveyance of information in order to make an impression, and that the information, having been recorded, can be played back in a similar fashion.

It seems that we naturally and implicitly conceptualize learning in this way at least some of the time, despite our intuitions to the contrary. Why is this understanding – however inaccurate we know it to be – so basic, so resistant to being fully uprooted? It's simply this: one of the wonders of the mind's unconscious organization of experience is that when all goes right, things really do seem that simple. Unconscious

processing operates so seamlessly, steadfastly and invisibly that we get the illusion of learning as simple and passive. But it's just an illusion, masking the incredible array of mental activity that learning represents.

In this chapter, we've touched upon a range of unconscious processes. Some organize our perception of the world around us. Others make it possible to understand and remember – to both appreciate the meaning of what we encounter and to further organize that meaning as it becomes consolidated in memory.

In the most general way of speaking, this discussion has had two goals. First, we have sought to provide you with a general sense – an understanding and a feel – for the activities of unconscious cognition and how organizing processes are essential in our functioning at all times. Along the way, our second goal has been to convey certain aspects of how attention is guided and how memory operates in order to provide a useful context as we begin our direct inquiry into the riddle of doing without learning. This information will allow you to better appreciate the significance of a few specific mental processes that will emerge as we tighten our focus on the role of mental organization in educational settings.

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