

Contemporaneous and Lagged Effects of Job Characteristics  
on Rigidity

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## Contemporaneous and Lagged Effects of Job Characteristics on Rigidity

In recent years there has been a rejuvenated interest in the construct of rigidity. Development, particularly in adulthood, is characterized by constant adjustment to changes in environmental demands, be it in building social and professional relationships, starting a family, changes in careers, or even solving everyday pragmatic problems. Even though there exists considerable ambiguity in defining rigidity, the myth of a unidimensionally labelled rigid versus flexible person has been questioned and denounced. It is now recognized widely that rigidity is not a global phenomena but rather is multidimensional.

Recent longitudinal studies such as the Baltimore Longitudinal Study of Aging (Shock, Greulich, Andres, Arenberg, Costa, Lakatta & Tobin, 1984) and the AT & T studies (Bray & Howard, 1983) have addressed the correlates of flexible styles such as openness to experience and managerial success. In all cases it has been demonstrated that rigid or flexible styles are related to open, and stimulating lifestyles of the individual.

The central ideas of this paper stem from the research program of Kohn and Schooler (1969, 1978, 1983). According to them, work environments such as substantive complexity of work, routinization and closeness of supervision affect ideational flexibility. They measured substantive

complexity through a detailed enquiry about how much time people spend and precisely what they do when working with data, with things and with people. Intellectual flexibility is assessed by answers to simple cognitive problems, perceptual tests, propensity to agree and disagree on questions and the impression made on the interviewer. Their causal models reveal that substantive complexity of work done has considerable contemporaneous effects on flexibility. Based on these and other data Schooler (1984) theorizes that complex environments systematically reinforces cognitive effort and motivate individuals to develop their intellectual capabilities and inculcate self directedness. The resulting cognitive processes are then generalized to other situations. Simpler environments, on the other hand may not provide sufficient rewards to develop or continue high levels of cognitive functioning and hence lead to decline.

If indeed complex environments do facilitate self direction then it can be expected that these people actively create complexity and thus sustain their intellectual functioning. While experimental manipulations intended to restrict environmental complexity in humans are hard to come by, we probably can view retirement as one such naturalistic transition to simpler environments.

The present paper addresses these ideas by examining longitudinally the impact of job conditions on a multidimensional and differentiated construct of individual

rigidity and flexibility in a sample of retired and non-retired elderly.

## METHOD

### Subjects

A subsample from the Seattle Longitudinal Study of intellectual development was used for these analyses (Schaie, 1983). Three hundred and twenty three (323) adults (192 males, 131 females) who were above 50 years and gainfully employed in 1977 were selected. The mean age of this subsample in 1977 was 61.63 yrs. (Range = 50-86; SD = 6.94), the mean educational level was 14.6 years of schooling (Range = 8-20 years; SD = 2.8), and the mean income level was \$29,700 (Range = \$3000-60,000, SD = \$18,609). About 166 subjects (96 males and 70 females) retired before or in 1984 and comprise the retired group; and 157 subjects (96 males 61 females) were still working at the second time of measurement and comprise the non-retired group.

### Measures

The two work characteristic scores (job complexity and routinization) were constructed from interviews conducted in 1977 and were similar to Kohn's questions. Job complexity scores were based on the time subjects reported they spent working with hands, reading writing and dealing with people. A principle component analysis of these reported hours

provided the weights for constructing the job complexity component for our analysis. Routinization scores were based on the extent of repetition of work tasks reported by the subjects. The subject's age, education and income were also included in these analyses.

Rigidity scores were ascertained in 1977 and 1984 by the Test of Behavioral Rigidity (Schaie, 1958; Schaie and Parham, 1975). This test battery comprises of three tests which assess the respondents rigidity in actual performance on tasks under reversed or interference conditions and their reported reactions to ambiguous unstructured situations and those involving attitudinal shifts. The scores obtained from this battery are factor analyzed and yield the following three factors

- (1) Motor Cognitive Rigidity (MCR) which indicates the individual's ability to shift from one activity to another. It measures the effective adjustment to shifts in patterns from familiar to reversed and unfamiliar situations.
- (2) Personality-Perceptual Rigidity (PPR) indicates the individual's disposition to new surroundings and change in environmental patterns. It measures the ability to perceive and adjust to unfamiliar and new patterns and situations.
- (3) Psychomotor Speed (PS) measures the rate of emission of familiar cognitive responses and implies swift thinking and rapid response.

All three dimensions combine to form the definition of rigidity as "a tendency to persevere and resist conceptual

change or resist acquisition of new patterns of behavior and relinquish old and established patterns" (Schaie, 1958). The TBR is a particularly attractive measure because it corrects for basic speed differences of the respondents in assessing their performance under interference conditions.

#### ANALYSIS AND RESULTS

In order to understand the effects of job conditions on rigidity, we looked for both structural changes and mean level changes in our analyses. Let us look at our structural analyses first \_\_

Causal effects of work characteristics, years of education and income on rigidity dimensions were modelled using LISREL VI (Joreskog & Sorbom, 1984). Covariance matrices among the measures served as the data base for these path analytic models. The strategy of analysis was similar for all models. Fully non-recursive models were set up initially to estimate freely the following parameters : all the correlations among the exogenous variables, all structural coefficients between the exogeneous and endogenous variables, as well as autoregressive coefficients for lagged effects. Since the factor scores are derived from the same test battery the residuals between these scores were allowed to be correlated. Model modification included setting non-significant paths to zero, examining the modification indices and significant normalized residuals.

In order to examine the lagged effects of job complexity and routinization in 1977 to rigidity dimensions in 1984 the following model was set up --

Job conditions, education and income were the exogenous variables and the rigidity scores of the subjects on MCR, PPR, PS were the endogenous variables. This model was found to fit the data well and needed little modification. In the final accepted model ( $X = 12.24$ ,  $df=4$ ,  $p=.016$ ;  $GFI=.989$   $AdGFI=.987$ ;  $RMR=.05$ ) job complexity was found to have significant lagged effects on Motor Cognitive Rigidity and Psychomotor Speed. Routinization in the 1977 job had a significant structural coefficient for Personality Perceptual Rigidity.

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Figure 1 about here  
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In order to examine both concurrent and lagged effects a more complex model was set up. In this model the exogeneous variables were the same ie. education, income, and job conditions in 1977, but the endogeneous variables included both 1977 and 1984 scores on MCR, PPR, and PS. For this model autoregressive stability coefficients were also estimated to control for prior levels of rigidity. This model also fit the data well. Model modification entailed freeing one crosslag from MCR score in 1977 to PS score in 1984. In the model finally accepted ( $X = 36.91$ ,  $df=21$ ,

$p=.017$ ;  $GFI=.977$ ,  $AdGFI=.964$ ;  $RMS\ residual=.056$ ) job complexity is seen to affect all the three dimensions of rigidity in 1977. Routinization affects PPR scores in 1977. The rigidity dimensions are indeed very stable as can be noted by their autoregressive co-efficients. It is seen that the lagged effects of job conditions fade out of statistical significance, however the trend of lagged effects is present at a 0.1 level of significance.

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Figure 2 about here  
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This accepted model was then tested on the two retirement groups simultaneously. The fit of the model on the two groups was acceptable ( $X = 46.73$ ,  $df=36$ ,  $p<.11$ ;  $GFI$  for both groups= $.973$ ;  $RMS\ residual$  for retired group= $.069$  and for the non retired group= $.041$ ); revealing that the structural relations in the two groups are no different.

#### Changes in Mean Levels

To further understand the impact of job complexity and retirement status on the rigidity dimensions, the sample was grouped according to their retirement status (retired and non-retired). Subjects were categorized into two groups of holding high vs low complexity jobs using the mean of the total group as a cutoff point. Thus retirement status and job complexity were the independent variables and the



difference between 1977 and 1984 scores on MCR, PPR, and PS served as the dependent variables.

Since job conditions, the individual's rigidity scores, and retirement are known to be age dependent the subjects AGE was introduced as a covariate in the analysis. This prevents misspecification of a correlated variable in the residual term and makes the parameter estimates more precise.

Our Analysis of Covariance results reveal consistent significant interactions between work complexity and retirement on ALL three rigidity dimensions. Let us look at the decline scores on these dimensions more carefully.

On Motor Cognitive dimension we note firstly that subjects currently working have higher flexibility scores. Furthermore, continuing work brings the means of the two groups of complexity closer. More importantly, we find that subjects with high complexity jobs continue to be more flexible than those with low complexity jobs even after retirement. This is because of the differential decline slope.

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Figure 3 about here  
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On Personality Perceptual Rigidity also we observe the same pattern. The decline on flexibility is lesser for the

subjects retired from high complexity jobs than for those retired from low complexity jobs.

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Figure 4 about here  
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The psychomotor speed scores do not give a consistent picture with this notion and in fact we note that there is no decline. Here too the high complexity non retired group is the highest at both times of measurement while the low complexity retired group is the lowest.

Since the three dimensions of rigidity are correlated, a multivariate test of Analysis of Covariance was deemed more appropriate. Here MCR, PPR and PS were the dependent variables, and the retirement and complexity groups served as the independent variables. The respondents age once again was included as a Covariate. The results from this multivariate analysis reveal once again no main effects of either age or retirement or job complexity. But the interaction of complexity and retirement produces significant effects.

#### DISCUSSION

In sum, let us see what do our data indicate? Job complexity and routinization do indeed have significant contemporaneous effects on all three dimensions of rigidity. These effects differ in magnitude for motor cognitive, and

attitudinal dimensions. There are lagged effects of complexity, though not very strong, given the very high stability of the rigidity dimensions. There is some decline in MCR and PPR and it is seen that subjects from high complexity jobs decline less slowly after retirement. This indicates some sustaining impact of complex environments on the individuals' flexibility and rigidity.

To conclude, this study contributes to the literature emphasizing the role of environmental influences in socialization and consequent individual psychological outcomes during the life span. It does seem to appear that individuals from complex environments sustain a certain degree of complexity in their lifestyles. Needless to say we do not know from these analyses what is the complexity of their post retirement lifestyle. Further analyses will be directed towards this area along with looking at changes in complexity level of jobs over time.

## APPENDIX

Complexity

One thing we would like to be able to pin down particularly accurately is how much of your working time is spent in reading and writing, how much working with your hands, and how much dealing with people. We realize, of course, that you can be doing two or even all three at the same time.

1. First -- reading and writing. Here we would like to include any type of written materials-- letters, files, memos, books or blueprints. About how many hours a week do you spend reading, writing, dictating, or dealing with any kind of written materials on your job?

-----hours.

2. Second -- working with your hands, using tools, using or repairing machines. We should like to include everything that involves working with your hands -- operating a lathe or a dentists drill, moving furniture or playing the piano. About how many hours a week do you spend working with your hands on your job?

-----hours

3. Third -- dealing with people. Here we do not mean to include passing the time of the day, but only conversations necessary for the job; for example, talking to your boss, teaching, supervising, selling, advising clients. About how

many hours a week does your job require you to spend dealing with people?

-----hours.

Routinization

1. Does your work involve:

----Doing the same thing in the same way repeatedly?

----Doing the same kind of thing in a number of ways?

----Doing a number of different kinds of predictable things?

----Doing a number of different kinds of unpredictable things?

----Other (Specify)

2. What it takes to do a complete job varies from occupation to occupation. How long does it take you to complete a job?

----Less than one day

----One day to one week

----One week to a month

----More than a month

----Not applicable.

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1977  
Predictors

### Lagged Effects Model

( $X=12.24$ ,  $df=4$ ,  $p=.017$ ,  $GFI=.989$ ,  $ADGFI=.987$ )

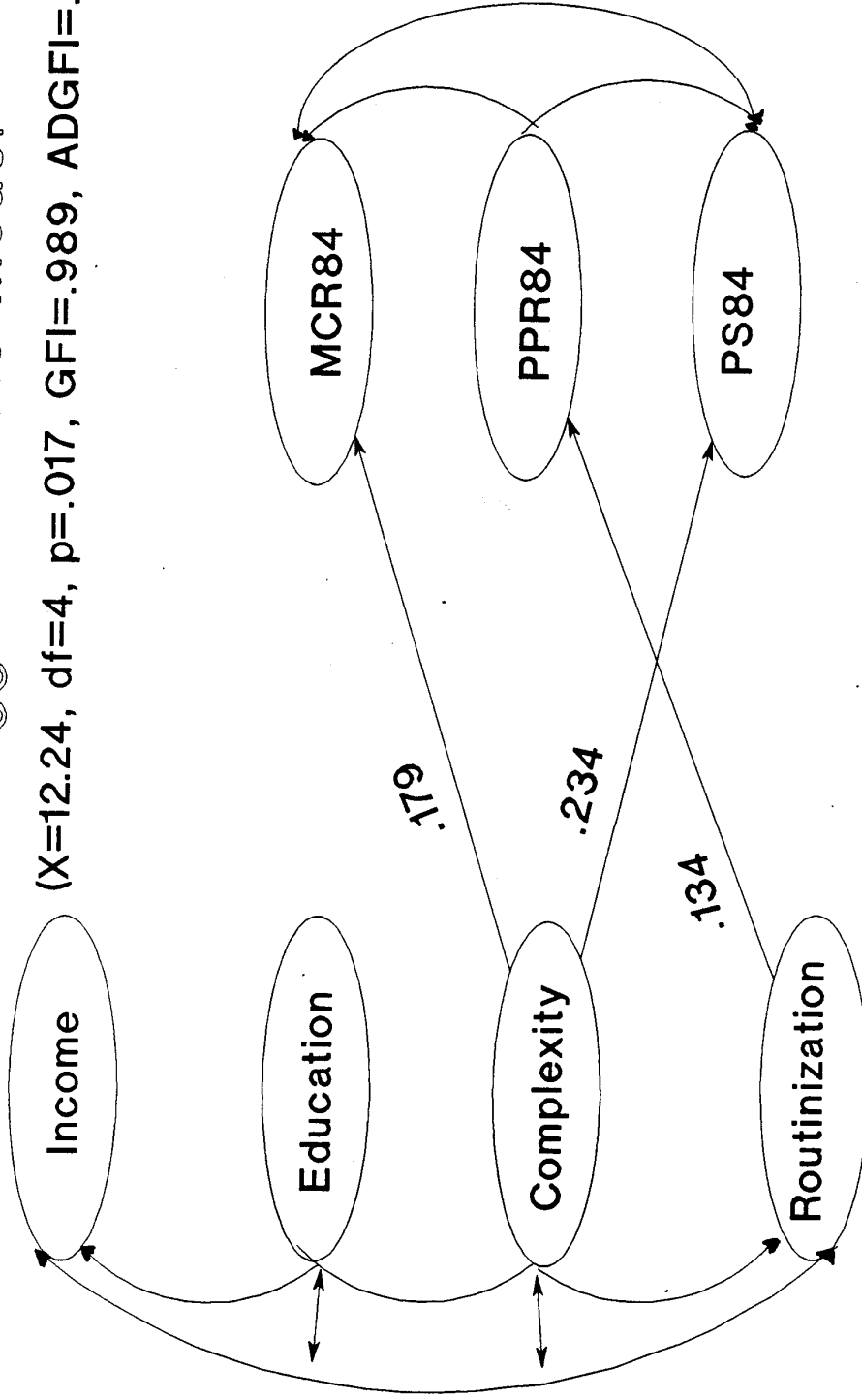


Figure 1: Lagged Effects Model



# Concurrent and Lagged Effects Model

( $X=36.91$ ,  $df=21$ ,  $p=.017$ ,  $GFI=.977$ ,  $ADGFI=.964$ )

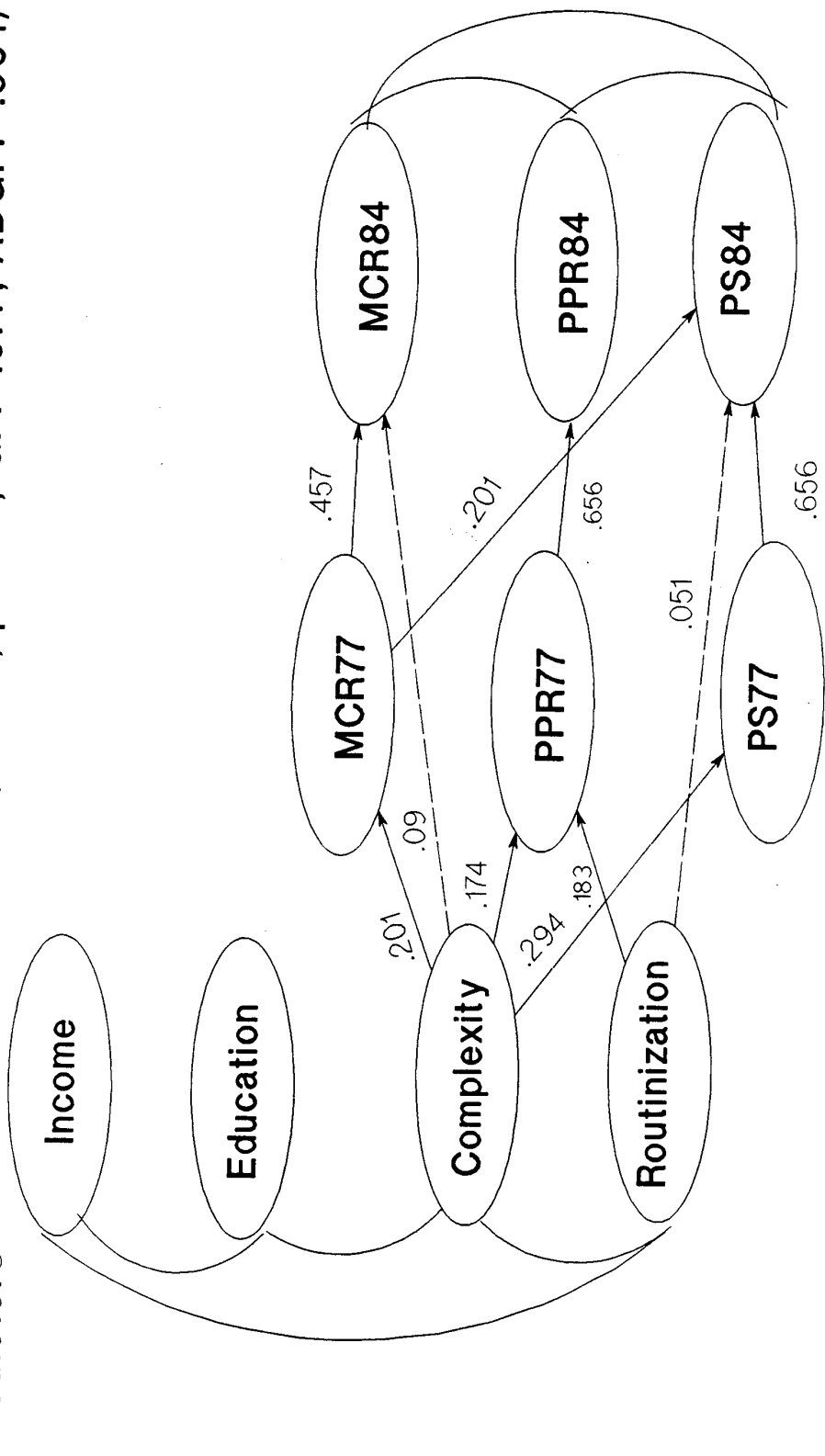


Figure 2: Concurrent and Lagged Effects Model

# Motor Cognitive Rigidity

## Complexity by Retirement

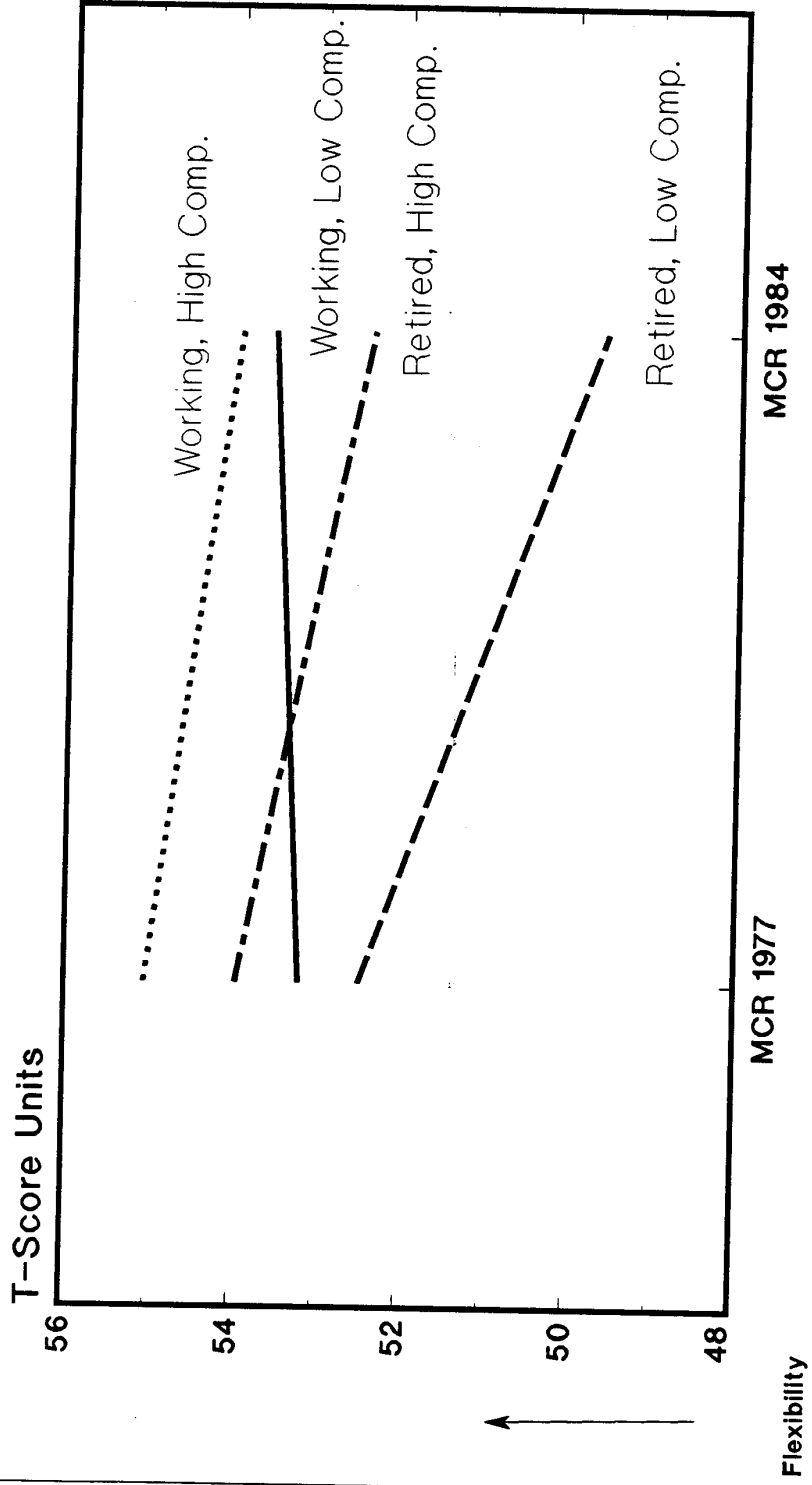


Figure 3: Mean Levels of Motor Cognitive Rigidity

# Attitudinal Flexibility (PPR)

## Complexity by Retirement

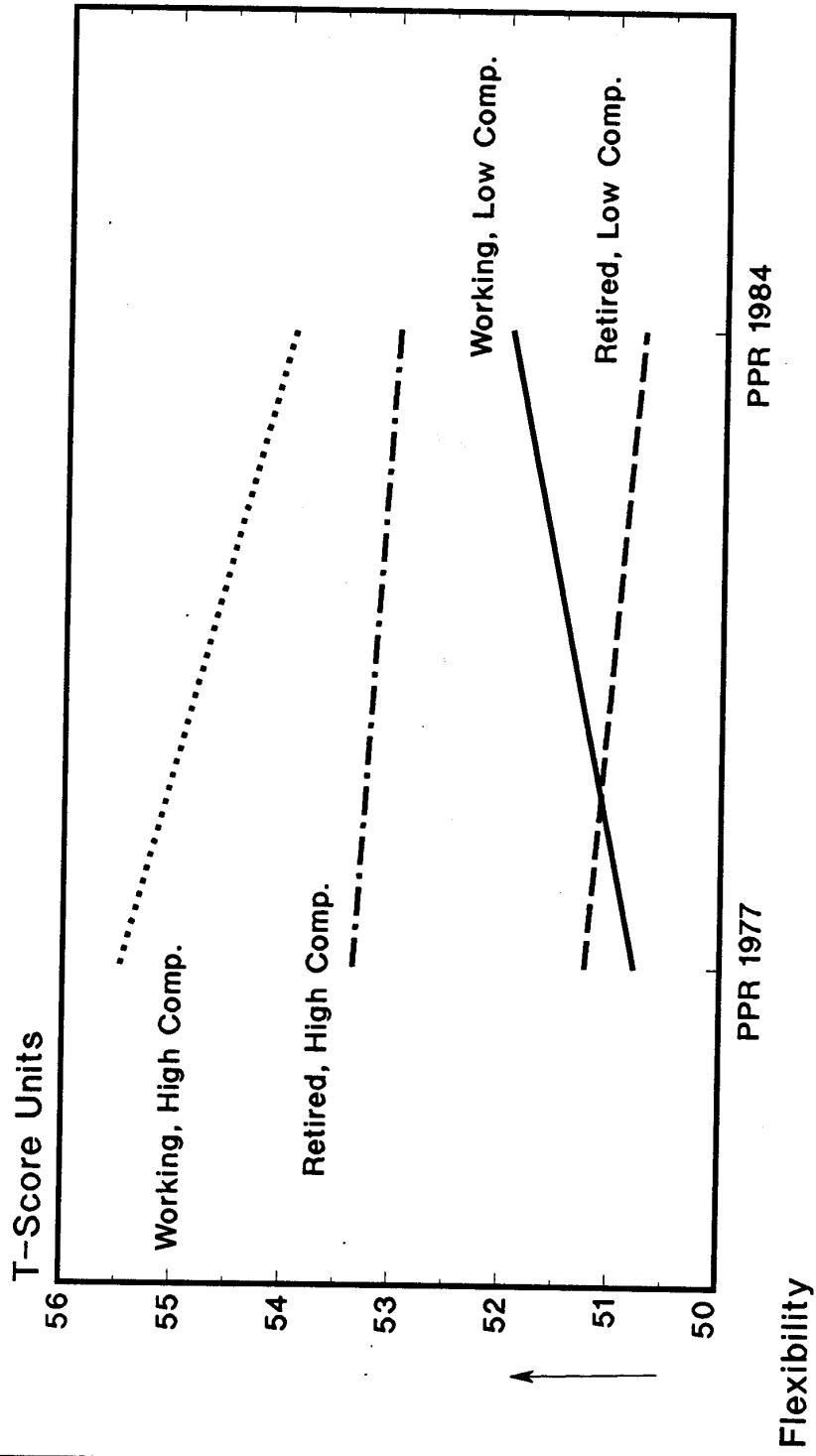


Figure 4: Mean Levels of Attitudinal Flexibility