DOCUMENT RESUME

ED 203 223 CG 015 206

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TITLE Age-Appropriate Measures and Intellectual Competence in Three Age Groups.
PUB DATE Sep 78
NOTE 18p.; Paper presented at the Annual Convention of the American Psychological Association (Toronto, Ontario, Canada, August, 1978).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Ability Identification; *Age Differences; Age Groups; Competence; *Ecological Factors; *Intelligence Tests; *Measures (Individuals); Older Adults; *Test Bias; *Test Construction; Test Validity

ABSTRACT

Because conventional test instruments designed to predict academic performance of the young tend to be inaccurate measures of competence in the elderly, new assessment instruments are being constructed which are more appropriate for current cohorts of the elderly. A comparison of performance on conventional measures to performance on newly constructed analogs of existing intelligence tests comprised of familiar rather than novel, abstract stimuli was conducted with young, middle-aged, and older adults (N=120). The two forms of inductive reasoning tests were then administered to an additional 40 older adults who constituted a more representative older population. Results of the comparison of the two older samples showed differential effects for different theoretically ecologically valid tests, better performance by highly educated older adults, and correlations between performance on cognitive tests and real-world competence. (Author/NRB)

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INTRODUCTION

A survey of cross-sectional research on cognitive functioning in the geropsychological literature (Baltes & Labouvie, 1973; Botwinick, 1973; Riegel, 1973; Schaie & Gribbin, 1975) indicates performance differences between cohorts, with young adult cohorts typically outperforming older cohorts. Recent cross-sectional analyses of longitudinal research (Schaie & Labouvie-Vief, 1974), however, suggest that while considerable individual differences in changes exist both within and between cohorts, there is less intraindividual change across the adult life-span than previously has been assumed. That is, often poor performance in the elderly may be attributed to ability-extraneous, but performance-related variables such as characteristics of the test-taking situation or past experiential history rather than characteristics of the older person per se. Relatedly, a lack of external validity exists in the area of adult cognitive measurement (Schaie, 1978) in that conventional test instruments originally designed to predict academic performance in the young tend to be inaccurate measures of competence in the elderly. Consequently, assessment instruments are beginning to be constructed which are particularly appropriate for current cohorts of elderly.

The present study investigated the issue of age-appropriate measures by comparing performance on conventional measures to that on newly constructed analogs of existing tests of intelligence comprised of familiar rather than novel, abstract stimuli. Previous related research (Arenberg, 1968; Gardner

& Monge, 1977; Hulicka, 1967; Sinnott, 1975), has indicated that older adults perform better when tasks are presented using familiar rather than novel materials since older adults often regard conventional tests as irrelevant to their lives and thus fail to elicit the necessary motivation and involvement needed in the test-taking situation to perform well. Therefore, it has been theorized that the use of familiar materials increases the interest of the older individual by providing meaningful, everyday referents, and hence alleviates some of the performance-debilitating anxiety which often exists in the elderly when they are placed in the unfamiliar test-taking situation.

As one component of recent efforts aimed at the development of an ecologically valid technology for the assessment of competence in adulthood and old age, then, the present study set out to determine 1) whether the elderly perform better on theoretically ecologically valid (i.e., those containing familiar and meaningful as opposed to novel materials) versus conventional measures of intelligence relative to young and middle-aged individuals; 2) whether educationally advantaged elderly perform better than less advantaged elderly; and 3) whether objective measures of performance are related to subjective perceptions of competence in the elderly.

METHOD OF PROCEDURE

The present study was designed to determine whether ecologically valid measures, i.e., those containing familiar and meaningful as opposed to novel materials, would differentially affect cognitive performance in three age groups. The study consisted of two parts. First, a total of 120 young (18 to 23), middle-aged (55 to 59), and old (65 to 69) adults were administered either a conventional measure of inductive reasoning, the Raven's (1958) Standard Progressive Matrices, or a theoretically ecologically valid analog,

the Gonda's (1977) Standard Progressive Matrices. There were 40 individuals in each age group, half of which were male and half female. Subjects in the young age group were recruited from the Psychology Department Subject Pool at the University of Southern California (USC) and received class credit for their participation. Middle-aged and older subjects were recruited from USC's alumni subject pool, which consists of individuals who typically are highly educated and relatively affluent, factors which in all probability reflect relatively high motivation for cognitive involvement, especially when compared to the average member for that cohort who has a mean educational level of high school or below. Items on the analog were constructed either by adding on elements to some of the existing matrices to transform them into a familiar form, or by substituting familiar for abstract stimuli in others (see Figure 1). Second, due to the highly select nature of the older adult sample in the first part of the study, hereafter referred to as Sample 1, an additional older adult sample, Sample 2, was drawn from a less educated and less affluent, and hence, more representative, population. That is, since the rationale for constructing a familiar form was to promote motivation and involvement, it was decided that a more representative population of older adults who were less educated and less affluent would also be a more appropriate population from which to sample given the nature of the present hypotheses.

Thus, the second part of the study consisted of administering the two forms of the inductive reasoning test to an additional 20 male and 20 female older adults. The mean level of education for Sample 2 was 11.3 years compared with 16.8 years for Sample 1. The majority of subjects in Sample 2 was obtained from the Andrus Older Adult Center, a multi-purpose center for older adults located in Hollywood serving primarily low income and relatively low education individuals.

Several additional tasks were also administered to Sample 2. The space subtest of the Primary Mental Abilities Test (PMA) (Thurstone, 1962) and its theoretically ecologically valid analog, the Quayhagen (1978) Object Rotation Test (ORT) (See Figure 2) in pencil and paper form, were given, along with the PMA verbal meaning subtest and the Situational Competence Q-sort (Scheidt & Schaie, 1978). These measures were added for several reasons. In the case of the spatial tasks, since the same subjects in Sample 2 received either traditional or ecologically valid forms both for the reasoning and space measures, the relative success of operationalizing the ecological validity construct for the two abilities could be compared.

In the case of the remaining tasks, the verbal meaning test provided a crystallized measure so that it could be determined whether performance on the fluid and crystallized measures was related. Similarly, the Q-sort task, a subjective measure of competence, offered a real-world criterion to which the other tasks could be compared.

The Q-sort consists of situations which have been grouped into 16 classifications, resulting from all possible combinations of four attribute dimensions. The four attribute dimensions are social or nonsocial, high activity or low activity, common or uncommon, and supportive or depriving. Each of the 16 classifications consist of five situations for a total of 80 situations (see Scheidt & Schaie, 1978).

The Q-sort procedure requires subjects to rate the different situations (e.g., driving on freeways, filling out tax forms) according to their own perceived relative competence in each situation. That is, they are supposed to rate their relative ease of coping with, and adapting to, the behavioral demands of each of these 80 situations.

RESULTS AND DISCUSSION

First, for the purpose of determining whether performance was affected differentially by age and/or form of test a four-way analysis of variance, 3(age) x 2(test) x 2(sex) x 2(experimenter) was performed. Dependent measure was the number of correct responses on the inductive reasoning tests. Means and standard deviations for the three groups can be found in Table 1. A significant age main effect, $F(2,105) = 13.48$, $p < .001$, was found, with Tukey contrasts revealing that young and middle-aged adults performed significantly better than old adults on both tests (HSD = 3.99, Middle-aged - Old = 5.88, Young - Old = 6.48, $p < .01$). It is interesting to note that there was no significant difference between the young and middle-aged group (55-59), a finding attributed perhaps to the highly select nature of the present middle-aged sample. No test effects nor age by test interaction obtained, although both had been expected. Consequently, it was decided to sample another population of older adults, Sample 2, since it was reasoned that perhaps no test effects obtained because of the highly select nature of the Sample 1 elderly.

First, the results of the comparison of the two older samples will be reported followed by the results of the additional tasks administered to Sample 2 only.

For the purpose of determining whether performance differences existed between the two older samples a 3-way analysis of variance, 2(sample) x 2(test) x 2(sex), was performed. Dependent measure was the number of correct responses on the two forms of the inductive reasoning task. Means and standard deviations appear in Table 2. For the reasoning tests, again no test effects nor the expected test x sample interaction were obtained. A significant sample effect was found, however, with Sample 1 performing significantly

better than Sample 2 ($F(1,72) = 28.06$, $p<.001$). A significant main effect was also obtained for sex, with women outperforming men on both tests ($F(1,72) = 11.28$, $p<.001$). A significant sex by sample interaction was also found, with Sample 1 males performing significantly better than males in Sample 2 ($F(1,72) = 4.56$, $p<.05$).

With regard to the additional tasks administered to Sample 2, data analysis revealed no significant effects for space although a trend was noticed for a test effect, with individuals who received the familiar form performing better than those who received the conventional form.

Correlations were performed between the reasoning, space, and verbal meaning scores and mean ratings on the 16 classifications and 8 dimensions of the situational competence task. Only correlations reaching a .01 level of significance or higher were accepted.

For the reasoning scores, traditional and familiar combined, several significant correlations were revealed. Reasoning was positively correlated ($r = .46$, $p<.001$) with situations in class 16, that is, situations classified as Nonsocial, Low activity, Uncommon and Depriving (See Table 3 for a description of the situations in this category). In other words, individuals who scored highly on reasoning also rated their competence level as high for situations within this classification.

The same relationship held for the Raven ($r = .53$, $p<.01$), males and females combined, and for Raven females only ($r = .68$, $p<.01$). When scores of females were collapsed across test on reasoning, the scores were positively correlated with class 16 also ($r = .57$, $p<.01$); scores for males were not. Reasoning was also correlated positively ($r = .36$, $p<.01$) with the Nonsocial dimension.

For Gonda males a significant negative correlation ($r = -.78$, $p<.01$) obtained between reasoning and class 4: Social, High activity, Uncommon, and Depriving (See Table 4). That is, males scoring highly on the Gonda rated their competence level as low for situations in this classification.

For space, different patterns of association emerge. A positive correlation resulted on space scores and class 13, Nonsocial, Low activity, Common, and Supportive, for ORT males ($r = .77$, $p<.01$) but not ORT females (see Table 5). When collapsed across test forms, males also had this relationship ($r = .53$, $p<.01$).

PMA Verbal Meaning scores correlated with class 16 ($r = .37$, $p<.01$) and with Dimension 8: Depriving ($r = .36$, $p<.01$).

Some interesting patterns have emerged from this data. For reasoning, it appears that in general high scorers on these formal measures of intellectual abilities perceive themselves as easily coping with depriving, stereotypically hard-to-handle situations. Taken alone it would appear that perhaps formal tasks of certain intellectual abilities can indeed predict intellectual competence in certain real-life situations. However, there was an exception to this in the negative correlation between reasoning and class 4 for Gonda males, with males who scored highly on the familiar form also rating their coping as poor on social, active, uncommon and depriving situations, a finding that underscores the danger of making theoretical generalizations regarding adult intellectual development.

For space, findings were quite different. Males who scored highly and particularly ORT males, perceived themselves as easily coping with solitary, passive, but common and supportive situations, that is, situations that were seemingly relatively innocuous.

Taken together then, results suggest that, indeed, in some cases, tasks

of intellectual abilities may not be valid for predicting intellectual competence in certain real-life situations but in some cases may which supports the position that generalizations about adult intellectual competence cannot be made without qualifications, but rather must be viewed in terms of person x task x situation interactions (Schaie, 1978).

Regarding the issue of the theoretically ecologically valid test forms, clearly the possibility exists that this particular theoretical construct may not have been successfully operationalized in the present study. Current pilot work is underway which is further exploring this method of operationalization.

Lastly, along with further refinement of ecologically valid tasks, future work should take the direction of developing paradigms in which behavioral measures of real-word competence in older adults can also be obtained.

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Table 1

Means and Standard Deviations for Number of Correct Responses on Raven and Gonda

	Test			
	Raven		Gonda	
Age	Mean	SD	Mean	SD
Young	53.05	4.60	52.95	3.59
Middle-Aged	52.90	5.32	51.30	5.80
Old	46.00	9.51	47.05	6.13

Table 2

Means and Standard Deviations for Number of Correct Responses on Raven and Gonda for Two Old Samples

	Test			
	Raven		Gonda	
Sample	Mean	SD	Mean	SD
Sample 1	46.00	9.51	47.05	6.13
Sample 2	34.00	13.55	36.10	11.19

Table 3

Situations in Class 16 of Scheidt's Situational Competence Task

(Nonsocial, Low Activity, Uncommon, and Depriving)

1. Searching around your residence with a flashlight at night to locate the source of a strange noise.
2. Slipping on a slick part of the floor and falling.
3. Discovering you have locked your keys inside your car while out shopping.
4. Taking out trash at night to a rather dark part of your yard or alley.
5. Trapped alone inside an elevator between floors of a building.

Table 4

Situations in Class 4 of Scheidt's Situational Competence Task

(Social, High Activity, Uncommon, and Depriving)

1. Waiting at end of a long line of people attempting to get tickets to some entertainment you would very much like to see.
2. During a public meeting you feel a friend is unjustly accused of doing a poor job on some task.
3. Sticking a knife against your body, a man says he will kill you unless you give him money.
4. Trying to prevent some young vandals from damaging some property near your residence.
5. Returning a faulty or defective item of merchandise to the store where you purchased it.

Table 5

Situations in Class 13 of Scheidt's Situational Competence Task

(Nonsocial, Low Activity, Common, and Supportive)

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1. Looking through a family photo album containing pictures of friends, relatives, and events of the past.

2. Trying to learn or master a new activity or interest, such as a new language or hobby.

3. Making some plans involving some things you will do in the future.

4. Taking a leisurely stroll around the immediate area or neighborhood where you live.

5. Reflecting on the meaning or significance of your life.

Figure 1. Example of item from the Gonda (1977) Progressive Matrices

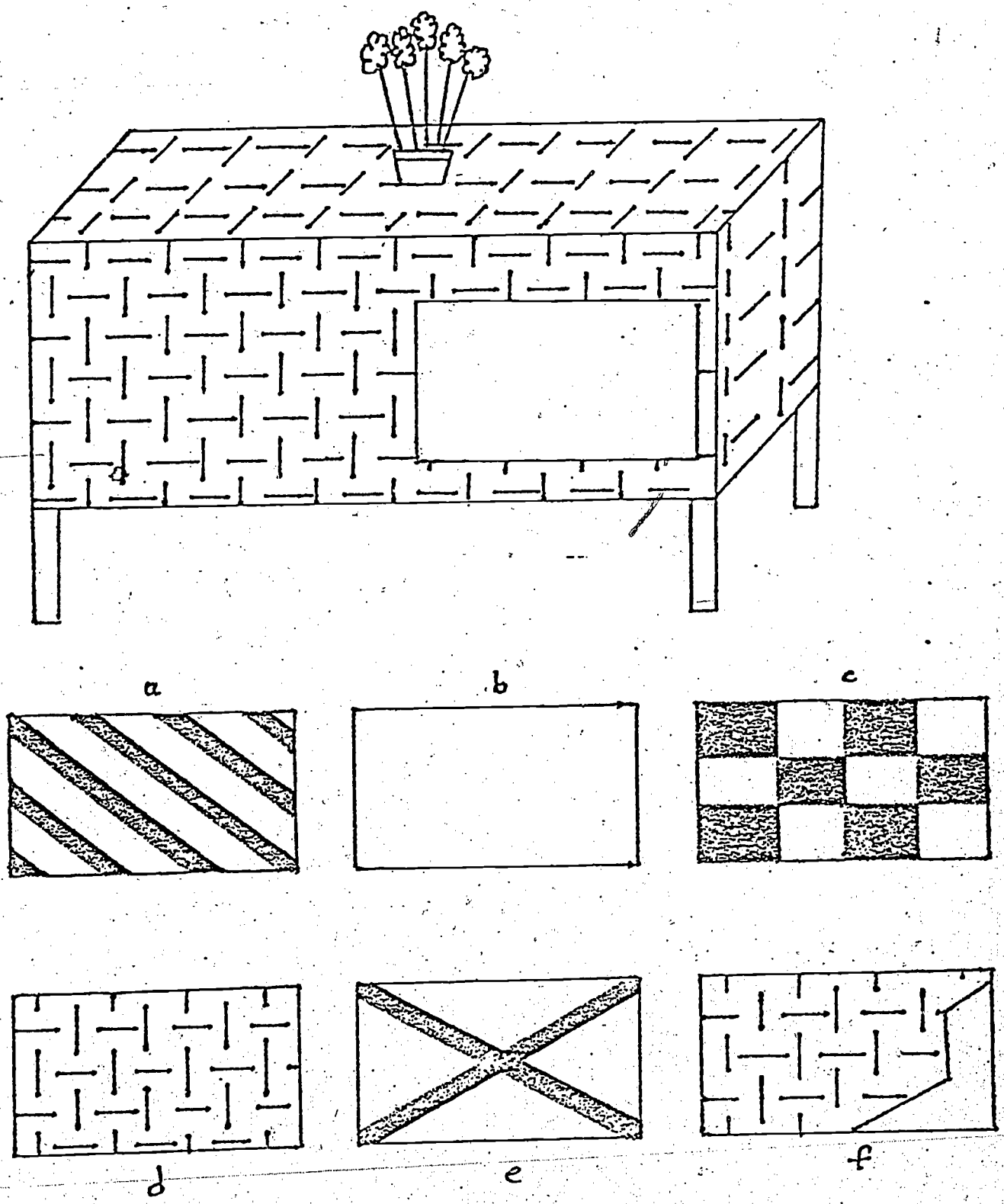

Figure 2. Example of items from the Quayhagen (1977) Object Rotation Test