

Applying Information Processing Theory to Supervision: An Initial Exploration

By: Jodi L. Tangen, [L. DiAnne Borders](#)

This is the peer reviewed version of the following article:

Tangen, J. L., & Borders, L. D. (2017). Applying information processing theory to supervision: An initial exploration. *Counselor Education and Supervision*, 56(2), 98-111. doi: 10.1002/ceas.12065,

which has been published in final form at <http://dx.doi.org/10.1002/ceas.12065>. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving.

*****© American Counseling Association. Reprinted with permission. No further reproduction is authorized without written permission from Wiley. This version of the document is not the version of record. Figures and/or pictures may be missing from this format of the document. *****

Abstract:

Although clinical supervision is an educational endeavor (Borders & Brown, 2005), many scholars neglect theories of learning in working with supervisees. The authors describe 1 learning theory—information processing theory (Atkinson & Shiffrin, 1968, 1971; Schunk, 2016)—and the ways its associated interventions may enhance the supervision enterprise.

Keywords:

Supervision | information processing theory | supervision pedagogy

Article:

Clinical supervision has long been deemed an educational process (Blocher, 1983; Borders, 2001, 2010; Borders & Brown, 2005; Carroll, 2010; Ekstein & Wallerstein, 1972; Watkins, 2015; Watkins & Scaturro, 2013, 2014), although the educational foundation of supervision practice remains underdeveloped. In recent years, some scholars have begun to suggest interventions from learning theories, such as direct instruction, modeling, feedback, and self-directed learning (Goodyear, 2014); reflection, Socratic information exchange, and scaffolding (Johnston & Milne, 2012); and educational interventions and learning/relearning (Watkins & Scaturro, 2013) for working with supervisees. However, with few exceptions (Abbey, Hunt, & Weiser, 1985; Guiffrida, 2015; Korcuska & Olson, 2011; Nelson & Neufeldt, 1998), learning-oriented interventions typically are not grounded in, nor guided by, overarching learning theories.

A *theory* can be defined as “a hypothesis that describes, speculates, or defines a relationship between a set of facts or phenomena through a body of principles, policies, beliefs, or assumptions” (Leonard, Noh, & Orey, 2010, p. 9), and a *learning theory* explains the phenomenon of learning. Using learning theories in supervision could (a) inform broader and

more pedagogically astute supervision conceptualization and (b) provide guidance in choosing and implementing more intentional interventions across sessions. For example, a supervisor using an educational intervention (e.g., modeling) without an overarching educational theory (e.g., social learning theory) is like a counselor using a counseling intervention (e.g., thought stopping) without an overarching counseling theory (e.g., cognitive behavior theory). Without consideration of the broader theory, the counselor's conceptualization of the client is limited. Thus, the use of an intervention like thought stopping may be random and unintentional. However, guided by cognitive behavior theory, the intervention of thought stopping becomes part of a broader conceptualization. Then, not only are the chosen interventions more intentional, but they can be used successively across sessions in a more focused and sequential manner.

Translated to supervision, learning theories can help supervisors better (a) conceptualize supervisees' processes of learning and (b) guide supervisors in selecting, implementing, and sequencing more intentional interventions. Although current supervision models (e.g., the Discrimination Model [Bernard, 1997], developmental models [Stoltenberg & McNeill, 1997]) provide frameworks for choosing interventions based on assessment of the supervisee, the models do not explain how they work from a learning perspective. Knowledge of the learning process, the “how,” is needed to help supervisors implement the selected interventions in ways that enhance their effectiveness. Certainly, the interventions may still be used effectively without contextualizing them in a learning theory. However, we argue that, when grounded in a learning theory, these interventions are guided by broader conceptualizations of supervisees' learning processes—how and why supervisees achieve the desired outcome of the intervention—and can be implemented and sequenced in a more deliberate manner across sessions.

One learning theory especially relevant to supervision is information processing. To describe information processing theory (IPT), we use tenets from Atkinson and Shiffrin's (1968, 1971) and Schunk's (2016) models, although our interpretation represents a somewhat modified integration of the two models. According to Atkinson and Shiffrin (1968, 1971) and Schunk, IPT provides a structure that explains how supervisees acquire, process, store, and retrieve knowledge, and, for our purposes, this includes specific information associated with counseling theories, skills, diagnoses, and conceptualizations. There is extensive research on the relevance of IPT in multiple educational contexts, and the theory increasingly is being supported by cognitive neuroscience research (Schunk, 2016; Wolfe, 2010).

IPT seems particularly relevant to supervision because supervisors often focus on supervisees' mental processing during counseling and supervision sessions (e.g., how supervisees are gaining needed information about counseling). To maximize supervisees' learning, supervisors must assess current knowledge and determine how to help supervisees gain needed knowledge, remember it, and be able to call forth that knowledge as needed during counseling sessions. Acting from an IPT perspective allows supervisors to do this in an intentional manner. To our knowledge, none of the aforementioned supervision scholars have explored this approach, and to date, we (Bartley & Borders, 2015) have only cursorily explored it. By learning more about IPT and its associated pedagogical interventions, supervisors will be able to present information in a more pedagogically astute manner and modify approaches based on the individual supervisee

and specific supervision context. Thus, in this article, we aim to (a) describe the three memory structures of IPT and provide supervision-based examples of them, (b) discuss when IPT would be warranted in clinical supervision, and (c) outline limitations and implications of the approach.

IPT

IPT “attempts to describe how sensory input is perceived, transformed, reduced, elaborated, stored, retrieved and used” (Kandarakis & Poulos, 2008, p. 111). In other words, IPT explains the process of acquiring, processing, storing, and retrieving information from memory and provides guidance on how memory can be enhanced. IPT is grounded within the larger educational paradigm of *cognitivism*, which equates learning with mental processing (Ertmer & Newby, 1993). Before cognitivism arose in the 1950s, behaviorist theories prevailed, which equated learning with stimulus–response types of reinforcement (Ertmer & Newby, 1993). With the advent of cognitivism, researchers began to explore the more intricate mental processes of how and why people learn. IPT is one theory stemming from that educational paradigm shift.

The theory of information processing, as a whole, is not generally attributed to a specific founder (Schunk, 2016), and varying models exist within it (Lutz & Huitt, 2003). Therefore, our descriptions and associated citations cannot include the vast references and concepts associated with IPT. Across the varying models, however, researchers have reached consensus on a few aspects of the theory: (a) the mind's ability to process information is limited, (b) some mental control is required for processing, (c) information processing occurs in developmentally consistent ways, and (d) past knowledge affects current processing (Huitt, 2003; Lutz & Huitt, 2003; the last aspect is also cited in St Clair-Thompson, Overton, & Botton, 2010). First, according to the theory, the mind can process only a limited amount of information at any one time. Under normal circumstances, for example, a person could not remember a list of 50 items after hearing those items only once. Second, some control function exists for processing; however, researchers are not sure how processing is controlled (Lutz & Huitt, 2003), although ongoing neuroscience research is exploring these functions (Schunk, 2016). Third, people seem to process similar types of information at similar developmental stages. An example of this is the parallel developmental progression of language acquisition in children across cultures (Huitt, 2003; Lutz & Huitt, 2003). Finally, the information a person currently possesses affects future learning. For example, a person with extensive knowledge about anatomy may better understand a specific disease than one without this background knowledge. These general principles highlight some general aspects of IPT; however, to begin to understand the theory with some depth, we use tenets from the information processing stage model first proposed by Atkinson and Shiffrin (1968, 1971) and recently updated by Schunk (2016).

According to Atkinson and Shiffrin (1968, 1971), the mental activities associated with acquiring, processing, storing, and retrieving information can be likened to computer functions (e.g., memory storage, search capability). Their two-store memory model of IPT is composed of three memory structures: sensory register, short-term (or working) store, and long-term store (Atkinson & Shiffrin, 1968, for an explanation of how their constructs slightly differ from the contemporary terms *sensory memory*, *working memory*, and *long-term memory*). Because

Atkinson and Shiffrin (1968) believed that information passed through each memory structure in a sequential manner, their model is considered a stage model (Lutz & Huitt, 2003).

Recently, on the basis of cognitive neuroscience research, Schunk (2016) reconceptualized and updated Atkinson and Shiffrin's (1968, 1971) information processing model in four ways. First, Schunk posited that the information processing model should be conceptualized as a dynamic model with phases that interweave, rather than as a stage model. Second, Schunk stated that *short-term* memory should be deemed *working* memory because of its relatedness to and influence on long-term memory. Third, aspects such as motivation, values, and beliefs should be given greater attention for the role they play in learning. Finally, Schunk emphasized the active nature of learning in the new information processing model, whereas Atkinson and Shiffrin (1968, 1971) considered learners as more passive (illustrated in their metaphor likening human learning to computer processing).

Because both Atkinson and Shiffrin's (1968, 1971) model and Schunk's (2016) model include three similar stages or phases, we describe each of these in the following sections and highlight associated supervision implications. Our presentation of these three stages and our associated examples are deceptively simple and presume a linear stage-like process to IPT. We chose this straightforward presentation given the lack of attention to IPT in the supervision literature to date. We agree with Schunk that mental processing is highly dynamic and complex, and we acknowledge that some overlaps are present in the following examples; however, for the purposes of this initial exploration, we do not elaborate on them. Rather, we seek to establish a platform from which to build additional contributions from IPT and other learning theories to the pedagogy of clinical supervision.

Sensory Memory

Information first enters sensory memory, which is conceptualized as a vast structure capable of acquiring anything detected through the five senses. Information could be a certain smell; a musical piece; or, for our purposes, a specific way of intervening with a client. However, because so much information is present at any given point in time, much of the material contained in sensory memory is lost anywhere from a few milliseconds (Kandarakis & Poulos, 2008; Schunk, 2016) to 3 seconds (Huitt, 2003; Lutz & Huitt, 2003) if not attended to in some way.

To retain information and transfer it into short-term or working memory, individuals must attend to it (Atkinson & Shiffrin, 1968; Kandarakis & Poulos, 2008; Schunk, 2016; Slate & Charlesworth, 1988). Huitt (2003) acknowledged two methods of stimulating attention—promote interest and trigger pattern recognition—both of which are mentioned by Schunk (2016) as well. More recently, Wolfe (2010) outlined four ways to stimulate attention, many of which were previously outlined by Slate and Charlesworth (1988) and mentioned by Schunk: (a) raise the importance level, (b) present novel information, (c) intensify the stimuli, and (d) encourage movement. For example, imagine that a teacher is trying to help her students learn vocabulary words. First, to gain students' attention, the teacher could tell them that they will be expected to know the definitions of the vocabulary words, which raises the importance level. Second, the

teacher could create a song including the vocabulary words and their definitions. This novel approach would also gain students' attention. Third, the teacher may present the vocabulary words in a loud or dramatic manner, thus intensifying the stimuli. Finally, the teacher could encourage the students to act out the definitions of the words, which encourages movement and further stimulates attention. As summarized by Schunk, teaching implications include varying teaching environments and materials as well as promoting activity and participation.

Imagine that Maria, a supervisee in her first internship, is highly cognitive and often misses subtle emotional shifts in her clients. In the most recent digital recording that she sent to her supervisor, Juan, she is working with a teenage client who is angry with her parents. Throughout the recording, the client keeps repeating, "My parents are never there for me." She is clearly angry, but at one point when she says that her parents were not there for her, her voice quivers slightly and she looks down. In response, Maria attempts to investigate the client's cognitions. Before beginning their next supervision session, Juan considers Maria's counseling practice from an information processing lens. As he considers sensory memory, he realizes that Maria simply is not attending to (or completely aware of) the client's underlying emotions. Juan considers the methods of stimulating attention and decides to raise the importance level of being aware of emotion and intensify the stimuli. To raise the importance level, Juan asks Maria what her goals for internship are. She says that she was given feedback in practicum that she did not focus much on emotion and that it is important for her to learn this skill. Juan agrees with her, stating that the ability to work with emotion is a critical component of counseling. Now that Juan has Maria's attention on her own specific objective, he asks if she is ready to work on this goal. She agrees.

He decides to help her by intensifying the stimuli (the client's emotion), using the recording to help Maria attend to the client's emotions. He sets the recording to where the client's voice quivered and she looked down. Because Juan is concerned that Maria may not be familiar with the cues of different emotions, he decides to assess her knowledge before playing the recording. He asks Maria to list all the emotions she believes that her client is experiencing. Maria mentions anger, irritation, and frustration. Juan attempts to stretch her consideration and asks her what she believes it would look like if her client were sad. Maria says that the client would probably cry, a typical indication of sadness. Juan intentionally works on the leading edge of Maria's awareness and asks her what types of behavioral characteristics precede sadness. She thinks for a bit and then says, "Well, a person becomes teary-eyed." Juan agrees with Maria but realizes that he needs to provide more direct information. He states other indications of underlying sadness, such as a shaky voice, changes in eye contact, swallowing, and changes in breathing. Before turning on the recording, Juan asks Maria to watch the client's nonverbal cues and listen to her vocal tone closely. Juan starts the recording at a low speed, which slows the client's words and actions, thereby intensifying each single stimulus and giving Maria time to attend to them. This time, she readily hears the client's quivering voice and sees the client look down. In summary, Maria's attention has been sufficiently captured by raising the importance level (using her goals) and intensifying the stimuli (using the slowed recording), and now she can specifically cue into subtle indications of sadness in her client. Although we present sensory memory as a distinct memory structure to illustrate this process, some of its characteristics overlap and interact with

components of working and long-term memory, thus illustrating the dynamic nature of the modern information processing model (Schunk, 2016).

Short-Term/Working Memory

If information is attended to, it enters short-term or working memory (Atkinson & Shiffrin, 1968, 1971; Schunk, 2016). Because of the level of active consciousness required in working memory, only a limited number of items (e.g., three to nine; Atkinson & Shiffrin, 1968, 1971; Huitt, 2003; Kandarakis & Poulos, 2008; Lutz & Huitt, 2003) can be processed and worked with at any given time. Furthermore, if not actively processed in some way, these items will be lost within 15 to 30 seconds (Atkinson & Shiffrin, 1968; Lutz & Huitt, 2003). In other words, unless individuals do something with the information that enters into working memory, it will be quickly lost. Consider the example of trying to remember the numbers and letters on a car license plate. If the information is not used very quickly, individuals typically forget.

Thus, it is important that teachers use strategies that encourage active processing. One of the most common strategies is *rehearsal* (Atkinson & Shiffrin, 1968, 1971; Huitt, 2003; Kandarakis & Poulos, 2008) or *maintenance rehearsal* (Lutz & Huitt, 2003; Schunk, 2016). Rehearsal is the process of repeating information (Atkinson & Shiffrin, 1971; Lutz & Huitt, 2003; Schunk, 2016) to increase the strength of memory. For example, if a person wanted to remember license plate numbers and letters, he or she could recite them over and over, which would be an example of maintenance rehearsal. Schunk (2016) also described *elaborative rehearsal*, which is the process of “relating the information to something already known” (p. 183). Because this process significantly overlaps with long-term memory (as something already known would presumably be stored in long-term memory), we describe it in the section on long-term memory.

In addition to maintenance rehearsal, organization is an important method of holding information in working memory (and also transferring it into long-term memory, described later). One common way of organizing information in working memory is by *chunking* it (coined by Miller as cited in Atkinson & Shiffrin, 1968; Huitt, 2003; Schunk, 2016), or organizing information into meaningful units. In the previous license plate example, the individual may chunk the letters into one group and the numbers into another group to aid memory. It is typically easier to remember organized chunks of information (e.g., a group of three letters and then a group of three numbers in a license plate) than it is to remember disparate pieces of information (six random letters and numbers in a license plate). Using strategies such as maintenance rehearsal and organization (mainly chunking) not only helps maintain information in working memory, but also helps begin the process of transferring information into long-term memory (Schunk, 2016). Because the relationship between working memory and long-term memory is dynamic (Lutz & Huitt, 2003; Schunk, 2016), the functions between the two overlap.

The specific strategies of maintenance rehearsal (repetition) and chunking (organizing information into chunks) inform pedagogical approaches. Because only a limited number of informational pieces (three to nine) can be processed at any given time, teachers need to divide the information into reasonable and manageable groupings based on students' current knowledge

and abilities, discern when students are overwhelmed, and adjust accordingly (e.g., reduce students' cognitive load; Kandarakis & Poulos, 2008; Schunk, 2016). In addition, teachers can use organizational tools and memory aids (Kandarakis & Poulos, 2008; Slate & Charlesworth, 1988; St Clair-Thompson et al., 2010), and encourage metacognition (e.g., thinking about one's own thinking; Kandarakis & Poulos, 2008). Schunk (2016) recommended the use of mnemonics. For example, a person might use the following mnemonic to remember how to spell: “*i* before *e* except after *c*.” Through these types of strategies, information may begin to move into long-term memory.

To illustrate how the strategies of rehearsal and chunking can be specifically applied to supervision, we provide another example. Imagine that Tyrone, a practicum-level supervisee, is learning how to conduct a suicide assessment. He tells his supervisor, Nia, that he does not know all of the warning signs of suicide, and will not be able to conduct a thorough assessment. He seems eager to learn and does not appear anxious about conducting suicide assessments. To help Tyrone, Nia decides to use strategies from IPT to reduce the cognitive load in his working memory. She decides to organize and chunk the information using the acronym IS PATH WARM (Juhnke, Granello, & Lebrón-Striker, 2007). She realizes that the number of items (10) is still lengthy (vs. the recommendation of three to nine items) and may still be cumbersome chunked to three, so she further reduces his cognitive load by providing a cheat sheet that briefly defines what each letter represents (e.g., I = Ideation, S = Substance abuse, P = Purposelessness). Then, she encourages maintenance rehearsal by quizzing him: “What's the H stand for again? How would you ask a client about it?” Throughout this process, Tyrone strengthens his memory through repetition by reiterating what each of the letters represents and he practices ways of using the acronym with clients. Again, because working and long-term memory are dynamic (Schunk, 2016), the more he uses rehearsal, the more he cements knowledge in long-term memory, which we describe next.

Long-Term Memory

Long-term memory is the permanent storehouse for information (Atkinson & Shiffrin, 1968, 1971; Schunk, 2016). Depending on the theorist, there are many different components of long-term memory and beliefs about how information is stored (see Lutz & Huitt, 2003, for a review). For example, Kandarakis and Poulos (2008) proposed two different types of long-term memory: declarative and nondeclarative. However, to maintain consistency with our reliance on Schunk's (2016) information processing model, we use his two descriptions of knowledge in long-term memory: (a) declarative and (b) procedural. *Declarative* knowledge includes “what” information (e.g., the names of counseling skills, the major tenets of counseling theories), whereas *procedural* knowledge includes “how” information (e.g., how to execute a counseling skill, how to develop a relationship with a client).

It is not enough to store information in long-term memory; it must be stored in a way that allows it to be retrieved successfully. Information retrieval can be difficult at times. Atkinson and Shiffrin (1971) compared it to the process of searching for a book in a library: An individual's working memory needs to search for matching information in long-term memory and bring it forward. Similar to locating a book in a library, retrieving information is easier if it is organized.

Within IPT, this process is known as *schemata organization* (Schunk, 2016), which is largely based on the work of Jean Piaget. *Schemata* are defined as “mental representations that we use to organise and simplify our knowledge of the world” (St Clair-Thompson et al., 2010, p. 134). For example, a toddler might have a specific schema of what a cow is (e.g., four-legged, big). When the child meets a horse (e.g., four-legged, big), she might say, “Cow.” At that point, her parents might correct her, saying, “No, that's a horse.” The child will need to reorganize her mental representation (or schema) for cow. Perhaps a cow's characteristic moos are added to the cow category and a horse's neighs are added to the horse category to differentiate the two. In the future (after additional practice), when the child sees a horse, she will search in her new mental schema for horse, retrieve the associated information, and correctly identify the animal. Thus, creating organized mental schemata helps individuals retrieve knowledge and use it in the context of processing new information.

In addition to schemata organization, two other ways of storing information into long-term memory and increasing the chances of memory retrieval are elaboration and encoding. (Although Schunk, 2016, subsumes organization and elaboration under the umbrella of encoding, we consider encoding a separate entity and focus on the quality of making meaning to promote memory storage and retrieval.) *Encoding* is the process of imprinting information into long-term memory (Schunk, 2016), often by making it meaningful, which is an important aspect of memory (Schunk, 2016; Slate & Charlesworth, 1988). For example, perhaps a teacher is attempting to teach the symptoms of attention-deficit/hyperactivity disorder to preservice teachers. To encourage them to make the information meaningful, she helps them to write a case study incorporating various symptoms of the disorder.

Similar to encoding, *elaboration* is the process of linking new information with previous information (Lutz & Huitt, 2003; Schunk, 2016; St Clair-Thompson et al., 2010). For example, when learning about the diagnosis of bipolar disorder, educators may elaborate on students' previous understanding of depression and mania. Elaborative rehearsal, identified earlier, is the process of repeating information in working memory while also linking it to information in long-term memory (Schunk, 2016). Thus, the educator teaching the diagnosis of bipolar disorder might encourage students to repeat the symptomatology while, at the same time, linking it to what they already know about depression and mania.

As with teaching implications offered for sensory and working memory, various recommendations have been offered to promote long-term storage and retrieval. Some researchers (Huitt, 2003; Lutz & Huitt, 2003; Slate & Charlesworth, 1988; St Clair-Thompson et al., 2010) have emphasized the practice of linking previous schemata with new information. In addition, it is often recommended that teachers organize the information that they present (Huitt, 2003; Kandarakis & Poulos, 2008; Slate & Charlesworth, 1988; St Clair-Thompson et al., 2010) and encourage students to encode and elaborate on the material (Huitt, 2003). To illustrate specific ways supervisors can supervise with long-term memory in mind, we provide an extended case example.

Imagine that Sue, an internship student, is working with her supervisor, Kenja. In the recent digital recording submitted for supervision, Sue is working with a 16-year-old girl recently

diagnosed with an eating disorder. In the session, Sue intervened with the client by encouraging her to challenge society's value on the thin ideal. Although Sue's intervention was pertinent, Kenja decides to inquire into Sue's understanding of eating disorders to assess her current level of knowledge. Sue responds by stating, "Eating disorders are simply attempts to fit into society's idealized body image." With this response, Kenja realizes that Sue does not have an extended understanding of the underlying—and often complicated and synergistic—causes of eating disorders. Because Kenja intends to present information and encourage Sue's long-term memory storage of the information, she decides to use elaboration, schemata organization, and encoding from IPT.

Kenja assesses Sue's preexisting knowledge and links it with new information, an example of elaboration. Kenja knows that Sue is currently enrolled in an addictions course and hypothesizes that Sue might be able to connect causes of addictions and causes of eating disorders. She asks Sue what may cause addictions. Sue considers this question and then says that based on what she learned in class, genetics and family influence play a role in addictions. Sue is curious about the question, so Kenja tells her that although eating disorders and addictions are different diagnoses, some of the causes are similar. Kenja restates that genetics and family influence are factors in both diagnoses and encourages Sue to elaborate on what she knows about the causes of addictions to begin linking Sue's preexisting schema of addictions with new knowledge about eating disorders.

In addition to elaboration, Kenja uses schemata organization to help solidify her supervisee's knowledge. Kenja is impressed that Sue was able to use her previous knowledge of addictions to hypothesize various causes of eating disorders; however, she would like Sue to learn a few more causes. Therefore, Kenja adopts the teacher role and presents two more possible causes of eating disorders besides dysfunctional family dynamics (e.g., Gillett, Harper, Larson, Berrett, & Hardman, 2009) and genetic predispositions (e.g., Costin, 2007), namely, personality characteristics (e.g., Birmingham & Beumont, 2004) and various life crises (e.g., Herrin & Matsumoto, 2007). To specifically promote schemata organization, Kenja draws a conceptual diagram on paper. She draws a large circle and writes *eating disorder* in the middle. She then draws four circles and writes *family dynamics*, *genetics*, *personality*, and *crises* in each of the circles and draws arrows from those circles to the eating disorder circle. Then, she draws several lines extending upward from each of the middle circles and begins explaining specific examples of each of the four causes. For example, on the lines extending from the personality circle, she writes *perfectionistic*, *people-pleasing*, *sensitive*, and *self-critical*. This conceptual diagram helps organize disparate pieces of information, which increases the chances that Sue will store the information in her long-term memory.

Finally, Kenja uses encoding—specifically meaning making—to further increase Sue's long-term memory storage. To help Sue encode the information, she encourages her to make meaning of it by examining it within the context of her actual client. Kenja asks, "How does this information seem relevant to your client?" Sue seems to gain insight, stating that besides some dysfunctional family dynamics in her client's situation, she notices that her client endeavors to please others (personality), has recently lost her grandmother (crisis), and had an aunt who also struggled with

an eating disorder (genetics). Taken together, the information processing interventions of elaboration, schemata organization, and encoding increase the likelihood that Sue will commit this new information in long-term memory and thus be able to retrieve it while working with her current and future clients. (To aid in readers' own information processing and memory enhancement, we offer a condensed list of IPT-based practical suggestions for supervisors in Table 1.)

Table 1. Practical Suggestions for Supervisors

Memory Structure	Suggestions
Sensory memory	Increase attention by emphasizing <i>importance</i> level
	Present the information in new and <i>novel</i> ways
	<i>Intensify</i> the stimuli of presented material
	Encourage <i>movement</i>
Working memory	Encourage supervisee to engage in <i>maintenance rehearsal</i> , repeating new information
	Present new information in five to seven logical and manageable <i>chunks</i>
Long-term memory	Use <i>schema organizers</i> to help supervisee categorize information in mental schema for later retrieval
	Encourage supervisee to <i>encode</i> information by making it meaningful in some way
	Encourage supervisee to <i>elaborate</i> on new information by linking it to and extending it from previous knowledge

Note. Suggestions based primarily on Atkinson and Shiffrin's (1968, 1971), Schunk's (2016), and Wolfe's (2010) conceptualizations of components of information processing theory.

Discussion

Our purpose was to describe and apply the three major components of IPT to the clinical supervision enterprise. However, supervisors should also consider when it would be the most appropriate to apply IPT. Ertmer and Newby (1993) suggested a developmental view of learning theories, proposing that different theories are more appropriate for various learning levels. IPT stems from the larger educational paradigm of cognitivism, which Ertmer and Newby recommended for students at intermediate levels. Supervisees at intermediate levels of development are characterized by increasing levels of independent functioning (Rønnestad & Skovholt, 2003; Skovholt & Rønnestad, 1992; Stoltenberg, 1981; Stoltenberg & McNeill, 1997); some fluctuations in motivation (Stoltenberg, 1981; Stoltenberg & McNeill, 1997); and increasing levels of self-awareness of behavioral, emotional, and cognitive responses to clients

(Rønnestad & Skovholt, 2003; Stoltenberg, 1981). Because supervisees in more intermediate levels (typically, later practicum and internship) are tasked with obtaining vast amounts of knowledge (about themselves, their clients, and the counseling process), we believe that IPT is an apt choice at this stage of development.

Even so, we believe that tenets from IPT are appropriate in any supervision context where supervisees need to acquire, process, store, and retrieve knowledge. Thus, an advanced supervisee who is just learning the interventions of a new counseling model, or systemic family counseling theories, or the paperwork requirements of a new organization, or the characteristics of a new counseling population, as examples, can also benefit from this theory. In each of these scenarios, the supervisee must attend to the new information (sensory memory), work with it (working memory), and store it for later retrieval (long-term memory).

Limitations

It may seem that IPT is an apt choice in a number of supervision contexts; however, limitations of the theory exist. Although Schunk (2016) encouraged readers to consider learning variables like emotion and motivation, we concur with others (e.g., Kandarakis & Poulos, 2008) that IPT does not adequately address such learning variables. For example, perhaps the supervisee in our second case (Tyrone) is so anxious about suicide assessment that he cannot attend to any of the incoming information. The supervisor would need to approach the situation differently and focus more on his emotional stability. We encourage readers to attend to the nonmechanistic aspects of information processing (motivation, values, etc.) aligned with Schunk's more contemporary view. Although these variables are important, we did not include them to keep our examples clear and representative of the basic tenets of IPT.

In addition, our presentation of IPT's three-memory structure appears deceptively linear, when in fact the memory structures operate more fluidly and dynamically (Schunk, 2016). We also have not illustrated the information retrieval processes of IPT (Schunk, 2016) that supervisees would use in remembering and applying their new knowledge and skills with clients. Perhaps most important, we have not explored several key cognitive processes beyond IPT, particularly *conditional knowledge* (i.e., “knowledge about when and why to employ forms of declarative and procedural knowledge”; Schunk, [2016], p. 245) and *metacognition* (i.e., self-regulating and reflective cognitions about one's cognitions that include assessment of the application of declarative, procedural, and conditional knowledge; Schunk, [2016]). Exploration of these cognitive processes is needed to build on the IPT framework we provide in this article.

Finally, although we agree that learning theories are critical in guiding supervision pedagogy, relying on one theory to the exclusion of others may be a disservice to supervisees. For example, IPT seems particularly relevant to the teacher role in the Discrimination Model (Bernard, 1997). However, still other learning theories (e.g., constructivism, self-regulated learning; Schunk, 2016) may be more relevant when supervisors choose the counselor and consultant roles in the Discrimination Model or when they are working with more advanced supervisees (Ertmer & Newby, 1993). Thus, knowledge of a range of learning theories is needed to inform one's decisions about supervision interventions.

Implications

Perhaps the most obvious implication is that supervision training needs to include instruction of learning theories and their application in supervision, as previously proposed by Borders (2010), Borders et al. (2014), and Bartley and Borders (2015). Unfortunately, few resources exist to support this instruction; a review of subject indexes in several major supervision texts yielded no listing for “learning theories.” Similarly, Barrio Minton, Wachter Morris, and Yaites (2014) found that few articles on teaching and learning in counseling journals were clearly grounded in pedagogy and learning theories; they found no articles on teaching supervision. Thus, further explorations of the relevancy of IPT and other learning theories to supervision are needed, as well as research regarding the impact of instruction in learning theories on supervisors' planning, implementation, and evaluation of their interventions. We hope that this initial attempt to apply one theory to the supervision enterprise will encourage additional explorations of a range of learning theories that, ultimately, will more fully inform the evolution of a true pedagogy of clinical supervision.

References

- Abbey, D. S., Hunt, D. E., & Weiser, J. C. (1985). Variations on a theme by Kolb: A new perspective for understanding counseling and supervision. *The Counseling Psychologist*, **13**, 477–501. doi:10.1177/0011000085133016
- Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. W. Spence & J. T. Spence(Eds.), *The psychology of learning and motivation* (Vol. 2, pp. 89–195). doi:10.1016/S0079-7421(08)60422-3
- Atkinson, R. C., & Shiffrin, R. M. (1971). The control processes of short-term memory (Technical Report No. 173). Retrieved from Stanford University, Center for the Study of Language and Information website: https://suppes-corpus.stanford.edu/techreports/IMSSS_173.pdf
- Barrio Minton, C. A., Wachter Morris, C. A., & Yaites, L. D. (2014). Pedagogy in counselor education: A 10-year content analysis of journals. *Counselor Education and Supervision*, **53**, 162–177. doi:10.1002/j.1556-6978.2014.00055.x
- Bartley, J. L., & Borders, L. D. (2015, June). Not as easy as ABC: Applying the science of learning to the supervision of struggling students. Educational presentation at the International Interdisciplinary Conference on Clinical Supervision, Garden City, NY.
- Bernard, J. M. (1997). The Discrimination Model. In C. E. Watkins Jr. (Ed.), *Handbook of psychotherapy supervision* (pp. 310–327). New York, NY: Wiley.
- Birmingham, C. L., & Beumont, P. (2004). *Medical management of eating disorders*. Cambridge, United Kingdom: Cambridge University Press.
- Blocher, D. H. (1983). Toward a cognitive developmental approach to counseling supervision. *The Counseling Psychologist*, **11**, 27–34. doi:10.1177/0011000083111006

- Borders, L. D. (2001). Counselor supervision: A deliberate educational process. In D. C. Locke, J. E. Myers, & E. L. Herr (Eds.), *The handbook of counseling* (pp. 417–432). Thousand Oaks, CA: Sage.
- Borders, L. D. (2010). Principles of best practices for clinical supervisor training programs. In J. R. Culbreth & L. L. Brown (Eds.), *State of the art in clinical supervision* (pp. 127–150). New York, NY: Routledge.
- Borders, L. D., & Brown, L. L. (2005). *The new handbook of counseling supervision*. Mahwah, NJ: Erlbaum.
- Borders, L. D., Glossoff, H. L., Welfare, L. E., Hays, D. G., DeKruyf, L., Fernando, D. M., & Page, B. (2014). Best practices in clinical supervision: Evolution of a counseling specialty. *The Clinical Supervisor*, **33**, 26–44. doi:10.1080/07325223.2014.905225
- Carroll, M. (2010). Supervision: Critical reflection for transformational learning (Part 2). *The Clinical Supervisor*, **29**, 1–19. doi:10.1080/07325221003730301
- Costin, C. (2007). *100 questions and answers about eating disorders*. Boston, MA: Jones & Bartlett Publishers.
- Ekstein, R., & Wallerstein, R. S. (1972). *The teaching and learning of psychotherapy* (2nd ed.). New York, NY: International Universities Press.
- Ertmer, P. A., & Newby, T. J. (1993). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly*, **6**, 50–72. doi:10.1111/j.1937-8327.1993.tb00605.x
- Gillett, K. S., Harper, J. M., Larson, J. H., Berrett, M. E., & Hardman, R. K. (2009). Implicit family process rules in eating-disordered and non-eating-disordered families. *Journal of Marital and Family Therapy*, **35**, 159–174. doi:10.1111/j.1752-0606.2009.00113.x
- Goodyear, R. K. (2014). Supervision as pedagogy: Attending to its essential instructional and learning processes. *The Clinical Supervisor*, **33**, 82–99. doi:10.1080/07325223.2014.918914
- Guiffrida, D. (2015). A constructive approach to counseling and psychotherapy supervision. *Journal of Constructivist Psychology*, **28**, 40–52. doi:10.1080/10720537.2014.922911
- Herrin, M., & Matsumoto, N. (2007). *The parent's guide to eating disorders* (2nd ed.). Carlsbad, CA: Gürze Books.
- Huitt, W. (2003). The information processing approach to cognition. Retrieved from <http://www.edpsycinteractive.org/topics/cognition/infoproc.html>
- Johnston, L. H., & Milne, D. L. (2012). How do supervisee's learn during supervision? A grounded theory study of the perceived developmental process. *The Cognitive Behaviour Therapist*, **5**, 1–23. doi:10.1017/S1754470X12000013

- Juhnke, G. A., Granello, P. F., & Lebrón-Striker, M. (2007). *IS PATH WARM? A suicide assessment mnemonic for counselors (ACAPCD-03)*. Alexandria, VA: American Counseling Association.
- Kandarakis, A. G., & Poulos, M. S. (2008). Teaching implications of information processing theory and evaluation approach of learning strategies using LVQ neural network. *WSEAS Transactions on Advances in Engineering Education*, *5*, 111–119. Retrieved from <http://www.wseas.us/e-library/transactions/education/2008/education-ex.pdf>
- Korcuska, J. S., & Olson, S. (2011). Creating constructivist courses in practicum and internship. In G. McAuliffe & K. Eriksen (Eds.), *Handbook of counselor preparation: Constructivist, developmental, and experiential approaches* (pp. 243–253). Thousand Oaks, CA: Sage.
- Leonard, K., Noh, E., & Orey, M. (2010). Introduction to emerging perspectives on learning, teaching, and technology. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology* (pp. 8–24). Retrieved from https://www.textbookequity.org/oct/Textbooks/Orey_Emergin_Perspectives_Learning.pdf
- Lutz, S. T., & Huitt, W. G. (2003). Information processing and memory: Theory and applications. Retrieved from <http://www.edpsycinteractive.org/papers/infoproc.pdf>
- Nelson, M. L., & Neufeldt, S. A. (1998). The pedagogy of counseling: A critical examination. *Counselor Education and Supervision*, *38*, 70–88. doi:10.1002/j.1556-6978.1998.tb00560.x
- Rønnestad, M. H., & Skovholt, T. M. (2003). The journey of the counselor and therapist: Research findings and perspectives on professional development. *Journal of Career Development*, *30*, 5–44.
- Schunk, D. H. (2016). *Learning theories: An educational perspective* (7th ed.). Boston, MA: Pearson.
- Skovholt, T. M., & Rønnestad, M. H. (1992). Themes in therapist and counselor development. *Journal of Counseling & Development*, *70*, 505–515. doi:10.1002/j.1556-6676.1992.tb01646.x
- Slate, J. R., & Charlesworth, J. R., Jr. (1988). Information processing theory: Classroom applications. Retrieved from ERIC database. (ED293792)
- St Clair-Thompson, H., Overton, T., & Botton, C. (2010). Information processing: A review of implications of Johnstone's model for science education. *Research in Science & Technological Education*, *28*, 131–148. doi:10.1080/02635141003750479
- Stoltenberg, C. (1981). Approaching supervision from a developmental perspective: The Counselor Complexity Model. *Journal of Counseling Psychology*, *28*, 59–65. doi:10.1037/0022-0167.28.1.59

Stoltenberg, C. D., & McNeill, B. W. (1997). Clinical supervision from a developmental perspective: Research and practice. In C. E. Watkins Jr. (Ed.), *Handbook of psychotherapy supervision* (pp. 184–202). New York, NY: Wiley.

Watkins, C. E., Jr., (2015). The evolving nature of psychoanalytic supervision: From pedagogical to andragogical perspective. *International Forum of Psychoanalysis*, **24**, 230–242. doi:10.1080/0803706X.2013.847532

Watkins, C. E., Jr., & Scaturro, D. J. (2013). Toward an integrative, learning-based model of psychotherapy supervision: Supervisory alliance, educational interventions, and supervisee learning/relearning. *Journal of Psychotherapy Integration*, **23**, 75–95. doi:10.1037/a0031330

Watkins, C. E., Jr., & Scaturro, D. J. (2014). Proposal for a common language, educationally-informed model of psychoanalytic supervision. *Psychoanalytic Inquiry*, **34**, 619–633. doi:10.1080/07351690.2014.924374

Wolfe, P. (2010). *Brain matters: Translating research into classroom practice* (2nd ed.). Alexandria, VA: ASCD.