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Learning Strategies: Prototypical Core and Dimensions of Variation

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Abstract

This paper explores the concept of learning strategies through a prototype perspective. It is argued that "learning strategy" is not a clearly definable concept, because strategies differ from each other in terms of "family resemblance" or "graded degrees of membership". The prototypical core of a strategy is a dynamic process with problem-solving as its central aim. It involves selective attention, analysis of task, choice of decisions, execution of plan, monitoring of progress and/or modification of plan, and evaluation of result. A strategy varies in terms of prototypicality along the following dimensions: 1) intentionality, 2) self-initiation, 3) metacognitive regulation, 4) sequentiality of activities, 5) chunking of activities, and 6) automaticity in strategy execution. In addition, a "learner-task-context-strategy" framework is presented to provide the "learning" dimensions of learning strategies. It is hoped that the perspectives presented in this article will alleviate the discomfort about conceptual fuzziness and open up a new agenda on language learning strategy research.

Keywords: learning strategies; prototype perspective

Note from the author

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Despite recent efforts by leading experts in the field (e.g., Cohen, 2011; Oxford, 2011), research interest in language learning strategies is at an all-time low. Part of this decline in interest came from the repeated and yet unsuccessful attempts at clarifying the concept of "learning strategies", so much so that some scholars have called for the concept to be abandoned and replaced with "self-regulation" (e.g., Dörnyei, 2005). I contend that this is not a healthy sign, because the definition quibble is going beyond the advancement of knowledge in delineating conceptual boundaries, and because teachers and learners on the ground are not getting the practical guidance needed from the experts.

A few scholars have argued against the proposed solution (e.g., Gao, 2007; Rose, 2012), reasoning that conceptual fuzziness should not be a problem serious enough to overthrow forty years of research on language learning strategies. The argument is clear and straightforward: if not being able to agree on the definition of a Planet until 2006 does not in any way discredit the scientific nature of astronomy, or necessitate the removal of the concept of "planet" altogether, why should we throw away a whole line of research on language learning strategies? In fact, the proposed alternative term "self-regulation" or even a more general and key term "learning" fall into the same fuzziness trap (For more details, see *Educational Psychology Review* 2008 special issue on metacognition and self-regulation; and *Educational Psychologist* 2009 special issue on learning). This indicates to me that the find-another-term solution is not viable.

In this article, I will contend further that conceptual fuzziness is not a problem at all. I will try to anchor the concept of learning strategies through a prototype perspective. In so doing, I will deliberately draw on the long tradition of learning strategies research in general, although my intended audience is primarily researchers and teachers in the language learning field. It will be argued that learning strategy is a prototypical rather than categorical concept, and finding a prototypical core and mapping out dimensions of variation would be a practical solution. Seeing learning strategies from this perspective will hopefully open up a new agenda for learning strategy research.

Learning Strategy: A Fluid Concept

The family of learning strategies is a large one. When theorists and researchers from various disciplines talk about learning strategies, they do not usually refer to the same concept. Weinstein and Mayer's (1986) conception of learning strategies, for example, bears little resemblance to that of Entwistle (1977) and Pask (1976, 1988). Even within similar conceptions, there may be disputes about what constitutes a typical strategy (see, Rothkopf, 1988). On the other hand, people do not always use the same terminology to refer to the same concept, resulting in overlapping conceptions with hazy boundaries. For instance, "cognitive skills" (Colley & Beech, 1989), "cognitive strategies" (Gagne, 1985; Kirby, 1984; Pressley & Levin, 1983a, 1983b), "study skills" (T. H. Anderson, 1979; Rothkopf, 1988), "learning to learn" (Bransford, Stein, Shelton,

& Owings, 1981), "metacognitive strategies" (Garner, 1988), "executive control processes" (Gagne, 1985), "self-regulation" (Zimmerman, 1990), as well as "learning strategies" (O'Neil, 1978; O'Neil & Spielberger, 1979; Weinstein, Goetz, & Alexander, 1988), to name only a few, can hardly be separated as distinctive concepts.

In solving the definition problem, O'Neil (1978) adopted an all-inclusive stance and defined learning strategies as "intellectual and affective skills" (p. xi) that constitute "a necessary condition for more efficient learning". He preferred the term "learning strategies" "because the term implies a broad general approach that includes affective and motor techniques as well as cognitive strategies" (O'Neil & Spielberger, 1979, p. xi). Kail and Bisanz (1982) expressed their dissatisfaction in an eloquent way, saying "disagreement over the exact definition of strategy may be a healthy sign, for it indicates that psychologists have learned enough about human cognition to make distinctions that were formerly unnecessary" (p. 230).

In search of a definition pattern, a number of definitions from some prominent theorists and researchers in educational psychology are collected and presented in Table 1. The original wording in these definitions is kept as closely as possible, but broken down into two columns.

Table 1. Defining Learning Strategies

Authors	What are LS?	What are LS for?
Brown, Bransford, Ferrara, and Campione (1983)	systematic application of deliberate plans, routines, or activities	to enhance learning
Derry and Murphy (1986)	a collection of mental tactics employed by an individual in a particular learning situation	to facilitate acquisition of knowledge or skill
Kirby (1988)	the means of selecting, combining, redesigning cognitive routines	for performing specified tasks
Mayer (1988)	behaviors of a learner that are intended	to influence how the learner processes information

Nisbet and Shucksmith (1986)	integrated sequences of procedures, the appropriate selection and flexible adaptation of which is	to meet the needs of a specific learning situation
Rigney (1978)	general operations or procedures	to aid the acquisition retention & retrieval of knowledge and performance
Schmeck (1988a)	a sequence of procedures	for accomplishing learning
Wade, Trathen and Schraw (1990)	a configuration of different tactics, deliberately selected and carefully monitored	for a particular purpose for effectiveness
Weinstein and Mayer (1986)	behaviors and thoughts that a learner engages in during learning and that are intended	to influence the learner's encoding process

Table 1 reveals that most scholars define learning strategies as, roughly, something used by students to accomplish learning. This over-simplification, of course, provides no help whatsoever either for research or for practical training purposes. On the other side of the coin, however, we do see from Table 1 that most scholars agree that the term "learning strategies" or "cognitive strategies" does encompass a definition of "strategies" and that of "learning", i.e., what strategies are for.

In further describing the concept of strategies, different researchers have proposed different categories. Table 2 provides a summary of some of these schemes expressed in terms of dichotomies:

Table 2. Dichotomies of Strategies

Authors	Dichotomies of Strategies	
Kirby (1984)	macro	micro
Perkins (1985)	general	specific
Nisbet & Shucksmith (1986)	strategies	skills
Snowman (1986)	strategies	tactics
Bellezza (1983)	strategies	techniques
Sternberg (1985)	executive	non-executive
Naus & Ornstein (1983)	strategies	processes
Dansereau (1978)	support	primary
Weinstein & Mayer (1986)	domain-general	domain-specific
Gilhooly & Green (1989)	domain-independent	domain-dependent
Rigney (1978)	detached	embedded

It should be noted that Table 2 by no means lists exclusively strategy descriptions in the psychology literature; it simply tries to capture similar descriptive patterns of fuzzy categories. Concepts in each column overlap but are not identical to each other. Similarly, the relationship between each dichotomy may not be the same as that between another pair in the table.

A distinction most often made, as is seen in the first five pairs in Table 2, is along the lines of scope or generality. Some strategies appear to be more general than others; the less general ones are usually referred to as "skills", "tactics", or "techniques". In other words, only the general ones, according to these authors, can reach the strategy level (cf. Stern, 1975 in the SLA literature). The next three pairs of dichotomies focus on what strategies are for. The three terms on the left are for the management of learning. They refer more or less to the metacognitive strategies that we now know. The three terms on the right, on the other hand, refer either to strategies that aim to help with the execution of the primary cognitive processes such as encoding and retrieval ("non-executive", or "primary"), or to these cognitive processes as such ("processes). These distinctions are along functional lines and are very difficult to operationalize (Naus & Ornstein, 1983). "Distance from the task" (Biggs, 1984) is the criterion for the last three pairs in Table 2. These distinctions echo what some researchers in SLA have been positing, e.g., Vann and Abraham's (1990) differentiation of person-dependent vs. task-dependent strategies. It is believed that the domain-dependent or embedded strategies are nearer to tasks and thus the most teachable (Biggs, 1984). The detached strategies, on the other hand, are believed to be "more appropriate for bright students, who probably would be more able to direct themselves" (Rigney, 1978, p. 175).

Putting learning strategies in the light of these bipolar dichotomies has considerably enlightened our understanding of the general term "strategies", it has not, however, cleared up the mess, not to mention serving as the guiding hand for research and training (Chipman & Segal, 1985). The perennial argument about the generality of strategies, for example, does not seem at all productive, and some researchers even ended up pondering over the very existence of general strategies (Chipman & Segal, 1985) or at least questioning the significance of teaching general strategies, especially to experts, as

opposed to novices (Perkins, 1985). Though some researchers have gone beyond the dichotomy conceptualization and proposed elaborations, e.g., "macrostrategies-mesostrategies-microstrategies" (Biggs, 1984), or "strategies-tactics-skills" (Kirby, 1988), these new conceptions are not as readily and widely acceptable as the dichotomies and do not shed much more light upon the description of learning strategies. Practical questions from research and training continue to haunt theorists. e.g., Can knowledge be strategy? Are activities strategies? Are observable motor activities, as opposed to covert mental activities, strategies? Are strategies always under conscious control? What happens to the automated strategies? These questions, among others, have either been deliberately avoided or taken for granted in previous literature.

A Prototype Perspective of Learning Strategies

The questions above are difficult to answer, because there are no defining boundaries to the learning strategy concept. Operational definitions without due concern for the fuzziness of conceptual edges along different dimensions tend to present a false impression as though learning strategies were clearly definable, often obscuring empirical findings and reducing the external validity of research results (see Wellman, 1983; Yussen, 1985 for similar discussions on the concept of metacognition).

Pinker and Prince (1999) distinguish between two types of human concepts: classical categories that are defined by necessary and sufficient criteria, and prototype categories that are characterized by "graded degrees of membership" (pp. 8–9). The latter can be described in the following ways:

- They lack necessary and sufficient conditions for membership
- They have graded degrees of membership
- The category can be summarized by an ideal member or prototype, sometimes but not always an actual exemplar of the category
- There can be unclear cases
- They often display a family resemblance structure
- Good members tend to have characteristic nondefining features

Since the six points above can all describe the "learning strategy" concept that we know, I argue henceforth that a prototype perspective[1] would be a way out of the conceptual impasse, because it entails an open exposition of learning strategies. Instead of strategies vs. non-strategies, strategies display "family resemblances" to greater or lesser degrees (Pinker & Prince, 1999). In other words, learning strategies can be viewed as differing from each other in degree the same way as birds differ in terms of birdiness (Aitchison, 1987; Rosch, 1975), i.e., some strategies are more strategy-like than others just as some birds are birdier than other birds. Prototypes are the ideal forms, so to speak, of target concepts. Particular instances are evaluated by means of comparing them to the prototypical exemplars to see how much common variance they share. Finding strategy prototypes and matching various strategic properties against them offers a much more illuminating perspective in the definition and description of learning strategies than simple categorizations based upon the presence or absence of, for instance, generality, or of other strategic attributes. Hence, the definition of learning strategies, according to prototype theory, would mean the delimitation of attributes that anchor the central core of a strategy, while at the same time spelling out possible dimensions of variance in much the same way as, though far more complicated than, Labov's (1973) demonstration of the concept of a cup.[2]

Strategies: The prototypical core

Strategy is not a static concept. On the contrary, a prototypical strategy is a dynamic process with problem-solving as its central aim. The ideal strategy involves at least the following procedures:

- Attending selectively to learning problems and tasks
- Analysing the task at hand

[1] Kail and Bisanz (1982) mentioned in passing "prototypic features of strategic activity" (p. 230), but they did not elaborate on the idea.

[2] Labov (1973) conducted a series of experiments in which drawings of various household containers were provided. The container with a handle, whose width was similar to its depth, was invariably named a cup by his subjects. As the width increased, more and more subjects called it a bowl. When the depth was increased, however, chances also increased for the container to be called a vase. The revealing point is, there are no distinctive borderlines between a cup and a bowl or between a cup and a vase.

- Making decisions and choices
- Executing plans
- Monitoring progress and modifying plans
- Evaluating results
- Coordinating an orchestrating strategic behaviour

Figure 1 shows the whole process of a strategic move. From selectively attending to a problem or a novel task; to the analysis of self, problem, and situation; to the making, execution, and evaluation of a plan; all the way until the solution of the problem is reached. Every step is an integral link of the strategy chain; and every step involves the strategic choice on the part of the problem solver.

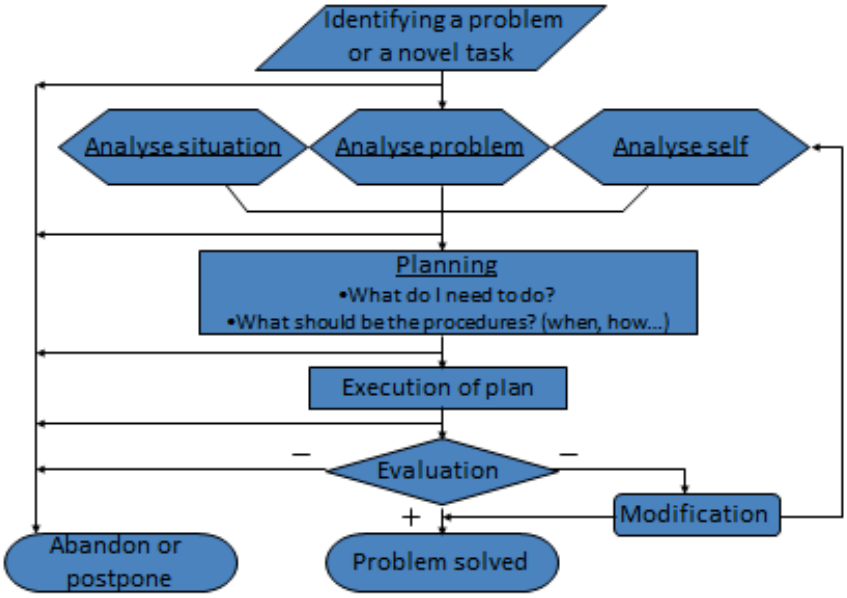

Figure 1. What's in a Strategy?

Strategies: Dimensions of variability and prototypical features

Due to its dynamic nature, an ideal strategy is made up of two components, a metacognitive component and a cognitive one. The former refers to the process whereby a learner selectively attends to a learning task; analyses the self, the task, and the situation;

plans for a course of action; monitors the execution of the plan; and evaluates the effectiveness of the whole process. The latter refers to the actual execution of the strategy. The metacognitive component is intentional and conscious, whereas the cognitive part is not necessarily so. The following six points delineate the dimensions along which a strategy can vary, and the prototypical features of each dimension.

In addition, the core concept of learning strategies can also be viewed as including both strategy competence and strategy performance (Rothkopf, 1988), the former serving as precursor to the latter without necessitating its activation. Similarly, Brown et al. (1983) visualized a distinction between a static and a dynamic perspective of knowledge and performance, arguing that "students vary not only in what they know but also in what they do with what they know. Knowledge is necessary but not sufficient for performance, for it is the efficiency with which a learner uses whatever is available that defines intelligence" (p. 100).

The significance of the competence/performance distinction has been repeatedly demonstrated in empirical work, especially in studies of metacognition, where a similar distinction, metacognitive knowledge vs. metacognitive regulation (Cavanaugh & Perlmutter, 1982; Lawson, 1984), has been shown pivotal in the interpretation of empirical results (see Yussen, 1985).

Intentionality and purposefulness. A prototypical strategy is intentionally selected, consciously engaged in, and consciously monitored and evaluated (Paris, Lipson, & Wixson, 1983; Underwood, 1978) for the fulfillment of an aim or a solution of a problem. A learning behaviour is not strategic if it is deployed without a purpose, no matter how many steps it involves, and how general it is. Some unsuccessful learners seem to employ learning behaviours similar to their peers and are confused as to why the same behaviours do not lead to the same learning outcomes. A careful analysis of these unsuccessful learners would reveal their aimlessness as compared to their successful counterparts (Gu, 1994). Intentionality and purposefulness are not a matter of yes or no, but a matter of weak or strong. In other words, it is a continuum along which prototypicality can be judged.

Self-initiation. Another "central feature" of strategies is learner-initiation (Palmer & Goetz, 1988), indicating a strong link between strategies and the underlying motivational force, which explains why learners often fail to put their strategic competence into practical use (Brown et al., 1983; Flavell, 1970; Flavell & Wellman, 1977; Paris & Lindauer, 1982). Rothkopf (1988) described this dimension of learning strategies vividly:

> Study skills[3] are like dietary information that diabetics can describe in fastidious detail, but that they neglect at the dinner table. They are like knowing how to protect the roses in your garden from aphids, but failing to do so. They are like knowing about calories and wishing to be thin and yet continuing to eat too much (p. 276).

Awareness, monitoring, and evaluation. Because of the deliberateness and goal-orientedness of learning strategies, learners are usually aware of the strategies they are using (Rabinowitz & Chi, 1987). Moreover, the strategies are monitored on-line and their effectiveness evaluated after completion of a task. This aspect of learning strategies is exactly what Flavell (1970, 1976) referred to as metacognition. Awareness of learning strategies enables a learner to know what s/he is doing, making it possible for the researcher to elicit the on-going mental activities. Monitoring and evaluation, on the other hand, empowers the learner to adapt to various socio-contextual changes by means of flexible application of strategies adjusted to his/her personal needs and styles of learning, and to the requirement of tasks. As has been repeatedly demonstrated in previous literature (e.g., Brown, 1978; Forrest-Pressley & Gillies, 1983; Pressley, Borkowski, & Schneider, 1987), it is exactly this flexibility and conditional nature of strategies that serves as the critical agent that distinguishes the mature from the young, the good from the poor, and the expert from the novice learners. To use Garner's (1988, p. 64) words, "knowing when to use a strategy is as important as knowing how to use it".

[3] In Rothkopf (1988), the term "study skills" was used interchangeably with learning strategies.

Strategy performance: Sequence of activities vs. single activities. "A strategy is a sequence of activities rather than a single event" (Garner, 1988, p. 64). This conception is shared by quite a number of researchers (Derry & Murphy, 1986; Kail & Bisanz, 1982; Nisbet & Shucksmith, 1986; Schmeck, 1988b; Wade et al., 1990). Many researchers (Bellezza, 1983; Goh, 2002; Snowman, 1986) label the single learning activities as "techniques" or "tactics" and refer to the activity groups as strategies. This is understandable from the dynamic conception we see in Figure 1, in that the sequence of activities is a deliberately designed problem-solving process, not a one-shot aimless activity.

Strategy performance: Activity chunk vs. activity pile. Defining a learning strategy as a "sequence" or "configuration" of activities does not mean an arbitrary piling of these activities, nor does it mean the piecemeal application of each activity one by one. When a group of single activities or tactics are applied in a particular sequence again and again, they form chunks that preserve the effect of the sequence, take up less working memory capacity by building in information that no longer requires domain-specific declarative knowledge to be retrieved from long term memory, hence requiring less time to perform. These are the composition and proceduralization processes of John Anderson's (1982, 2000) knowledge compilation which bridges the gap between declarative knowledge and procedural knowledge. In this way, from knowing how to perform to actual performance, from slow performance to fast performance, strategies become automatised activity chunks. Without the sequential nature of performance, piles of activities will not serve strategic purposes.

Strategy performance: Automatized vs controlled. Repeated effective use of these chunks results in automatization of the process, which entails less and less effortful attention, thereby reducing the required working memory capacity as well as processing time. As a learning strategy is automatized, the learner's control over the strategy is reduced, and it becomes less and less conscious and can be initiated at the prompt of a task demand without the learner's awareness. Rabinowitz and Chi (1987) insist that once strategic behaviors become automated and lose conscious awareness, they are not

strategic any more. However, I contend that the strategies under conscious control are only at the beginning stage, and that the highest form of strategic performance is automatic. An automatised strategy may appear to lose the learner's conscious awareness, but this is only the execution and performance aspect and is therefore not the entire manifestation of a strategy. What automatisation may lose is the awareness of the execution process. Many of the metacognitive components, e.g., selective attention, analysis of the situation, decision making, monitoring and evaluation of the strategic plan, are all intentionally done, no matter how quick the process is. In the meantime, awareness of metacognitive regulation will not be entirely lost either. For instance, an expert tennis player in a match is constantly observing and analyzing how the match is going, modifying and evaluating his/her choice and use of strategies. The actual execution of the strategies, however, must be done automatically. Hitting the backhand of the opponent is a conscious decision resulting from intentional analyses of the match, but the modification of posturing, positioning of body, aiming of angle, and hitting of ball are all done automatically. Theoretically, if the match is stopped immediately while the strategies are still in Short Term Memory, the player should be able to verbalize the process of choosing and deploying the strategies. This is essentially the same argument as the one made by Winne (1995), when he contended that self-regulated learning "can be automatic and non-deliberate once the learner has automated procedural knowledge that recognizes when to regulate and what to do" (p. 223).

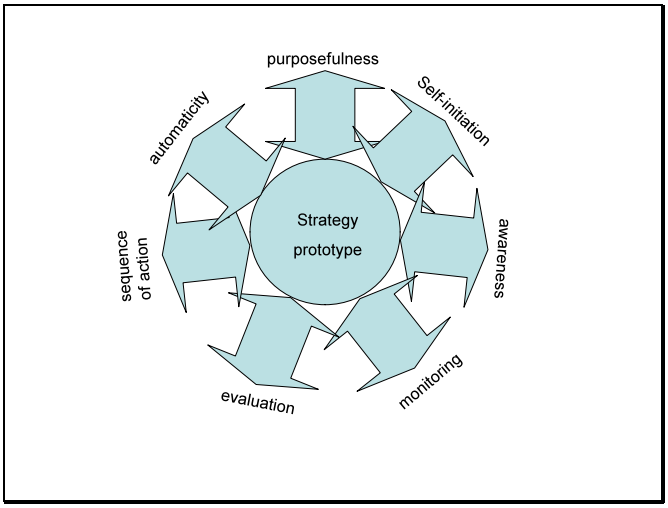

Figure 2. The Strategy Prototype and Dimensions of Variation

Ideal features vs. minimum features. I have just outlined what I believe to be core features of strategies. However, it may be necessary to make a distinction between ideal features and minimum features of a strategy. Just like the ability to fly is an ideal but not minimum feature of a bird (e.g., ostriches), some features of a strategy may be ideal but are not minimum, defining features. For instance, ideal strategies are aimed at and lead to success in performance (Macaro, 2006), but success in task completion should not be a defining feature of a strategy. Similarly, some of the strategy dimensions I described above, for example, the automatic execution of a strategy, must be an ideal but not minimum feature.

To sum it up, a prototypical or ideal strategy is a dynamic process of problem solving. It contains a metacognitive component and a cognitive component. A prototypical strategy is a purposeful, self-initiated, and intentionally selected, monitored, and evaluated sequential series of activities. A mature strategy is automatically executed. As is illustrated in Figure 2, the prototypicality of a strategy depends on 1) how many dimensions are present, and 2) how close to the prototypical core each dimension is.

To date, learning strategy research includes the following kinds: Quantitative perspectives typically focus on the repertoire (how many) and frequency (how often) of strategy use; and qualitative approaches tend to describe how particular strategies are used by certain learners in performing selected learning tasks. A prototype perspective of learning strategies entails a whole new range of new angles in examining learning strategies. For example, in addition to the repertoire and frequency of strategy use, we could measure the degree of prototypicality of a learner's strategy use and relate it to his/her learner results, e.g., how many central dimensions of a strategy are present, how prototypical is each dimension of a strategy being used. We can also examine different stages of strategy use (e.g., selective attention, analysis of self, task, and situation, decision making, monitoring and evaluating of plan, etc.) so as to diagnose where the exact problems are in a particular learner's strategic behaviours, and to help him/her modify strategy choice and use for desired learning outcomes.

Dimensions of Learning

Competence or performance, general or specific, controlled or automatic, learning strategies are what the learner utilizes when confronted with a learning task. The strategies a learner chooses to use, the ways they are deployed, monitored and evaluated, depend both on what the learner brings with him/her to the learning situation, i.e., individual differences, as well as on the situation *per se* where learning occurs. Most importantly, as Biggs (1984) rightly emphasizes, "'strategy' is a key concept in explicating relationships between person, situation, and performance" in that it, among other things, explains "what happens between personological and situational variables on the one hand and performance on the other" (p. 112). Thus the conceptualization of learning strategies will not be complete without examining the aspect of learning and the corresponding dimensions along which the acquisition and performance of strategies vary.

Both individual differences and situational variables play decisive roles in the formation, retention and use of learning strategies. Which side is more decisive, however, is essentially an issue virtually unresolvable (see Shipman, 1988 for an excellent discussion on the nature/nurture dispute). As Schmeck (1988a) put it,

> If we keep a situation constant and look across people, we see situational influences; and if we keep the person constant and look across situations, we see the influence of personal style. However, the two are normally (e.g., in our classrooms) operating simultaneously in a sort of "chemical reaction" that, in the end, may be unanalyzable (p. 10).

What we can do, it seems, is to, on the one hand, map out both the personological and the situational variables (Biggs, 1984) that determine the competence and performance of a learner's learning strategies, while on the other hand remind ourselves that "a person in context is not simply the sum of the person and the context" (Schmeck, 1988a, p. 12).

When a person approaches a relatively challenging task, s/he adopts certain strategies to solve the problem. This problem-solving process is boosted or constrained

by the learning context where the problem is being tackled. Language learning involves such problem-solving tasks at different levels of complexity. The strategies a learner uses and the effectiveness of these strategies very much depend on the learner him/herself (e.g., attitudes, motivation, prior knowledge), the learning task at hand (e.g., type, complexity, difficulty, and generality), and the learning environment (e.g., the learning culture, the richness of input and output opportunities).

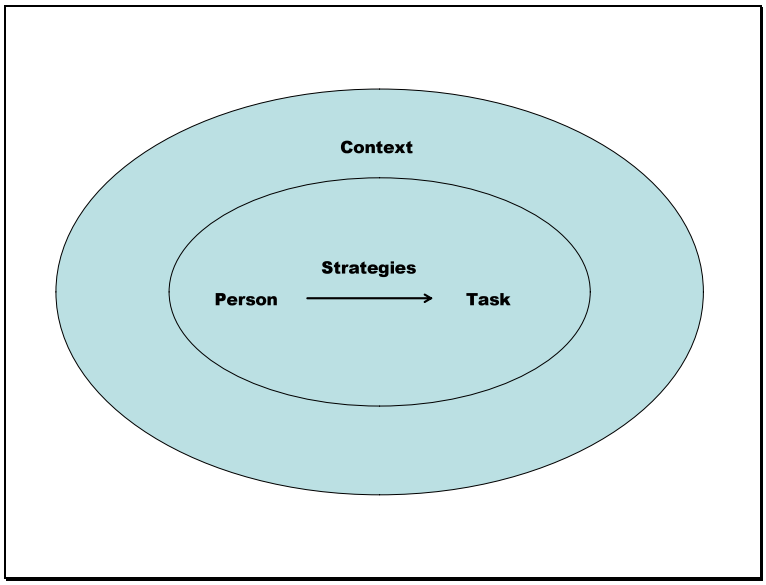

Figure 3. Person-Task-Context-Strategies: An Explanatory Model

Theorists and researchers have presented the same framework (see Figure 3) in slightly different ways. Brown et al. (1983) advocated the adoption of a tetrahedral learning model proposed by Jenkins (1979) which elaborates the person-by-context (Sarason, 1979) conception of learning into four interrelated factors: characteristics of the learner, learning activities, nature of the materials, and criterial tasks. The first two are roughly dimensions of individual differences, and the latter two dimensions of contextual variations. Williams and Burden's (1997) social constructivist model outlines four aspects of the teaching-learning process, i.e., teachers, learners, tasks, contexts. Cohen (2003) focuses on learners and discusses the intersection of learning style preferences, learner strategies, and language tasks. Flavell's (1979) conception of the three components of metacognitive knowledge, i.e., person, task, and strategy, also applies in

the language learning field (Wenden, 1987). Similarly, Fox and Riconscente's (2008) three components of self-regulatory action, i.e., the subject who does the regulating, the object that is regulated, and the means by which regulation is done, describe essentially the same strategic learning processes. The person-task-context-strategy model outlined here can be viewed as a synthesis of this body of knowledge, specifically for the purpose of analyzing research work on language learning strategies.

Learner characteristics and learning strategies

The learner brings to the language learning situation a wide spectrum of individual differences that will influence the learning rate and the ultimate learning result. The most widely reported learner factors include age, sex, language aptitude, intelligence, prior knowledge, motivation, self-concept/image, personality, and cognitive and learning style. These person-dependent factors are relatively stable, and determine to a large extent how a learner approaches a task. After all, strategies are but learner-initiated actions that result from, make use of, or make up for, the aforementioned individual differences. Among these IDs, the learner's sex, motivation, cognitive style, knowledge of various types, and his/her processing capacities are the most researched in relation to learning strategies. Compared to task-related strategies, person-related strategies have rarely been studied.

Learning task and learning strategies

When a learner approaches a task with a repertoire of strategies, s/he often chooses a strategy with the product demand in mind, and tailors his/her choices in tune with their effectiveness in performing the task (Bransford et al., 1981). Different types of tasks call for different strategies. The encoding, retention, or retrieval processes, for instance, require corresponding strategies for effective performance (Rigney, 1978). Likewise, tasks of various scopes also set limits to the corresponding strategies required, hence the differentiation between the generality/specificity of strategies (Dansereau, 1985).

A learning task can be as broad as mastering a second language or as specific as remembering one meaning of a word. Broadly speaking, this conception of the learning

task includes the materials being learned (such as the genre of a piece of reading) as well as the goal the learner is trying to achieve by using these materials (such as remembering, comprehending, or using language). It should be noted that this conception of "task" is in line with the traditional, broader understanding of task as in Flavell (1979), Wenden (1987), and Williams and Burden (1997), and is different from the more recent and narrower definition of "task" in "task-based" approaches to language teaching and learning (e.g., Nunan, 1989).

Different types and structures of task materials, task purposes, and tasks at various difficulty levels demand different learner strategies, even overriding individual differences from time to time. Take vocabulary learning, for example, learning words in a word list is different from learning the same words in a passage. Remembering a word meaning is different from learning to use the same word in real life situations. Guessing from context would mean different things for texts of different levels of new word density. Similarly, the most frequent 1000 words would need different learning strategies from some low frequency vocabulary. Likewise, knowledge acquisition strategies would not be expected to be identical to those for skill acquisition. Strategies used in learning a foreign language are certainly different from those in learning, say, history, art, or literature, hence the distinction between domain-specific and domain-general strategies. Strategies for learning oral/aural competencies would also be different from those for learning written discourse. In addition, the ways in which stimulus materials are organized and structured may also bring about different processing strategies (Brown et al., 1983).

Learning context and learning strategies

Learning context refers to the learning environment. It is the social, cultural, educational, and political environment where learning takes place. The learning context can include the teachers, the peers, the classroom climate or ethos, the family support, the social, cultural tradition of learning, the curriculum, and the availability of input and output opportunities. Learning context is different from language context which refers to the textual or discoursal place in which a particular word or structure can be found. Learning contexts foster or constrain the ways learners approach learning tasks. A

learning strategy that is valued in one learning context may well be deemed inappropriate in another context. In other words, an individual learner's strategies and activities are often determined not only by his/her own predispositions, but also by the social context where learning occurs. "Other regulation", to use a term of the sociocognitivists (Vygotsky, 1978), plays a vital role in learning *vis-à-vis* "self-regulation". As a result, learners often have to develop social learning strategies in addition to their cognitive and affective repertoire.

Person, task, context, and strategy are interrelated and work together to form the chemistry of learning. An analysis of learning strategies will never be complete without knowing the person-task-context configuration of the particular learning situation. Some strategies are more person-dependent, some are more task-dependent, and others are more context-dependent.

This interweaving relationship is best summed up by Brown et al. (1983):

> We would like to argue that just as psychologists need to understand how the four points interact (Jenkins, 1979) so, too, do learners. On her road to becoming an expert in the domain of intentional learning, the child will be greatly helped if she can develop the same insights into the demands of the tetrahedral model that the psychologist needs (p. 106).

Indeed, nor can research on intentional learning, i.e., learning strategies, afford to overlook any of the four interrelated functional dimensions when defining learning strategies and when examining either their acquisition, retention, and performance, or the relationship between the employment of these strategies and the outcomes of learning. In other words, learning strategies cannot simply be viewed as general or specific strategic competence, and controlled or automatic strategic performance independent of the learner and the context. The functional/learning aspect of learning strategy definition and research is as important as the prototypical core of strategies.

Summary

The concept of learning strategies is an extremely fluid one. At the first sight, O'Neil's (1978) seemingly all-inclusive definition which embraces both cognitive and affective learning skills, and Vygotsky's (1978) view of learning that places emphasis on other-regulation as well as self-regulation, seem to suffice in the definition of learning strategies (cf. O'Malley & Chamot's (1990) strategy scheme). However, when microstructures of learning strategies are analyzed, focusing on both the entailment of a strategy and that of learning, the picture is far from clear.

A prototype perspective of learning strategies is presented above, delimiting core features of strategies and mapping out dimensions of variation around the concept of strategy and that of learning. I argue that the core concept of strategy is a dynamic process involving noticing and selectively attending to a problem, analyzing the self, the task and the situation, making decisions and plans, executing plans, monitoring, and evaluating the effectiveness of the whole process. A strategy includes strategy competence and strategy performance. In addition to purposefulness and self-initiation, the prototypical strategy is intentionally selected and used, consciously monitored and evaluated. A strategy is manifested as a sequence of activities, chunked rather than piled up, and gradually automatised. The selection of a strategy is intentionally done, and the learner is consciously aware of the strategies s/he is using, monitoring the strategies as they are being performed, and evaluating their effectiveness after they are executed. Nevertheless, the skillful execution of a strategy is done automatically. Finally, I present a "learner-task-context-strategy" framework so that learning strategy research can be carried out or examined from these dimensions.

The approach taken in this article corresponds to essentially the same strategy taken by Alexander, Schallert, and Reynolds (2009) in conceptualizing "learning" and by Kaplan (2008) in the theorizing of self-regulation. In other words, instead of lamenting the fuzziness of scientific concepts or research constructs, it is more productive to "seek the core meaning … as well as where these constructs converge and diverge along select dimensions" (Dinsmore, Alexander, & Loughlin, 2008, p. 329).

The prototype perspective and the functional framework help clarify the learning strategy concept not just in defining the conceptual core along possible dimensions of variation, but also in potential guidance of future research. First of all, it serves as a standard against which incongruent research results can be evaluated. We can, for example, see whether these differences result from the data obtained, or from disparate operationalizations of the same concept. Secondly, it provides a theoretical framework that helps see the trees as well as the forest of learning strategy research. Thirdly, the realization that strategies are not efficient in themselves and that efficiency and expertise come only after strategies turn into automatic behavioral routines challenges us both in our interpretation of research results and in our search for the best available ways to elicit strategy expertise. Lastly, this article underscores the crucial importance of an idiographic approach to learning strategies that we need at this juncture. In other words, perhaps we have found enough overall patterns; perhaps it is time that we started looking deeper into how the choice, use, and effectiveness of learning strategies differ in terms of person, task, and learning context.

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