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Information Processing Speed: Coding Task

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Introduction

Information processing speed can be seen as a processing resource. Processing resources can be defined as 'any internal input essential for processing (*e.g.* locations in storage, communication channels) that is available in quantities that are limited at any point of time' (Navon 1984: 217). Usually processing resources are conceptualized in terms of space, energy or time. It has been demonstrated that processing speed is negatively affected by age (*e.g.* Salthouse 1993).

The Coding task used in the LASA study is based on the work of Savage (1984). The purpose of the test is to measure information processing speed.

Procedure and sample

A specimen of the test (reduced size) is seen in Figure 1. There are two rows of characters. In the example each character in the upper row forms a combination with the character in the lower row. The respondent has to fill out the empty rows on the page, with the same letter-combinations as in the example.

The original Coding task (Savage 1984) had to be adjusted. A first adaptation relates to the written component of the task. Pilot studies in preparation of LASA (Deeg and Smit 1993) pointed out that respondents had difficulty in writing the letters. Moreover code clerks were not always able to read the handwriting of the elderly. Therefore it was decided that the respondent read the letters aloud. Apart from these practical problems it was noted that the original coding task resulted in scores reflecting both motor speed (writing) and mental speed. Second, the cha-

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racters were enlarged to reduce non-response due to poor eyesight. Third, because of time limitations, the Coding task is abbreviated to three trials of one minute and no recall section is included. Furthermore the letter 'Y' (used in the original version) was not used in the LASA Coding task. One reason was the fact that the 'Y' in Dutch is a vowel, and in the English version no vowels have been used. Another reason is the fact that 'Y' can be pronounced in various ways ('I-greque', 'lange ij', 'ij').

B	C	D	F	G	H	J	K	L	M	N	P	Q	R	S
N	K	T	X	V	Q	Z	D	P	J	C	L	W	M	F

Q	J	P	M	K	G	D	F	C	N	B	H	J	P	L

R	S	B	Q	M	C	K	G	M	F	D	P	J	H	C

B	S	N	F	Q	K	D	R	M	L	K	G	N	S	H

N	C	F	B	L	C	D	P	M	R	Q	S	F	L	N

H	Q	P	S	L	C	N	J	G	D	B	M	F	C	K

Figure 1
Specimen of the Coding task as used in LASA (reduced size)

The score on each trial of the Coding task consists of the number of completed characters irrespective of the number of wrong answers (as the total score was shown to be strongly related to the total correct score). A score was computed as missing when four or more missing values were detected. The missings were significantly correlated with the age of the respondent: the older the respondent, the more missings. No significant relationship with sex was found.

The Coding task was part of the medical interview. For 2672 persons a Coding task score could be computed.

Results

Table 1 lists some descriptive statistics of the Coding task. During the three trials a progression in the number of correct answers is seen. Although the increase from trial 1 to trial 2 is relatively greater than from trial 2 to trial 3, t-tests show significant differences for both increases ($p < .0001$).

Table 1
Coding task: Descriptive statistics

Coding	Trial 1	Trial 2	Trial 3
mean	21.450	23.190	24.180
median	22.000	24.000	25.000
std. dev.	8.680	9.100	9.340
kurtosis	-.019	.260	.400
skewness	-.332	-.490	-.580

With respect to sex differences for trial 3 a small but significant difference ($P = .05$) is seen. Women have higher scores than men. In the other trials, however, no sex difference is detected.

Age differences are great on all trials. The older the respondent the lower the score. As an example Figure 2 shows age differences on trial 3. Striking is the peaking bar at the score of 15 for the oldest age group. This may be the effect of the end of the first row. The same effect is seen at score 30 (end second row) for the age group of 65 to 74 and less conspicuously at score 45 (end of the third row) for the youngest age group (see also Figure 1).

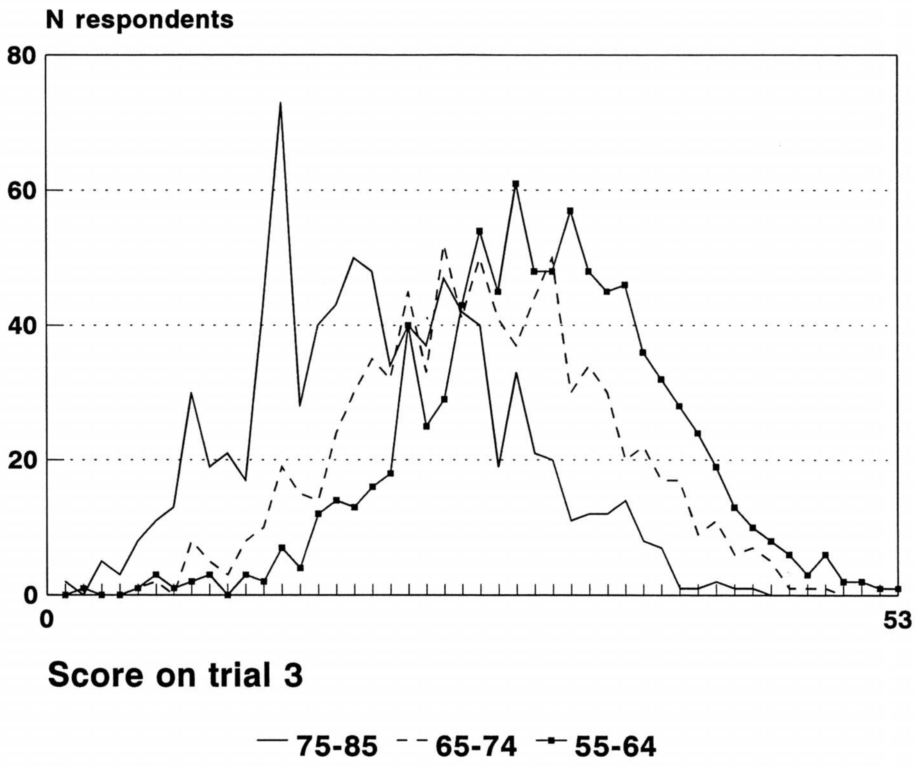

Figure 2
Age differences in the Coding task performance

Associations with education show significance for all trials: the lower the education, the lower the score on the Coding task.

Discussion

The adjusted Coding task seems to be an acceptable task for older adults in survey studies. No serious complaints were heard from either respondents or interviewers. The code clerks' task was easier than in the pilot studies, which decreased the chance of errors.

It seems that the length of a row has some influence on the score of a respondent. In the score distribution we found peaks at the end of each row, and the row was different for the various age groups. Most likely this has something to do with the (information processing) time needed to change one's focus from one line to another. In addition, almost at the end of a row, respondents may be more inclined to speed up in order to reach the end of a line.

References

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