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3 Everyday Cognition: Taxonomic and Methodological Considerations

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Several years ago one of our research subjects asked a question that has influenced our present work and is central to the topic of this volume. Our research has focused broadly on a psychometric abilities approach to the study of adult intelligence. Since intelligence is construed in many different ways by lay persons and particularly by older adults, the term "problem solving" has often been used in explaining our research to subjects. One day as one of our staff members was explaining a study, an elderly farm woman interrupted and asked: "Now, dear, are we going to solve *your* problem or *my* problem?" There is the assumption in research on everyday cognition that the problems that our subjects encounter in their daily lives are the focus of study. In this chapter we consider not only research findings and methodological issues, but also examine *whose* problem is really being studied.

DEFINING EVERYDAY COGNITION

A major focus of this chapter is on methodological issues related to the study of everyday cognition. However, the phenomenon must be delineated before considering methods and procedures for studying it. Although there is no commonly agreed upon definition for everyday cognition, there is some consensus regarding certain dimensions characterizing the phenomenon. Several definitions of everyday cognition are presented in Table 3.1. Three dimensions are highlighted in these definitions (Charlesworth, 1976; Neisser, 1976; Wagner, 1986). First, everyday problem solving involves the application of *cognitive abilities and skills*. Second, practical problems are experienced in *naturalistic or everyday contexts*.

TABLE 3.1
Definitions of Everyday Cognition

INTELLECTUAL COMPETENCE in NATURALISTIC settings or in wordly affairs (Neisser, 1976; Wagner, 1986)
Behavior under control of COGNITIVE PROCESSES and employed toward the solution of problems which challenge the WELLBEING, NEEDS, PLANS, and SURVIVAL of individuals (Charlesworth, 1976)
Practical Intelligence: (a) Is embedded in the individual's ORDINARY EXPERIENCE; (b) Is most often formulated by the individual and is of INTRINSIC INTEREST to the problem solver; (c) May be ILL DEFINED or involve ill structured information; (d) Involves MULTIPLE ANSWERS or MULTIPLE METHODS of solution (Neisser, 1976; Wagner & Sternberg, 1985).

Third, everyday problems are *complex and multidimensional,* when compared to laboratory tasks, such as simple reaction time or list learning.

Some authors have added other characteristics on which there is far less consensus (Neisser, 1976; Sternberg & Wagner, 1986; Sinnott, 1989). These include statements asserting that everyday problems are of necessity ill structured, are defined primarily or solely by the problem solver, and must involve alternative solutions. We question whether these latter attributes necessarily characterize many of the problems encountered by individuals in their everyday lives. There are many everyday tasks that are fomulated by society rather than by the individual (e.g., driving regulations, banking procedures). Also, many everyday tasks involve one correct or commonly agreed upon solution or procedure (e.g., determining the correct departure time from an airline schedule; giving the correct currency in making a purchase).

Just as there is little concensus on the definition of everyday cognition, there is also little commonality across investigators in the types of problems or tasks employed to study everyday cognition. One approach has been the study of expertise—comparing experts and novices on the specialized skills and knowledge bases associated with a profession or field. Skills associated with complex tasks, such as race course handicapping, chess, mental squaring, typing, and interpretation of medical slides have been studied (Ceci & Liker, 1986; Charness, 1989; Hoyer, 1985; Salthouse, 1990). While mastery of these types of skills is critical in certain professions, these are not representative of the problems experienced by most adults in their daily lives.

The Instrumental Activities of Daily Living (IADLs) is a more common universe of daily activities (Fillenbaum, 1985; Lawton & Brody, 1969). Ability to accomplish these activities is considered essential in order to live independently in our society. Our most recent research has focused on the cognitive demands of seven IADL domains (Willis, 1991). These domains are shown in the first column of Table 3.2. Older adults' comprehension of printed materials (directions, charts, forms) related to each of the IADL domains is being examined. Exemplar tasks are shown in the second column of the table.

TABLE 3.2
Instrumental Activities of Daily Living (IADL)

IADL Domains	*Exemplar Task*
TELEPHONE USAGE	Dialing instructions
SHOPPING	Directions for coupon redemption
TRANSPORTATION	Bus schedule
HOUSEKEEPING	Washing machine instructions
FOOD PREPARATION	Nutrition label
MEDICATIONS	Medicine bottle label
FINANCIAL MANAGEMENT	Billing statement

EVERYDAY COGNITION: TAXONOMIC ISSUES

We have conceptualized everyday problem solving as involving multiple dimensions as shown in Table 3.3. The cognitive core of everyday problem solving involves the assumption of the presence of a sufficient level of relevant mental abilities and domain-specific knowledge bases required to solve the problem (Park, 1991; Willis, 1991; Willis & Marsiske, 1991). The knowledge base and abilities are then integrated with certain social and affective components of everyday problem solving. Everyday problem solving is a highly individualized affair, and thus subjects' understanding and perceptions of their own personal circumstances enter into the process. The individual must consider a given problem within a specific physical and interpersonal context (Lawton, 1982). One's attitudes and beliefs, such as locus of control and self-efficacy play a role in considering solution alternatives (Baltes & Baltes, 1986; Rodin, Timko, & Harris, 1985). Finally, resolution of a problem typically requires the integration of all of the preceding dimensions or phases. This integration process involves: Awareness of the problem, the identification of alternative options for solving the problem, the ruling out of options that will not work, and the prioritizing of viable options. Selecting the "best" option should involve the preceeding dimensions, including domain-specific knowledge base, personal circumstances, as well as attitudes, beliefs, and preferences.

TABLE 3.3
Dimensions of Everyday Cognition

A. Relevant abilities and skills
B. Domain-specific knowledge bases
C. Understanding of:
Personal circumstances
Interpersonal context
D. Attitudes, beliefs, preferences
E. Integration of dimensions

The Role of Cognition in Everyday Problem Solving

We now consider in more detail cognition in relation to everyday problem solving, since much of our research has been focused at this level. Three questions are of interest: (a) What are the cognitive demands of the problem to be solved? (b) What is the relationship between the cognitive demands of a specific problem and more traditional mental abilities and information processing approaches to the study of cognition? (c) What is the role of domain-specific knowledge and everyday cognition?

Cognitive Demands of Everyday Tasks. Excellent work on analyzing the cognitive demands of tasks is being conducted by those studying expertise. Their research has focused on modeling the processing demands of complex tasks such as race course handicapping (Ceci & Liker, 1986), bridge and chess (Charness, 1981, 1983), typing (Salthouse, 1990), and the interpretation of medical slides (Hoyer, 1985).

In our research on everyday problems involving printed materials, we have adapted Meyer's parsing scheme for applications with nontextual materials, such as charts and forms (Meyer, Marsiske, & Willis, in press). Utilizing the parsing scheme, several components related to the difficulty of comprehending the printed material have been identified. Components associated with the difficulty level of the printed material include factors such as the length of the text, the level in the text structure of the salient information, whether the salient information is signaled (e.g., capitalized or italicized) in the material, and the number of points in the text structure that must be searched in order to answer the question (Meyer et al., in press). Estimates of the difficulty level of a problem can be derived or the relative difficulty of two different problems can be compared. In Fig. 3.1, for example, two stimuli, dialing instructions for a pay phone and a chart of alternative medigap insurance plans, are presented from our battery of everyday printed materials. The relative difficulty of answering a question with respect to each of the stimulus materials was analyzed utilizing the parsing scheme and the components of difficulty. Figure 3.2 presents the relative difficulty level of the phone and insurance problems for several of the components derived from the text analysis research.

There are a number of limitations for both the expertise and text analysis approaches to analyzing the cognitive demands of everyday problems. First, the analyses are very labor intensive. Second, the modeling and processing components derived are often highly task specific. The modeling of the cognitive demands of even the most important tasks of daily living looms as a herculean endeavor. In studying the cognitive demands of a broad array of everyday problems, task taxonomies will need to be developed so that it becomes possible to compare different tasks along common dimensions.

Everyday Problem Solving and Psychometric Intelligence: What is the Relationship? A second question deals with the relationship between the cognitive demands of everyday tasks and the mental abilities and processes that have traditionally been investigated in the study of adult intelligence (Schaie, 1983). Recently, it has been proposed that intelligent behavior involves multiple forms of intelligence (Baltes, Dittman-Kohli, & Dixon, 1984; Sternberg & Berg, 1987). The distinction has been made between the "mechanics of intelligence," involving basic mental abilities and cognitive processes, and the "pragmatics of intelligence" concerned with everyday cognition. A major issue for multiple intelligence theories is the nature of the interrelationship among various forms of intelligence.

A mechanistic theory is needed to identify the cognitive processes involved in practical problem solving. However, the question arises whether the mental abilities and processes traditionally studied by psychologists are even relevant to the study of everyday cognition. Some contend that practical intelligence and more traditional approaches (e.g., psychometric intelligence) are distinct and unrelated forms of intelligence (Ceci & Liker, 1986; Friedricksen, 1986). Others, including ourselves, find a hierarchical relationship more plausible. From a hierarchical perspective, basic cognitive processes and abilities are believed to be universal across cultures and contexts. When nurtured and directed by a particular context, cognitive processes and abilities develop into domain-related competencies, that are manifested in daily life as cognitive performance. This view is supported by several recent studies that have found significant relationships between everyday task performance and traditional intelligence measures (Willis, 1991). Fluid and crystallized intellectual abilities have been found to be related to everyday problem solving (Camp, Doherty, Moody-Thomas, & Denney, 1989), interpersonal competence (Cornelius & Caspi, 1987), computer literacy (Garfein, Schaie, & Willis, 1988), and comprehension of printed materials (Willis & Schaie, 1986; Willis & Marsiske, 1991; Willis, Jay, Diehl & Marsiske, 1992). Capon and Kuhn (1979, 1982) reported consumer behavior to be related to formal reasoning within Piagetian theory. Proficiency in leisure activities, including recall of TV shows, video games, jigsaw, and crossword puzzles, were found to be predicted by verbal ability (Cavanaugh, 1983; Willis, Maier, & Tosti-Vasey, 1992), reaction time (Clark, Lanphear, & Riddick, 1987), and memory (Rice, Meyer, & Miller, 1988).

A Hierarchical Perspective. Several assumptions need to be explicated regarding a hierarchical relationship between abilities and everyday tasks. First, because practical intelligence tasks are complex, everyday problem solving involves the application of *multiple* mental abilities and cognitive processes (Willis & Marsiske, 1991; Willis & Schaie, 1986). For example, our research indicates that comparing alternative health insurance plans, like the one shown in Fig. 3.1,

Chart: Group Health Insurance Program

MEDICARE SUPPLEMENT PLANS

MEDICARE SUPPLEMENT INSURANCE PLANS	HOSPITAL BENEFITS	COVERS DOCOTOR AND MEDICAL CARE IN AND OUT OF HOSPITAL (AFTER $75 PLAN DEDUCTIBLE)*		SKILLED NURSING FACILITY BENEFITS		IN-HOSPITAL PRIVATE DUTY NURSING		PRESRIPTION DRUGS
	INPATIENT HOSPITAL DEDUCTIBLE COVERAGE	20% OF MEDICARE ELIGIBLE EXPENSES NOT PAID BY MEDICARE	COSTS ABOVE MEDICARE ELIGIBLE EXPENSES**	DAYS 1-18	DAYS 151-365	UP TO $30 PER SHIFT	80% OF USUAL AND PREVAILING CHARGES***	
MEDICARE SUPPLEMENT		✓		✓	✓	✓		
MEDICARE SUPPLEMENT PLUS	✓	✓		✓	✓	✓		
EXTENDED MEDICARE SUPPLEMENT	✓	✓		✓	✓		✓	✓
COMPREHENSIVE MEDICARE SUPPLEMENT	✓	✓	✓	✓	✓		✓	✓

Directions: Pay Phone Instructions

0 + and 1 + calls are managed by BELL OF PENNSYLVANIA where authorized. Elsewhere 0 + calls are handled by US SPRINT COMMUNICATIONS and 1 + calls by AT&T. Other long distance companies serving this area can be reached from this telephone by dialing the access code provided by them.

Local Calls
Deposit 25 cents before dialing
Change not provided
Coin Repair Service.....611
Toll Free 800 Numbers
.....1 + 800 + Number

Station-to-Station Calls
Local.....Number
Toll....within this Area Code
.....1 + Number
Toll...Outside this Area Code
....1 + Area Code + Number

Calling Card Collect, Person-to-Person Calls
Within this Area Code
.....0 + Number
Outside this Area Code
....0 + Area Code + Number

Directory Assistance
Within this Area Code
.....1 + 555-1212
Outside this Area Code
1 + Area Code + 555-1212
Dial 911 for Emergency Help

PA-1A-UTC-12/88 **OPERATOR ASSISTED RATES APPLY TO TOLL CALLS FROM THIS PHONE**

FIG. 3.1. Stimulus material for everyday tasks measure. Top figure is chart of group health insurance plans. Bottom figure is directions for making long distance calls from pay phone.

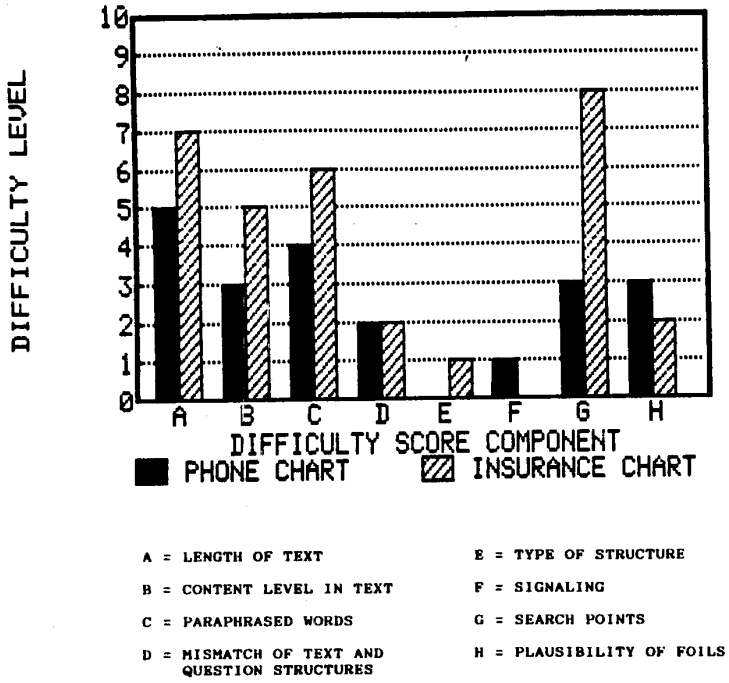

FIG. 3.2. Comparison of difficulty level of problems involving insurance plan and phone instructions, based on readability components.

involves both verbal and inductive reasoning ability. While verbal ability is required to read the chart, making comparisons among different insurance plans involves inductive reasoning.

Second, *different* constellations of mental abilities and processes will be required for various types of practical problems (Willis, 1991; Willis et al., 1992). For example, spatial orientation ability will be more salient for reading a map, whereas inductive reasoning will be more salient for interpreting a drug label. Third, competence with respect to basic abilities and processes is seen as a *necessary but not sufficient condition* for the successful solution of practical problems. Affective and social components are also involved, and are briefly considered later in this chapter.

Domain-Specific Knowledge

The assumption is often made that effective everyday problem solving is strongly related to the breadth and depth of an individual's domain-specific knowledge base. However, our current understanding of the importance of domain-specific

knowledge bases for the solution of applied problems is based largely on the expertise literature. Here, indeed, domain-specific knowledge bases have been shown to play a critical role (Hoyer, 1985; Salthouse, 1984, 1990). Whereas the expertise literature has shown relationships between a single, highly specialized knowledge base and competence in a skill or profession, it is likely that solutions for many everyday types of tasks will require accessing *several* different knowledge bases. Again, referring to our insurance chart (Fig. 3.1), the problem solver would need to have at least rudimentary knowledge not only about insurance policies but also about the medicare system. Mapping out the particular set of knowledge bases required for a given practical problem remains an important task for future research.

Even more problematic, however, is the lack of measures or procedures for assessing an individual's breadth or depth of knowledge in many substantive domains. One approach has been to use subjects' self-reports of frequency of performing a task or their familiarity with a task as proxies for their level of domain-specific knowledge and skill (Salthouse, 1990). It has been assumed that the greater amount of time spent in a task will always result in an increase in domain-specific knowledge and skill. However, empirical findings have been quite mixed on the relationship between the frequency of carrying out everyday tasks and competence in task performance (Cornelius & Caspi, 1987; Rice et al., 1988). What accounts for this discrepancy? Learning of complex skills generally involves the application of these skills to a diverse set of problems and in a wide array of contexts, so that general principles can be developed (Schooler, 1989; Sprafkin & Goldstein, 1990). But many older persons do not experience this diversity of problems and contexts in their daily lives. Although they may spend considerable time on a particular task, their experience is often confined to the same context and exercised in a routinized and repetitive manner. In assessing task familiarity, we must therefore go beyond studying the length of time spent on a given task to examining *how* time was spent in task-related activities.

Knowledge of Personal Circumstances and Interpersonal Context

Considered next are the more personal, affective, and social dimensions of everyday problem solving in which individuals take into account their own personal circumstances and contexts in solving tasks of daily living. Consider again the older adult faced with the problem of purchasing a supplemental medigap health insurance plan. Which insurance plans represent viable options for an elderly woman, for example, will be partially determined by personal circumstances: her financial status, as well as her current and future health status. Likewise, the interpersonal context of the individual must be taken into account. For example, what types of health care services need to be purchased will depend in part on the older adult's social support network. The availability of family and friends to provide assistance must be factored into decisions regarding health

care needs (Moss & Lawton, 1982). The availability of alternative health care services in the physical environment must also be considered.

Attitudes, Beliefs, and Preferences

Understanding of one's personal circumstances reflects in part certain attitudes, beliefs, and preferences (Baltes & Baltes, 1986). For example, it is likely that health-related locus of control and self-efficacy beliefs (Wallston & Wallston, 1982) will influence one's decisions regarding health insurance. Current research on age-related changes in self-efficacy indicates an increased dependence on powerful others in old age (Lachman, 1986; Rodin et al., 1985). Some elderly persons may therefore increasingly seek and depend on the advice of others in making important decisions in everyday life.

Integration of Everyday Cognition Dimensions

Effective solution of everyday problems requires, of course, an integration of the various dimensions discussed earlier. Integration is ongoing, occuring at various phases of the problem solving process, as well as at the point of reaching a final decision or solution. Effective integration involves several steps: (a) Identification of solution alternatives; (b) ruling out of options that will not work given the individual's personal circumstances; and (c) prioritizing the remaining viable options.

In decision theory, the first step involves the ability to consider a problem from multiple perspectives and to identify alternative solutions. This step has been emphasized in some research. These studies have judged effective everyday problem solving in terms of how many alternative solutions the subject considered (Camp et al., 1989; Denney, 1989). However, while there may be a large number of hypothetical solution alternatives, in many everyday problem solving situations most adults are faced with painfully few real options. For example, although most medigap insurance plans offer four to six options, most older adults indicate that not more than two options are really viable, given their personal circumstances. Thus, in practical problem solving, the ruling out of options that are not feasible or will not work, and the prioritizing of the remaining viable options may be more crucial than the generation of a large number of hypothetical alternative solutions.

Problem Solving as a Recursive Process

Our laboratory experiments have left us with the naive assumption that problem solving is linear and is consummated relatively quickly. However, problem solving in the real world is often recursive (see Fig. 3.3) and extends over days, months, or years. The individual may exercise through the dimensions of problem solving multiple times before reaching a final solution. Alternatively, a problem may appear to be "solved" at one point in time only to recur, requiring it

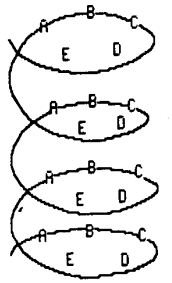

FIG. 3.3. Everyday problem solving is a recursive process. At each cycle in the recursive process, any or all of the dimensions in problem solving may have changed.

to be resolved at a later time. At each cycle in the recursive process, any or all of the dimensions (see Table 3.3) in problem solving may have changed. For example, the problem of choosing among medigap insurance options must be repeatedly resolved as medicare benefits shift and as the individual's health care needs change. Within each cycle, there may also be shifts in the individual's cognitive competence to consider the options as well as in the person's self-efficacy beliefs regarding their health.

METHODOLOGICAL ISSUES

As our delineation of the dimensions of problem solving suggests, the process by which an individual solves everyday problems may not be entirely rational. However, it does not follow that the methods and procedures for the study of everyday cognition must also be ill structured and ambiguous. Instead, we argue that the "murkier" the problem, the more rigorous must be the approach to the study of that problem. Because neither the domain of everyday problem solving nor the procedures for its study are well defined, structure must be imposed by developing taxonomies for the study of everyday problem solving. In this section four questions will be addressed. First, there is problem definition—that is, what are the *elements* currently being employed in studying the domain of everyday problem solving? Second, there are issues regarding *subject sampling*. Third, the *methods of assessing* everyday cognition that are currently employed are examined. Finally, the thorny question of how we are to judge the *adequacy of problem solutions* is addressed.

Dimensionalizing the Domain of Everyday Problem Solving

A cursory review of the practical intelligence literature suggests that the study of everyday problem solving has followed three approaches, each of which has addressed a different facet of the phenomenon. These facets have been labeled: Personal attributes, Task properties, and Contexts (see Fig. 3.4).

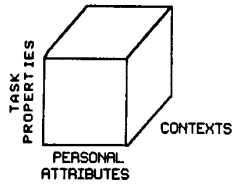

FIG. 3.4. Three facets of everyday problems: Personal attributes, task properties, and context. Study of everyday problems involves examination of the interrelationship among these facets.

Personal Attributes. In the first approach, the focus is on the problem solver. What are the personal attributes, characteristics, skills, or tacit knowledge exhibited by an intelligent, competent adult? In some studies, there has been a general search for attributes and characteristics of an intelligent person, one who possesses whatever it is that might be characterized as practical intelligence. In this type of study there is no reference to solving a particular problem. This approach is reflected in studies concerned with naive theories of intelligence (Berg, 1990). In his research on implicit theories of intelligence, Sternberg (e.g., Sternberg, Conway, Keton, & Berstein, 1981) compared attributes of an intelligent person, as defined by lay persons vs. academic psychologists.

The more common approach has been to examine attributes and skills of the individual with respect to solving a particular type of problem. In studies focusing on common, everyday problems, the problem solver's level of intellectual ability related to problem solving proficiency (Camp et al., 1989; Willis, 1991; Willis et al., 1992). In studies of expertise, domain-specific skills and knowledge related to level of proficiency (Charness, 1989; Salthouse, 1987).

Various procedures have been employed to identify or define the attributes or competences of the problem solver. One procedure employs the ratings of judges, as in defining an individual's level of mastery in chess or bridge. Alternatively, experimental procedures have been employed to differentiate the level of skill and cognitive processes employed by experts and novices, such as in Salthouse's study (1984) of expert older typists. In ethnographic research, interviews and observational procedures have been employed, for example, to determine those in culture who are considered "wise" or who possess certain skills or abilities (Berry & Irvine, 1986).

Task Properties. In other studies the primary focus has been on the characteristics of the task or problem, rather than on attributes or competencies of the problem solver. A number of different task properties have been examined: substantive domain, importance of task, age-appropriate tasks, well- versus ill-structured tasks, and common versus uncommon tasks (Sinnott, 1989).

Tasks are most frequently characterized in terms of the substantive domain represented. Substantive domains examined include interpersonal competence and coping (Cornelius & Caspi, 1987), games and leisure activities (Clark et al., 1987; Charness, 1981, 1983; Rice et al., 1988), work-related skills (Hoyer,

1985; Salthouse, 1984; Wagner & Sternberg, 1985), and tasks of daily living (Camp et al., 1989; Willis, 1991).

There has been the assumption that everyday cognition is the study of "important" tasks or problems experienced relatively frequently by the "average" adult. In this vein, Sinnott suggests that we ask, "Is this (task) ever likely to happen to any one, and if it did, would they care?" (1989, p. 40). A cursory survey of the literature, however, suggests that among researchers studying everyday cognition, there is little consensus on what are the *most important* everyday problems and the frequency of their occurrence.

We conducted a study (Diehl & Willis, 1990) recently to examine the degree of consensus on two questions among different types of service providers for the elderly: (a) What are the most important tasks of daily living that an older adult must be able to perform in order to live independently? and (b) How frequently are various tasks of daily living encountered by older adults. Three groups of service providers (senior center directors, managers of housing for the elderly, and occupational therapists) rated 106 everyday tasks on the both the importance and frequency dimensions. The 106 tasks involved printed materials representing five IADL domains (food preparation, medications, phone usage, shopping, and financial management). Three types of printed material (directions, charts/schedules, forms) were included in each domain. As shown in Fig. 3.5, there was considerable agreement among the three groups on the IADL domains considered most important for independent living. Tasks related to medications (e.g., interpreting a medicine bottle label) and financial management (e.g., comprehending a phone bill) were rated as being most important for independent living. In contrast, there was much less consensus on the dimension of frequency. Raters differed in how frequently they thought various tasks were likely to be encountered by older adults.

EQ 74

Context. The third approach to the study of everyday cognition has focused on the context, acknowledging that everyday problem solving does not occur within an environmental vacuum (Baltes, Wahl, & Schmid-Furstoss, 1990; Willis, 1991). In the broadest sense, context is defined by the cultural environment within which individuals engage in problem solving behavior. But contex-

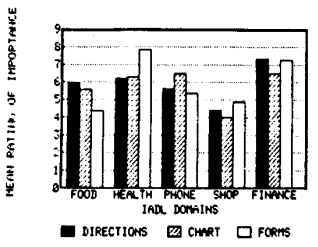

FIG. 3.5. Ratings of importance of tasks representing five domains of daily living by 3 groups of service providers (senior center directions, managers of housing for the elderly, occupational therapists).

tual domains can be elaborated in increasingly specific ways as we consider subsets related to social class, work settings, age-structured communities, and ethnic subcultures (cf. Scribner, 1984). However, knowing the cultural expectations and the class membership of our problem solvers will not suffice in helping us understand the more specific attributes of contextual situations within which everyday problem solving is to occur. Hence, a quasi-ethnological approach is needed to discover the everyday situations in which older persons are expected to solve problems. Such an approach can yield a data language that will allow us to describe the contextual attributes of specific situations within which problem solving occurs.

A study by Scheidt and Schaie (1978) discovered that most everyday contexts within which older persons were expected to solve problems could be arranged within a four-dimensional framework. Problem solving situations were seen as occurring within a social or nonsocial context, were perceived as being common or uncommon, had supporting or depriving elements, and required either active or passive responses on the part of the older problem solver. Age difference findings revealed that with increasing age, older adults perceived themselves as more competent in situations that involved social, common, passive, and depriving features (Willis & Schaie, 1986).

Integrating the Facets. If we assume that these three approaches, focusing on personal attributes, task properties, and context, simply represent alternate facets of the everyday problem solving domain (see Fig. 3.5), it then becomes clear that study of only a single facet will not suffice. What is needed are comprehensive studies that cross elements of all three facets in a single design. Such a requirement would impose excessive demands upon a single investigator, if all possible personal attributes, task properties, and contexts were to be crossed. Nevertheless, it is not unreasonable to hope that future studies will study the interrelationship among personal attributes of problem solvers, task properties, and contextual factors.

Sampling Issues

Once the problem is defined, one then must select the sample on which to study the problem. In studies of everyday cognition, external validity is, of course, a primary concern, and thus, the issue of sampling representativeness must be considered. Questions must be asked, such as: To what populations is the study of everyday cognition to be generalized? On what critera are the samples representative? A review of the literature indicates two sampling procedures that are frequently used and that require careful consideration.

Specialized Vs. Representative Samples. The study of expertise has involved the use of samples with highly specialized skills or knowledge bases, such as master chess players, expert typists, successful business executives, and pros at

the race track. Use of these unique samples is clearly appropriate when one is concerned with identifying qualitative differences between highly competent individuals and novices with respect to their knowledge base or skills. However, there are limitations in generalizing findings from these studies to more representative populations (Salthouse, 1990). Expert samples are probably not appropriate for identifying predictors or correlates of everyday cognition because of the problem of restriction of range. Almost by definition, there is a restriction in the range of talent or ability in expert samples; these subjects are likely to be functioning at very high levels not only on domain-specific tasks, but also on more general skills and abilities that are germane to their area of expertise. Many cognitive measures that have sufficient range in the general population are likely to exhibit near ceiling effects in expert samples, significantly reducing correlations and thus undermining the search for meaningful relationships with a host of variables. Typically, experts also show less variability on factors that are known to be related to cognitive problem solving, such as health and socioeconomic status.

Extreme Age Group Comparisons. Several studies of everyday cognition have sought to identify tasks on which the elderly perform as well as or better than the young (Denney & Pierce, 1989). These studies have typically involved extreme age group comparisons. Although age is presented as the primary individual difference variable, the college and older adult samples may also vary on a number of other factors, such as health, use of prescription drugs, and sensory limitations, that are known to be related to proficienty in problem solving. A major problem with extreme age group designs is that it is virtually impossible to equate representatives of young and old on all the variables required to rule out rival hypotheses for group differences (Hertzog, 1990).

Recently, researchers employing extreme age group designs have sought to "equate" the old and young on vocabulary scores. Frequently, the old are reported to have mean vocabulary scores equal to or above those of the young. Two issues are of concern in equating extreme groups on verbal ability scores. First, there is the question whether verbal ability is of particular relevance to the everyday task being studied. For example, if the everyday task involves map reading, then groups need to be equated on spatial ability rather than on verbal ability. Second, it is likely that the young and old are at different points of their developmental trajectory with respect to verbal ability, even though their mean scores may be comparable. In that verbal ability, on average, does not peak until the 50s and remains stable into old age, it is likely that one is comparing young adults who have not yet reached their peak level with older adults who have passed their peak, but have not yet exhibited appreciable decline (Schaie, 1990).

Finally, it should be noted that issues of sample representativeness and generalizability are of particular concern when studying the old-old (75–84 years) and very old (85+ years). With advancing age, increasing proportions of the elderly are institutionalized, such that approximately 20% of the very old reside in

assisted living contexts. Thus, studies of everyday cognition among the community-dwelling very old will represent increasingly selective samples.

Assessing Everyday Cognition

In the final part of this chapter, the thorny issues of assessing and measuring everyday cognition are discussed. Two questions are examined: (1) What methods or procedures are useful in assessing everyday cognition, and (2) How is the adequacy of performance on everyday tasks to be judged?

In order to understand how people perform on everyday tasks, it does not suffice to remain an observer of subjects' performance in their natural habitat. The purpose of the laboratory in the behavioral sciences has always been to take a complex phenomenon and to synthesize it by purposefully introducing controls. Thus, for everyday cognition as well, complex behavior must be decomposed into its parts at successive levels of reduction. No matter how arbitrary this process may appear, it is the standard method of science. Only when the components of everyday behavior are understood is it possible to link the individual's performance on these components to the adequacy of the global behavior observed outside of the laboratory.

Methods for Assessing Everyday Cognition. Six procedures frequently employed in assessing performance on practical problems are: Naturalistic observation, interview, "think aloud" or verbal description of problem solution, paper-and-pencil measure, task simulation, and computer-interactive problems. For the most part, these are the same methods and procedures that have been used in studying traditional forms of intelligence. How effectively can the same methods and procedures be used to study everyday cognition? There is a continuum of methods that ranges in appropriateness from assessing detailed behavioral components to those offering descriptions of global phenomena. What particular method or procedure is to be used will necessarily depend on the step at which the investigator is operating. If it is the objective of a study to describe the global behavior, then there is no substitute for direct observation. To bring the behavior under control for study and to identify dimensions of the phenomenon, more structured methods are required. Once the behavior has been described, and its dimensions have been understood, the scientific objective must be to design studies that decompose the phenomenon. In the latter instance, the methods of study can no longer mirror the conditions under which the behavior occurs in the natural environment. Because the objective is no longer to describe the whole but instead to analyze its parts, it is now necessary to impose controls of a type that are not present in the naturalistic context. At this point, our more traditional procedures that allow for experimental control become the methods of choice.

Internal and External Validity. With respect to internal validity, there are the issues of convergent versus divergent validity. The question of *convergent* validity is to determine whether the dimensions of everyday cognition represent a coherent domain. If research on the construct of everyday cognition is to transcend the study of isolated tasks, then it is necessary to discover superordinate dimensions—hence the need for task taxonomies. The question of *divergent* validity involves the demonstration that the dimensions of everyday cognition can indeed be defined independently of the ability constructs measured by traditional approaches to the study of adult intelligence.

With respect to *external* validity, it is necessary to show that the factors identified through controlled studies in the laboratory can be generalized to everyday behavior in the naturalistic context. Here reference is made to our earlier definition of everyday cognition, in which three facets (personal attributes, task properties, contexts) were identified (see Fig. 3.5). It is essential to demonstrate that the laboratory-defined facets can be observed in everyday problem solving in the real world. That is, it would be essential to show that personal attributes, task properties, and context account for variability in everyday functioning in the real world, as well as in the laboratory.

Adequacy of Problem Solutions. In the final instance, what counts is whether or not an individual succeeds in solving a problem. But who will determines the adequacy of the problem solution, and how is this judgment to be made? For some everyday tasks, the problem solver's own judgment of the adequacy of problem solution is sufficient. An example is decisions regarding the purchase of household furnishings. However, even in this instance, there may be a hierarchy of external criteria that would inform us whether the criterion used by the problem solver is totally individualistic or whether it conforms to criteria more generally accepted by others.

There are other, perhaps more important everyday problems, where external criteria for judging adequacy of problem solution are required. There are at least three sources for these external criteria: Social consensus, theory, and empirical data. For example, the appropriateness of different ways of resolving interpersonal conflict is often judged by criteria defined by social consensus (Cornelius & Caspi, 1987). On the other hand, criteria for assessing the adequacy of solutions for moral dilemmas have been generated by theory (e.g., Kohlberg's stages; religious theology). Empirical criteria for assessing the adequacy of a solution, alternatively, are typically developed by experts through experimental trials on a case by case basis, such as determining the best sequence of steps in assembling a piece of equipment.

SUMMARY

This chapter has considered some of the salient taxonomic and methodological issues that confront the study of everyday cognition. Everyday problem solving has at least three defining characteristics: (a) the application of cognitive abilities

and skills, (b) within naturalistic or everyday contexts, to (c) problems that are complex and multidimensional. Some of the dimensions of everyday problem solving were then examined. These include: a cognitive core of basic abilities and domain-specific knowledge bases, followed by consideration of the problem solver's individual circumstances, as well as social and affective factors. Problem solving involves the *integration* of these components. In many instances problem solving turns out to be a recursive process.

Four methodological issues were considered. First, the factors currently employed in studying the domain of everyday problem solving include: personal attributes, task properties, and contexts. Future research needs to examine the interrelationship among these factors, rather than defining everyday cognition by a single factor. Second, there are sampling issues, including the limitations of specialized samples and of extreme age group comparisons. Third, methods currently employed in the assessment of everyday problem solving were examined. Finally, the ways in which the adequacy of problem solutions are judged were discussed.

The study of everyday cognition is a challenging and fruitful endeavor. However, as this overview of methodological and taxonomic issues suggests, the complexity of the problem will require intensive and rigorous studies utilizing all of the sophistication that characterizes both the psychometric and experimental traditions in the study of cognitive development.

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