Expertise: The true essence of nursing art

This article analyzes the concept of expertise. Expertise can have varied definitions, and different theories can be used to explain how individuals become experts. Chunking theory, network theory, and schema theory are described as they relate to the development of expertise. Intuition and expertise are two concepts that are closely related, and this association is clear as characteristics of expertise are described. This article concludes with a presentation of clinical exemplars that serve as model cases to illustrate dimensions of expertise. Key words: *chunking theory, expertise, intuition, network theory, schema theory*

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What do nurses mean when they state that specific members of the nursing profession are experts? What constitutes expertise, and how does expertise develop? Moreover, why are some nurses never considered to be experts, even after years of clinical experience? These questions need to be answered by nursing scholars and nursing clinicians to foster the development of the nursing discipline.

Nursing has been referred to as both an art and a science. Nursing originated as a household art and later developed into a vocation. Between 1900 and 1940, efforts were made to clarify the professional status of nursing.[1] This "focus on developing a profession of nursing with a distinct body of knowledge led to an emphasis on the science, rather than the art, of nursing."[2(p30)]

A wealth of untapped knowledge is embedded in the practice of clinicians who embody the art of nursing through expert practice. This article analyzes the concept of expertise. Because expertise more closely

Adv Nurs Sci 1994;17(1):15–24

relates to the artistic than to the empiric aspects of nursing, qualitative aspects of nursing practice will be the primary focus of the discussion.

DEFINITION OF EXPERTISE

An *expert* can be defined as one who demonstrates expertise.[3] Johnson[4] stated that an expert is one who, because of training and experience, functions both proficiently and efficiently.

Expertise is a concept that can have varied meanings, depending on the nature of expertise and the characteristics underlying expertise. Expertise is generally considered to be a characteristic of individuals who have reached the pinnacle of performance in their discipline.[3] Pichert and Elam[5] stated that expertise should be considered the penultimate but not the ultimate expression of proficiency. They also maintained that expertise is not something reserved for an elite few but may be attained by individuals who pursue, capture, and master operative knowledge in a specific field or endeavor.

Experts have two kinds of knowledge, experiential knowledge and theoretical knowledge.[6] Because of their theoretical and practical knowledge, experts are good at "plowing through irrelevant information"[4(p79)] when problem solving and at recognizing patterns from previous similar experiences. Experts also can recognize when a pattern or rule does not fit the situation and when the knowledge they have is inadequate. With experience, experts develop powerful heuristic methods that result in faster problem solutions.[6]

Characteristics of expertise include quality decision making, intuition, knowledge, adept psychomotor skills, and clinical specialization[3]: "The essence of expertise is an ability, the ability to accurately perform the required mental or physical activity rapidly and with the fewest number of cues."[3(p8)] Because of the abilities of expert performers, peers seek the advice of experts and recognize experts as the most knowledgeable members of the profession.

DEVELOPMENT OF EXPERTISE

Why experts are expert is a question that needs to be answered to better understand what constitutes expertise. According to Dreyfus and Dreyfus,[7] not all people become experts in their discipline. Skill cannot be perfected in some disciplines except by a small fraction of individuals because of the complexity of the field. Dreyfus and Dreyfus[7] stated that individuals pass through stages of skill acquisition before they become experts. As individuals acquire a skill through instruction and experience, they do not appear to leap suddenly from rule-guided "knowing that" to experience-based know-how: "What should stand out is the progression from the analytic behavior of a detached subject, consciously decomposing his environment into recognizable elements, and following abstract rules, to involved skilled behavior based on an accumulation of concrete experiences and the unconscious recognition of new situations as similar to whole remembered ones."[7(p35)]

The five stages of skill acquisition proposed by Dreyfus and Dreyfus[7] include (1) novice, (2) advanced beginner, (3) competent, (4) proficient, and (5) expert. Individuals progress from one proficiency level to the next as they obtain more experience in a

specific area. The development of a high level of skill in responding to unstructured situations requires considerable experience with real situations.[7]

Benner and Wrubel also maintained that experience is necessary for the development of expertise: "Experience rooted in systematic study and in actual clinical practice is the crucial element in the development of clinical knowledge."[8(p11)] Experience is described as the refinement of preconceived notions and expectations when practical situations are encountered that add nuances to theory.[8–10]

According to Johnson,[4] Woolery,[6] and Posner,[11] expertise is acquired through a process consisting of three phases of learning or cognitive development. In phase 1, the stage of cognition and thought, the individual must learn from instruction or from observation of performance. In this phase, the individual tries to understand the task and what it demands.[11] In phase 2, termed the "associative" phase of learning, the relationships learned during phase 1 are practiced with feedback until performance is proficient and efficient. In the final phase, called the phase of "automaticity," performance can be accomplished without thinking due to much practice. As actions become increasingly automatic, interference from environmental distractions decreases, and less cognitive control is needed to perform.[11] When the three phases of learning are complete, expertise is said to be acquired, and performance of tasks should be smooth and efficient.[4]

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Three primary theories are discussed in the literature that describe the cognitive processes by which expertise develops. These theories, chunking theory, network theory, and schema theory, derive from the field of cognitive science. Because these theories relate to memory systems, a brief discussion about memory follows.

Cognitive psychologists assert that memory can be subdivided into two significantly different systems, short-term (primary, active, immediate, or working) memory and long-term (secondary, permanent, or operational) memory.[12] Short-term memory is memory of events that occurred within the past few seconds and that remain in consciousness after they have been processed.[12] The amount of information that can be stored in short-term memory is limited.[13–15] Long-term memory is concerned with information about events that have left consciousness; these events are not currently being processed and are said to form part of the psychological past.[12] Long-term memory is described as "associative,"[3] meaning that information is retrieved from and stored in memory based on how it is linked or connected to other stored information.

The literature refers to divisions or parts of long-term memory. One proposal is that long-term memory consists of episodic memory and semantic memory.[12] Episodic memory is "basically autobiographical memory," while semantic memory "contains organized knowledge about the world."[12(p215)] A second theory is that long-term memory includes declarative memory and procedural memory. Declarative

memory pertains to "knowing that" and includes theoretical or factual knowledge to which we have conscious access.[6,12,16] In contrast, procedural memory is concerned with "knowing how." Procedural memory contains experiential knowledge, including practical and motor skills such as walking or riding a bicycle.[6,12]

How does the structure of memory relate to expertise? Chunking theory, network theory, and schema theory essentially are based on the association or linking of information. As the individual becomes more expert, elements of knowledge become well integrated in memory. Through experience, newer elements are linked to established knowledge structures so that meaningful patterns exist for the expert to use in solving problems.[12]

Chunking theory

According to chunking theory, the speed and superiority of experts in problem solving is due to an ability to quickly organize information into groups, or chunks, of related information.[5,13,15] Larkin et al described a chunk as "any stimulus that has become familiar from previous repeated exposure and hence is recognizable as a single unit."[13(p1336)] They also refer to a chunk as a "familiar pattern." Similarly, Glover, Ronning, and Bruning defined a chunk as any stimulus (eg, letter, number, word, or phrase) that has become "unitized through experience."[17(p74)]

Chunking has been described as a process that involves both short-term and long-term memory processes.[12-14,18] Egan and Schwartz[18] proposed that chunking involves the organization of concepts in long-term memory. Larkin et al[13] also discussed the amount of perceptual knowledge (measured in chunks or familiar patterns) that is held in long-term memory, and they noted that the expert or grand master chess player may have 50,000 chunks stored in long-term memory. Chunking theoretically occurs when the individual is able to organize encoded information into a group or groups of related information and then use a symbol to represent the group.[12] Pichert and Elam[5] defined the chunking process as being able to see the pattern that relates elements of information; the elements then enter memory as one related pattern versus individual elements. As learning occurs, the amount of information that is included in a chunk can be increased through a process of recording.[17]

The knowledgebase of the expert contains chunks of information that are not only bigger, but also better organized and interrelated.[5] Larkin et al[13] stated that the large set of chunks or familiar patterns in long-term memory serves as an index or access route to theoretical and experiential knowledge. As encoded information is related to information stored in long-term memory and as recognition of a pattern occurs, actions and strategies appropriate to the context of the situation are evoked from memory.[13]

Chunking theory can be used to explain why recall of information from the memory of the expert is somewhat automatic, whereas the novice must struggle to remember relevant information. The automatic assimilation and recall of information from memory allows experts to accomplish tasks more quickly and efficiently than can less experienced individuals.[5]

Network theory

Network theory, which has also been described as the spreading activation theory of

semantic processing,[19,20] can also be used as a theoretical framework for the study of expertise.[3] Within the network theory framework, *expertise* is defined as the "ability to perform appropriate actions rapidly"[3(p7)] after recognizing a minimal number of situation-related cues. According to network theory, cognitive elements are represented as nodes in a network.[19] These nodes are connected via "bidirectional relational links representing the type of relationship involved between two concepts."[3(p5)]

Quillian described network theory as "a theory of the structure of human long-term memory."[20(p410)] Viewed abstractly, Quillian[20] stated, long-term memory consists basically of a large, complex network of nodes and one-way associations between them. All information in memory is defined in terms of "some ordered configuration" of other things in memory.

Network theory has been described as spreading activation theory because a memory search spreads activation from node to node through connecting links. Since the contents of working memory and long-term memory overlap, activation can spread from short-term memory to associated nodes in long-term memory.[17] The spread of activation constantly expands to all of the nodes linked to the first node, then to all nodes linked to each of the new nodes, and so on. At each node in the process, an activation tag is left that specifies the immediate predecessor node and the starting node. When a tag from another starting node is encountered, an intersection between the two nodes is established.[17,19]

When an intersection has been found, Collins and Loftus[19] stated, it is necessary to evaluate the path to decide if it satisfies the constraints imposed by the situation. This evaluation occurs through the use of complex decision rules.

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Thompson et al[3] described how network theory explains the development of expertise. As individuals encounter new information or situations within their discipline, new nodes are established. As connections are made between textbook principles and actual events, links between nodes are formed or become stronger. Activation along links proceeds from controlled to automatic as the individual becomes more experienced.[3]

A network that was initially established in response to educational activities or other experiences is modified by additional clinical experience. The expert is able to access this network during clinical situations and thus to more rapidly decide on the appropriate course of action. The networks of the novice and the expert may contain the same concepts, but the expert's network may be more efficient. The efficiency evolves from increased speed of activation across the network links.

Schema theory

Schema theory is based on the belief that knowledge is organized into complex representations called schemata (plural of schema) that control the retrieval of stored information, the encoding of new information, and the storage of information in memory.[17] According to schema theorists, comprehension occurs when the individual

is able to bring to mind a schema that gives a good account of the objects and events involved in the situation.[21] The idea underlying schema activation is that individuals have some relevant knowledge to which new incoming information can be related.[17] Schemata consist of structured groups of concepts or procedures that constitute generic knowledge about objects, actions, events, and scenarios.[12] Schemata have also been defined as hypothesized knowledge structures[22] in long-term memory that contain elements of related information and that function as guides for the accumulation of additional information. Schemata incorporate "prototypes, distinctive features, and structural descriptions."[17(p41)]

Schemata can be linked into hierarchial sets.[16,21] According to schema theory, every input event must be mapped against one or more schemata, and all aspects of the resulting schema must be compatible with the input information. This requirement results in two basic modes of information processing: bottom-up processing and top-down processing. With bottom-up processing, data enter the system through the best-fitting bottom-level schemata. As these schemata combine with higher-level schemata, they also are activated. Through this process, information is communicated upward through the hierarchial structure, which increases levels of interpretation. Top-down processing works in the opposite direction. As the system searches for information to fit into partially satisfied, higher-order processing, top-down processing proceeds. Bottom-up and top-down processing should occur simultaneously.[21]

According to schema theory, the schema that is currently activated guides the selection of what is encoded and stored in memory, so that relevant information is more likely to be remembered than irrelevant information. The evoked schema provides a framework within which new information can be stored and that can be used as a search process guide during information retrieval. The effects of schema-driven processing are that information becomes more abstract and general and memories are normalized to fit pre-existing schemata. By this process, bizarre or unexpected features in the environment are omitted or transformed.[12]

Glover et al[17] illustrated how the development of schemata relates to expertise through a discussion of three different kinds of learning: accretion; tuning; or schema evolution; and restructuring, or schema creation. With accretion, new information is encoded in terms of existing schemata. As learning occurs, existing schemata may be changed, thus giving the schema system greater flexibility and allowing the schema to be applied in situations where it previously did not fit.[16,17]

The next level of learning, tuning or schema evolution, involves the slow modification and refinement of a schema as a function of the application of the schema.[16] With time and experience, "a schema conforms more and more adequately to the kinds of situations to which it is directed. . . . As schemata are used again and again, they are modified by the addition of new information that change them so they operate more effectively."[17(p167)] Expertise develops as schemata evolve and change with further practice and feedback.

The final level of learning is restructuring or schema creation, whereby new schemata are created.[16,17] Creating analogies is the major mechanism through which restructur-

ing occurs. New schemata are created by relating them to similar existing schemata.[17]

RELATION OF INTUITION TO EXPERTISE

Experts do not need to rely on conscious reasoning in practice as often as novices do, and thus experts may be less aware of reasons for their actions than are novices. Experts are frequently inarticulate about the reasons they took specific actions because the skill has become part of them: "Things often look 'right' or 'wrong' to them, or they just 'feel' something should be done or just do it without even being aware."[23(p954)]

This automatic response represents intuition. Some scholars consider intuition to be the essence of the art of nursing.[23,24] *Intuition* refers to the "understanding that effortlessly occurs upon seeing similarities with previous experiences."[7(p28)] Intuitive perception, or the immediate knowing of something without using conscious reason,[25] leads to a different sense of understanding than what is possible through reason alone.[26]

Benner and Tanner[27] stated that intuition is a legitimate and essential aspect of clinical judgment. A new nurse begins with theory as a guide and uses a deliberative analytical method to respond to the clinical situation. Expert nurses, because of prior experience with similar situations, have an intuitive grasp of the situation and can pinpoint the true problem without wasteful consideration of a large range of unfruitful responses.[9,10] Because of their broad knowledgebase, experts can single out relevant information from among irrelevant information and can grasp and respond to a situation as a whole rather than as a series of tasks.[8] Expert nurses also have a vision of "what is possible" that makes them stand out from competent and proficient performers.[10,28]

The literature supports the belief that intuition is not the guessing of a beginning practitioner. Instead, intuition is predicated on a sound knowledge and experience base.[25] Young[29] maintained that experience is the basis of awareness and perception that encompasses knowledge and that allows cues to be recognized during the decision-making process. Young also stated that experience "provides the critical source material from nurse–patient interactions and judgements that becomes the framework of clinical intuition."[29(p60)]

The theories of expertise also can be used to support the assumption that intuition is not a hunch or uneducated guess, as many have previously thought. For example, with chunking theory, experience leads to chunking of information so that familiar patterns emerge to suggest a mode of action. These associations persist and are further developed because they contribute to success in problem solving.[30]

Intuition grows out of experiences that once involved analytical steps. As experience builds, information is chunked into patterns, and the expert bypasses the sustained, systematic thought processes used by the novice. Thus, intuition is "not a magical sixth sense; it is a sophisticated form of

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reasoning"[30(p122)] that is acquired by the expert over years of learning.

DEMONSTRATION CASES OF EXPERTISE

Measuring behaviors or other characteristics indicative of expertise is difficult because of the inability to measure cognitive processes. Thus, the study of expertise relies on the observation of behaviors and their outcomes.[3]

According to Benner, "expert clinicians are not difficult to recognize because they frequently make clinical judgements or manage complex clinical situations in a truly remarkable way."[10(p34)] However, observing nursing performance provides only minimal insight into why the expert nurse makes specific decisions. To evaluate the level of expert performance, an interpretive approach to describing nursing practice and qualitative evaluation strategies must be added to quantitative measures.[10]

Examples of performance analyses that demonstrate expertise are described in the literature. Dreyfus and Dreyfus[7] offered various accounts of expert performance of individuals in nonnursing disciplines. Four qualitative nursing studies were reviewed that described examples of nursing situations that demonstrate the concept of expertise.[2,10,24,31] Various exemplars of expertise are also described in multiple other articles that relate to practice situations.[8,27,32,33]

Two case studies from the author's recent experience illustrate the decision-making approaches and the intuitive perception of two expert nurses. These two situations also illustrate the complex cognitive processes used by the expert nurses to relate the current situation to previous situations and thus to automatically know the best response for coping with a situation.

Case study 1

When she began her shift, A received report from the night shift registered nurse and was told the patient was restless and confused. The night nurse stated she had no idea why the patient was so uncomfortable. A's assessment of the patient revealed a normal assessment except for the patient's restlessness; however, A knew something was wrong and highly suspected poor oxygenation. Arterial blood gases were drawn, which revealed abnormal values.

Case study 2

X was admitted to the coronary care unit from the emergency department with a diagnosis of myocardial infarction. Shortly after arrival to the unit, X's condition began to rapidly deteriorate, and resuscitative measures had to be initiated. During the process of the code, X regained consciousness and was very restless. She did not respond to commands to calm down. Because X's condition was so unstable, she needed to remain calm. However, because of the desire not to cause respiratory depression, a decision was made not to sedate X.

B was the attending nurse who had admitted X. While everyone was trying to get X to calm down, B suddenly remembered seeing a bible with X's personal belongings. B said, firmly and clearly, "X, your condition is very critical and you need to help us help you. If you believe in God, you need to pray now—and pray hard." X immediately relaxed and became quiet.

Expertise and intuition in the case studies

Expert nurses could document multiple examples of cases in their repertoire of practice that illustrate expert performance and use of intuition, as did the two case studies described here. For both of the clinical situations discussed, the nurse knew what to do instantly and without conscious deliberation. The nurse's ability to make a rapid as-

sessment of the clinical situation described in the first case study and to accurately diagnose the problem was likely due to an in-depth knowledge of the clinical symptomatology that occurs with respiratory distress.

The second case study illustrates that the nurse intuitively knew that the patient's religious beliefs must be of significance to her because of the bible she carried in her personal belongings. This automatic empathy with the patient allowed the nurse to perceive what was important to the patient and to sense what to do. This ability to impart meaning to what is being expressed during the patient encounter, as occurred in this situation, is what creates artful nursing actions.[34,35] Such artful responses are evidenced in various ways in the practice of expert nurses.

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Benner[9,10,32,33] has published more information that articulates the knowledge embedded in the practice of expert nurses than has any other nursing author. Benner's application of the novice to expert proficiency levels to nursing addresses how nurses reach a level of perfection to near perfection in the art of patient care practice.

Art is any skill or technique and can broadly be defined as the practical know-how that an individual has in a particular situation.[36] Present day use of the term "art" associates art with expertise, or a certain degree of elegance in craft that follows formal training and occurs through experience.[1] To practice in an artful manner, the nurse must systematically apply skill and knowledge to a particular situation.[36]

A continued focus on the practice environment is essential to the survival of nursing. With the present-day emphasis on scientific approaches, nurses need to be careful not to let scientific interest substitute for the study of aptitudes and acquired skills that constitute the art of nursing. A focus on how to promote and develop expertise in practice is essential to foster the stability and growth of the nursing discipline. Members of the nursing profession need to hold steadfastly before them a vision of what nursing is and what nursing can become. A continued focus on how the concept of expertise relates to the essence of nursing will help nurses continue to value their artistic abilities.

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