Rome Wasn't Built in a Day: Why Transformative Learning Takes Time

JOHN TAGG
Palomar College

Abstract

This article approaches student learning as a non-linear path, comparing the transformative learning process to one's driving, which requires accidents, roadblocks, and delays. Referring to Daniel Kanheman's (2011) "mind systems" to better explain the cognitive journey, System 1 happens automatically and unconsciously, while System 2 is a state that requires more mental attention. Usually operating in System 1 without conscious control, students often fail to engage in logical reasoning or recognize their need to seek new information when necessary. Changes in students' meaning perspective will take time though, for it challenges the traditional school system which emphasizes mindless learning and testing in timed structures. Through understanding the way our working and long-term memory operates, students can go from the previously instilled mindlessness involved in traditional schooling, to mindful reflection on learning activities and engagement in true transformative learning practices. Properly reflecting on the accidents, roadblocks, and delays involved in the process removes the student from a timed racetrack and places them on a personal journey where he or she becomes a self-conscious agent of his or her own thinking.

Keywords: transformative learning, mind systems, knowledge projection, meaning perspective, working memory, mindful perspective

The Complications of Getting Where You're Going

The student facing new knowledge is in many ways like you driving to work. And if we hope for transformative learning, students will achieve it only if they encounter accidents, roadblocks, and delays. The straight route won't get them there.

You are driving to work along the familiar route you take every day. What are you thinking about? Given that traffic and weather conditions are within the normal range, you are probably thinking about something, almost anything, other than driving. You may be planning a conversation you will have when you arrive at your destination, thinking through plans for a class you will teach or a meeting you will attend, listening to the news or music on the car radio. If I am sitting next to you and ask, "What are you thinking about?", you may tell the truth or you might lie. But if you lie (the truth being embarrassing or inappropriate), the kind of lie you will tell will be something on the order of a plausible mental scenario: "I was thinking about how

long it will take me to finish preparing for the meeting." What would not be a plausible lie—so obviously concocted that it would not pass the smell test—would be something like, "Oh, I was thinking about how hard to depress the break pedal to maintain a constant distance from the car I'm following" or "I was thinking about whether I should begin to signal a right turn now or wait until we have passed that fire hydrant." Nobody would believe it.

Yet, you are driving. So most of the mental operations that you are engaged in—those guiding your nervous system through the movements that entail driving—are implicit rather than explicit, unconscious rather than conscious. They are conducted, to use the "mind systems" that Daniel Kahneman (2011) has popularized, in System 1 ("operates automatically and quickly, with little or no effort and no sense of voluntary control") rather than in System 2 ("allocates attention to the effortful mental activities that demand it, . . . associated with the subjective experience of agency, choice, and concentration") (p. 20-21). Because System 1 activities are often learned and practiced tacitly or implicitly rather than openly and declaratively, they are easy to execute: you don't have to *think* about driving or writing to do it; it just flows. But for the very reason that they are not hard to do, they can be hard to change. If you pick up a bad habit when learning to play tennis or golf, or to drive or write cursive, it may be hard to change later exactly because you do it without the burden—or the aid—of conscious awareness.

But this distinction doesn't just apply to skills. It works for knowledge as well. Indeed, the most basic foundations of our knowledge system are usually tacit. When someone asks you a question for which the answer is "obvious" ("Who was president during the Civil War?" "Who proposed the Theory of Relativity?") you don't stop to think about it, any more than you stop to think about depressing the breaks when the car in front of you slows down. You just find the answer available in your brain. Thinking in System 1 is not, so to speak, visible, even to the thinker. It happens out of sight, and apparently both effortlessly and instantly—a*nd out of conscious control.*

One of the processes by which we learn is what psychologists call *knowledge projection*. This means that we often project onto new knowledge the implicit, unexamined frameworks we use to effortlessly produce already mastered knowledge. When new information comes into view, we exercise *selective scrutiny*. Psychologist Keith Stanovich (2002) summarizes it this way: "subjects accept conclusions that are believable without engaging in logical reasoning at all. Only when faced with unbelievable conclusions do subjects engage in logical reasoning about the premises" (p. 147). We might also call this experience of being faced with the unbelievable a *disorienting dilemma.*

But what determines whether new information is believable or unbelievable? Its consistency with what you already believe, its capacity to merge with and support your existing framework of thinking that you are attempting to project onto the new information. Jack Mezirow (1991) uses the term *meaning perspective* to describe what I think is, perhaps, the same thing: "the structure of assumptions within which one's past *experience assimilates and transforms new experience*" (p. 42).

The thing about this process that we need to keep in mind is that it is usually unconscious and automatic. The student taking in new knowledge, acting in System 1, is doing it the same way you drive to work: without any conscious awareness of the process by which he or she is assigning meaning and significance to information. As Kahneman (2011) points out, System 2 is inherently lazy. System 2, of course, is the mode in which we seek out ideas to fill gaps in our thinking, compare concepts, and weigh relative probabilities. But we don't do any of these things unless we have to, unless we are *forced* to. When you are driving to work, you will think about alternative routes *only if you must*. Say the road is closed because of construction or an accident. Then, if I'm sitting next to you in the car and I ask, "What are you thinking about?" you can honestly answer "I'm thinking about whether the freeway or Grand Avenue is going to get us there quicker." You are self-consciously reflecting, thinking in System 2, about your driving. The System 1 conclusion automatically projected into your brain really is, now, unbelievable. You need to think what to do next.

Kahneman (2011) describes the conservative aspect of System 1 thinking with a remarkable initialism: WYSIATI, which stand for "what you see is all there is." System 1 only considers what its automatic process offers up. He points out that "System 1 is radically insensitive to both the quality and the quantity of the information that gives rise to the impressions and intuitions." As far as System 2 is concerned, it starts with what it is given: "The combination of a coherence-seeking system 1 with a lazy System 2 implies that System 2 will endorse many intuitive beliefs, which closely reflect the impressions generated by System 1" (p. 86).

When do we question the automatic assumptions that we have learned to make? Only when they conspicuously fail. It's possible that the route you've been taking to work these last many months is not, in fact, the best route. Perhaps they completed the construction on Grand Avenue, which is now both quicker and easier. But you won't discover that under normal circumstance, unless the road is closed, creating a disorienting dilemma. For students, the meaning perspectives that they use to project meaning on to new information may not—I'm being diplomatic here—be ideal. But they will never discover that, will never try the alternative routes, unless the road is closed.

This does not depend on how informed or sophisticated or intelligent people are. It's just the way our minds tend to work. Students who are, from your perspective, deeply ignorant on a subject probably don't know it. They don't know what they don't know: WYSIATI. As Kahneman (2011) puts it, "The confidence that individuals have in their beliefs depends mostly on the quality of the story they can tell about what they see, even if they see little. We often fail to allow for the possibility that evidence that should be critical to our judgement is missing—what we see is all there is" (p. 87). We tend to project our meaning perspectives onto the new information we encounter, which means that the confirmation bias is a built-in quality of our mental operations and one that we are usually completely unaware of.

Sometimes this works to our benefit. Sometimes not. It explains, probably, why the Ptolemaic model of the universe was, through centuries of observation and new discovery, jiggered and adjusted and augmented by increasing numbers of cycles and epicycles rather than being abandoned. It explains why the Copernican system, faulty and incomplete in its original form, nonetheless provoked its own correction. It

explains why theorists working from a sound theory make good sense out of new data, and why theory correction often takes a long time. It explains why students, as Stanovich puts it, are sometimes isolated "on 'islands of false beliefs' from which—because of the knowledge projection tendency—they are unable to escape" (p. 148). This has nothing to do with intelligence or fundamental mental capacity, as Stanovich (2002) points out: "Knowledge projection from an island of false beliefs might explain the phenomenon of otherwise intelligent people who get caught in a domain-specific web of falsity and because of projection tendencies cannot escape . . ." (p. 149).

This is not just about science, though the scientific examples may be more clear-cut. People can reside on islands of false belief with respect to social and personal relations, history, and their own skills and capacities. And, of course, politics. Indeed, the very conception of intelligence that sees IQ as a global predicter of ability and reasonableness may be an island of false belief on which many of us are stranded, keeping us from perceiving the sources of many problems.

Why It Takes Time

Changing one's meaning perspective is not easy or automatic, and we might correctly conclude that it isn't fast either. Yet the whole structure of schooling, not just college but all schooling from kindergarten up, puts a priority on speed. The semester or quarter structure of classes and the stand-alone credit granted by individual teachers at end of term mean that the highest rewards go to the students who can master "the material" fastest. Timed tests of all kinds, from IQ tests to in-class essays, measure, not how much students know or what they know, but what they can report in a given format in a defined period of time. Tests do not find out who has the best answers, they find out who has the best answers in fifty minutes, or whatever the time limit is. What determines the speed with which students can solve a problem or answer a question?

Processing a question or a problem is done in *working memory*. And everybody's working memory works in essentially the same way. It can hold more or less seven elements and operate on two to four of them at the same time; after about 20 seconds, information is lost to working memory unless it is refreshed (Merriënboer and Sweller, 2005, p. 148). Working memory allows us to compare, contrast, and perceive the intersections among the various elements that appear in it. The limitation to a few elements is probably built into our brains by evolution. Why? Long-term memory, the information and responses that we have access to on demand in our mental "data bank" needs to be relatively stable and secure. If long-term memory changed rapidly, especially in it overall design, we could not build on existing knowledge but would be constantly replacing it. We would be starting over all the time. Long-term memory has to be recognizably coherent in the long term.

Jeroen van Merriënboer of the Open University of the Netherlands and John Sweller (2005) of New South Wales University in Australia point out that "Human cognition has a specific structure to ensure that rapid alterations to long-term memory do not occur: A limited working memory. Working memory can be used to test the effectiveness of only a small number of combinations of elements" (p. 155). That this

must be so is clear when we consider the alternative. Because the number of permutations of information elements increases exponentially with the number of elements, that number must be small. Three elements can be combined in six different ways. Ten elements can be combined in more than 3.5 million ways. "A working memory that could deal with more than a few elements of information would not be functional" (Merriënboer and Sweller, 2005, p. 155). So, the vast library of long-term memory is subject to change, but the only passageway through which it can be reached is the narrow door of working memory.

Cognitive Load and the Speed of Thought

The number of separately processed items in working memory constitutes the *cognitive load* of a mental process. Some people can apparently handle a greater cognitive load than others, can calculate more elements faster or anticipate more steps in a process. Yet people who process information more rapidly than others are generally not processing the contents of working memory any faster. How, then, do they do it? The key to processing information more rapidly lies not in working memory but in long-term memory. Working memory has constant access to what is already stored in long-term memory. The schemas or patterns that reside in long-term memory are the tools by which novel information is understood in working memory. Just think about the process of reading. Readers who lack the background knowledge and context to process the meaning of a passage will read it slowly and arduously, and probably come away from it with a more vivid memory of its difficulty than of its content. Readers do not find meaning in the words they encounter, they *assign* meaning from the schemas that they carry around in their heads. Those who teach reading know that readers must be able to read at a certain speed to accomplish anything. Why is this? If you have ever progressed to a certain point in learning a new language you have had the experience. If you have to stop to look up half the words in a passage, you may understand the words, but not the passage. It takes two readings, one to ascertain the import of each word in the context, another to put them together as a statement, to sort out what is being said. Working memory cannot handle all of that processing with its limited scope. Only when you have built a secure enough vocabulary—that is, when the functional meanings of most words have been saved in long-term memory so as to be readily accessible—can you process the meaning of a sentence in working memory. Otherwise, the cognitive load of the task exceeds your capacity.

Experts not only know more than novices, they learn faster and more securely than novices. They learn faster *because* they know more. That is, they have a more complex, secure, and flexible apparatus of schemas in long-term memory that they can use to assign meaning to new problems and information. They do not actually *think* faster than novices. They have already done much of the thinking in advance, by chunking related facts and processes in long-term memory so they can be easily applied in working memory. They seem to think faster now because they have invested much time in the past in rehearsing and reinforcing the elements of the kind of thinking they are doing now. The math teacher who has been rehearsing problem-solving strategies for years can solve complex problems seemingly instantly and

without conscious thought for the same reason you can drive to work with little attention to the task. Once you have securely *consolidated* a process or a mental schema in long-term memory, you can use it quickly or effortlessly. Until you have done so, the cognitive load of the task will make the work slow and arduous.

How to achieve that consolidation should perhaps be seen as a central—if not the central—question for teachers. But that question will have to wait. The point I want to raise now is that the consolidation of knowledge and skills takes time, and that has a couple of important implications. First, when we put learning on the clock, we slow it down in a significant sense. When we put time limits on learning processes, one effect is to reward those who need to learn the least and punish those who need to learn the most. We create an environment in which those who have already consolidated the essential knowledge or skills in a field will thrive and those who have not will struggle. As John Hattie and Gregory Yates put it in their valuable survey *Visible Learning and the Science of How We Learn* (2014), "By asking students to race through mandated lessons under duress of time pressures, we run considerable risk of creating little more than isolated islands of knowledge. Isolated knowledge will be subject of rapid forgetting in the natural course of time, and is not conducive to schemata development" (p. 41).

Second, transformative learning, which by definition allows for changing the student's meaning perspective, takes a long time for the simple reason that the student's meaning perspective is *already consolidated*. It consists of the schemas that have been formed and used over a long period of time. They were largely consolidated through practice and exercise in System 1, conducted thoughtlessly and uncritically. And this has nothing to do with whether they are good or bad, rich or sparse, fonts of wisdom or islands of false belief; the meaning perspective the student brings to the learning process is what the student will use to project and generate new knowledge for the simple reason that it is all the student has to work with. (The same is true, of course, of you and me.)

Mindful Reflection and the Need for Roadblocks

The need for speed in higher education works against transformative learning because reflection on existing, consolidated meaning perspectives requires that the System 1 apparatus, developed over a long period of time and now exercised effortlessly, be brought into System 2 and analyzed through the effortful process of conscious deliberation, and perhaps rebuilt on a new foundation. This is the process of *reflection*. It is not automatic and we should not expect that students (or faculty) will engage in it spontaneously, though some will.

To see one's thoughts as objects of reflection is to assume a *mindful* perspective. As Ellen Langer (1997) describes it: "A mindful approach to any activity has three characteristics: the continuous creation of new categories; openness to new information; and an implicit awareness of more than one perspective" (p. 4). The opposite, of course, is mindlessness. "Mindlessness," as Mezirow (1991) notes, "leads to the uncritical acceptance of labels, self-induced dependence on external authority, simplistic attributions, diminished self-image, and reduced growth potential" (p. 115).

Have you had a chance to observe these limitations in real life? Of course you have. To a considerable degree, mindlessness is taught in school. The whole idea that the project of education is to get the right answer in the time limit tends to impose mindlessness on students, invites them to be closed to new information that does not fit in sanctioned categories ("will this be on the test?") and to adopt only sanctioned perspectives (who has time for alternate perspectives? Only one perspective is rewarded on a multiple-choice test.) I believe that the essence of reflection is the awareness of more than one perspective. We cannot reflect upon what we are unaware of. And to become aware of our meaning perspectives, we need to see alternatives to them. If my meaning perspective is one-of-a-kind, it is merely the background to all of my knowledge. It owns me. If I am to own it, even to freely choose it, then I must see an alternative to it. To engage in reflection on the meaning perspectives that we take for granted means, at a minimum, *not taking them for granted.* Normally, we see *with* the meaning perspectives we carry with us. Reflection requires that we see *through* them. As Mezirow puts it, "Through reflection we *see through* the habitual way that we have interpreted the experience of everyday life in order to reassess rationally the implicit claim of validity made by a previously unquestioned meaning scheme or perspective" (p. 102). You will take the same route to work every day unless you learn there are alternatives. And you will not learn that unless your normal road is blocked. Thus, education for transformation requires that we cause accidents and blockages in students' routes to the truth. But if we do, they won't always get where they're going on our schedule.

Transformative learning does not always lead to transformation of ideas. As Mezirow points out, the resolution of a student's reflection on his or her meaning perspectives lies in the student's hands. It may result in the transformation of meaning perspectives, or "it may result in an elaboration, confirmation, or creation of a scheme" (p. 108). To try to determine the outcome would defeat the purpose. But even the student who confirms her prior meaning perspective, but does so as a mindful, reflective choice, has become a more mature and self-conscious agent of her own thinking. That in itself is a kind of transformation, and one that would produce an educated person in quite a different sense than is the case for many recipients of bachelor's degrees today. To get there will take time, and time allocated to the creation of dilemmas and roadblocks that cannot be quickly resolved. We cannot explore here all of the implications of this fact. But we can see that developing a habit of reflective mindfulness is not likely to be achieved in a single class. If our goal is transformative learning, we need to think beyond single classes, to the alignment and coherence of the whole curriculum, and indeed the whole experience of the student. Our word "curriculum" is borrowed from Latin, where it is a metaphor. The original meaning was "a race or racecourse," the kind that chariot races would be run on. A curriculum should not be a sequence of short, disconnected sprints. It should be a journey, a quest, and it should have a destination.

The student facing new knowledge is in many ways like you driving to work. And if we hope for transformative learning, students will achieve it only if they encounter accidents, roadblocks, and delays. If students are to arrive at the end of college in a different place than they started, they must devote some time to getting there.

References

Hattie, J., & Yates, G. C. R. (2014). *Visible learning and the science of how we learn.* NY: Routledge.

Kahneman, D. (2011). *Thinking, fast and slow.* NY: Farrar, Straus and Giroux.

Langer, E. J. (1997). *The power of mindful learning*. NY: Addison-Wesley.

Mezirow, J. (1991). *The transformative dimensions of adult learning*. San Francisco, CA: Jossey-Bass.

Stanovich, K. E. (2002). Rationality, intelligence, and levels of analysis in cognitive science: Is dysrationalia possible? In R. J. Sternberg (Ed.), *Why smart people can be so stupid.* (pp. 124-158). New Haven, CT: Yale UP.

Van Merriënboer, J. J. G., & Sweller, J. (June 2005). Cognitive load theory and complex learning: Recent developments and future directions. *Educational Psychology Review*, *17*(2), 147-177.

Author's Note: John Tagg is an emeritus professor at Palomar College. He does research in Adult Education, Educational Technology and Science Education.