4. METHOD

The empirical investigation comprised two parts: practice (sessions 1 – 4) and test (sessions 5 – 8). The purpose of the practice sessions was to extensively familiarize study participants with experimental tasks when performed separately and concurrently and to collect information on socio-demographic characteristics, cognitive and health status. The test sessions provided data based on which the research hypotheses were tested (see Section 4.3, for the study design). At the end of the study, participants filled out life management questionnaires.

4.1 Participants

4.1.1 Recruitment Process

Thirty-nine individuals were recruited for the participation in the study. During recruitment all potential participants were screened by a health questionnaire for history of falling, diabetes mellitus, peripheral neuropathy, Parkinson’s or Alzheimer’s disease, and musculoskeletal problems preventing the unaided standing with ease. Although all recruited individuals met the health criteria for this study, three older adults could not complete the experiment for health reasons, leaving 36 adults in the effective sample. Participants were drawn from the subject pool of the Max Planck Institute (MPI) for Human Development, Center for Lifespan Psychology[8]. Recruitment and data collection took place at the MPI over a period of 4 months, from July 2001 to October 2001. All volunteers were informed of the testing procedures before signing a consent form. Participants received 160 DM for participating in the eight sessions of the entire experiment (see Section 4.3, for the study design).

4.1.2 Socio-Demographic Characteristics

The effective sample consisted of 18 younger (*M* = 24.53 years, *SD* = 2.14) and 18 older participants (*M* = 75.85 years, *SD* = 4.63). Both the younger and the older subsample comprised more female than male participants (*n* = 11 and *n* = 12 female participants, respectively). The majority of the younger adults were university students (88.9%), whereas all older individuals were retired. Four older (22.2%) versus 100% of the younger participants were high-school graduates (i.e., held a German Abitur). However, the age-

[8] The research participants, however, had no previous experience with the experimental tasks used in the present study.

group differences in the cognitive status (see next section) were comparable to those typically reported in the literature. Therefore, the difference in the educational status between younger and older adults is rather an indicator of cohort effects[9]. Table 1 gives an overview of socio-demographic characteristics of the younger and older subsamples.

Table 1. *Socio-Demographic Sample Characteristics*

		Young (*n* = 18)		Old (*n* = 18)	
Age *(in years)*					
	Range	20.48 – 29.18		69.82 – 83.59	
	M	24.53		75.85	
	SD	2.14		4.63	
Gender					
	Male	7	(38.9%)	6	(33.3%)
	Female	11	(61.1%)	12	(66.7%)
Education [a]					
	Primary	-	-	4	(22.2%)
	Lower secondary	-	-	10	(55.6%)
	Higher secondary	18	(100%)	4	(22.2%)

[a] Primary = Volksschulbildung (8 – 9 years); Lower secondary = Mittlere Reife (10 years); Higher secondary = Abitur (13 years).

4.1.3 Psychological Assessment of Individual Resources

In addition to the typical marker tests of intelligence mechanics (Digit-Symbol Substitution) and pragmatics (Vocabulary), reasoning (Raven's Advanced Progressive Matrices Test), several indicators of health status (Vision; Hearing; Strength of Extremities; Number of Diseases; Sport Activities; Satisfaction with Life, Physical and Mental Health), and two indicators of life management (SOC – Strategies; Tenacious Goal Pursuit versus Flexible Goal Adjustment) were assessed (see Table 2). They were selected for the following reasons: (a) to document the age-group differences in different abilities potentially relevant for the performance of experimental tasks; (b) to draw a descriptive comparison of "resources" of the older subsample with the subsample of the "young old"

[9] See Handl (1984) and Mayer (1980) for description of societal trends toward higher educational attainment.

(70 – 84 years; *n* = 258) who participated in BASE[10] (cf. P. B. Baltes, Mayer, Helmchen, & Steinhagen-Thiessen, 1999). Table 2 gives a brief overview of the measures. Appendix A provides a more detailed description of measures.

Table 2. *List of Measures*

Measure	Indicator	Instrument description
Cognitive Status		
Reasoning	Raven's Advanced Progressive Matrices	Raven, Court, & Raven (1983) - Select correct pattern out of 6-8 alternatives - Sum of correct responses (36 items max.)
Perceptual-Motor Speed	Digit-Symbol-Substitution	Wechsler (1982) - Fill in the symbol that correspond to the digit - Sum of correct responses (93 items max.)
Knowledge	Spot-a-Word	Lehrl (1977) - Mark the word - Sum of correct responses (35 items max.)
Health Status		
Visual acuity	Distance visual acuity Close visual acuity	Borchelt & Steinhagen-Thiessen (1992) - Standard optometric procedures - Binocularly with a Snellen chart - Separately for each eye in close vision - Snellen decimal units (1.0 = normal vision)
Auditory acuity	Average threshold at 0.25, 0.5, 1.0, and 2.0 kHz	Standardized audiometry (Bosch ST-20-1 pure-tone audiometer) - Decibel units (dB) - 0 = "high hearing ability" - 100 = "low hearing ability"

(Table continues)

[10] As BASE is a locally representative study of a heterogeneous sample of older adults with detailed selectivity analyses (cf. Lindenberger et al., 1999), it is possible to use its multidisciplinary data set to check whether older participants in this study represent a positively selected sample. The subsample of "young old" adults comprises the BASE participants who were 70 to 84 years of age. For the purpose of comparisons, I took the 242 BASE participants who were 69 – 83 years of age at the time of Intensive Protocol Assessment. The years of age were truncated to an integer.

Table 2 *(continued)*

Measure	Indicator	Instrument description
Strength	Grip Ankle flexion Knee extension	Borchelt & Steinhagen-Thiessen (1992) - Standardized dynamometry (Dyna-Chip device; Stamina-Pocket-Balance device) - Kilogram (kg) unit - Grip: 55, ankle and knee: 46 max. - 3 trials per hand, ankle, knee; - Best value selected
Number of diseases	Single-Item	"Have you been treated at least once for the following diseases: stroke, paralysis, unconsciousness, convulsions, vertigo, numbness of hands and feet, Parkinson's disease, cardiac arrhythmia, cardiac infarction, high blood pressure, low blood pressure, diabetes, arthritis of hands, or arthritis of other joints?"
Sports activities	Single-Item	"Do you go in for sports regularly?"
Satisfaction	Life Physical health Mental health	Three standard survey items "How satisfied are you (at the time of the interview) with your live, physical and mental health?" - 5-point Likert scale (5 = "not at all", 1 = "very good")
Life Management		
SOC-strategies	SOC-Questionnaire	P. B. Baltes et al. (1995, 1999) - 24 item version - 4 scales (6 items each) - ELS (α = .73); LBS (α = .49); Opt (α = .44); Com (α = .55) - Forced-choice between a target item describing SOC-behavior and a distractor item - Mean score of target choices on each scale
Tenacious goal pursuit & flexible goal adjustment	Tenflex-Questionnaire	Brandtstädter & Renner (1990) - 20 item version - 2 scales (10 item each) - Tenaciousness (α = .71); Flexibility (α = .69) - 1 = "not at all true", 7 = " very true" - Mean score on each scale

4.1.3.1 Cognitive Status

In order to document the age typicality of the samples, three paper-and-pencil tests were administered to measure reasoning, perceptual-motor speed, and knowledge: Raven's Advanced Progressive Matrices Test (Raven, Court, & Raven, 1983), Digit-Symbol Substitution (Wechsler, 1982), and Spot-a-Word (Lehrl, 1977). For each test, instructions and several practice items were given. Age-group differences comparable to those typically reported in the literature on aging (e.g., P. B. Baltes & Lindenberger, 1997; P. B. Baltes et al., 1998; Salthouse, 1991) were obtained for all three tests (see Table 3 for means and standard deviations [*SD*]).

Table 3. *Individual Resources: Cognitive Status as a Function of Age Group*

	Young (n = 18)			Old (n = 18)		
Variable	*M*	*SD*	Range	*M*	*SD*	Range
Reasoning	25.41	4.70	18 – 32	14.06	3.76	8 – 20
Perceptual-Motor Speed	65.39	7.59	52 – 77	44.44	11.12	24 – 68
Knowledge	23.72	3.37	17 – 31	26.67	2.33	22 – 31

Young adults obtained significantly higher scores than older participants in the Raven, $t(33) = 7.91$, $p = .000$, and the DS, $t(34) = 6.60$, $p < .001$. However, older adults were better in the Spot-a-Word, $t(34) = -3.05$, $p < .01$. These results demonstrate the typical developmental dissociation between decrements in the fluid mechanics and maintenance in the crystallized pragmatics of intelligence (P. B. Baltes, 1997).

4.1.3.2 Health Status

In order to assess the health status of the sample, visual and auditory acuity, grip, knee extension, and ankle flexion strength were measured. In addition, self-report data on the number of diseases and satisfaction with life, physical, and mental health were collected, and the study participants were asked whether they carry out sports regularly.

Table 4. *Individual Resources: Health Status as a Function of Age Group*

Variable	Young (n = 18)			Old (n = 18)		
	M	*SD*	Range	*M*	*SD*	Range
Visual acuity	1.05	0.13	0.68 – 1.19	0.63	0.26	0.27 – 1.09
Auditory acuity	16.47	4.74	7.13 – 24.13	31.52	7.18	17.63 – 41.00
Strength						
Grip	27.56	9.19	16 – 46	17.57	5.92	10 – 29
Ankle	9.00	3.18	3 – 15	6.47	2.92	1 – 14
Knee	34.39	7.81	22 – 46	25.47	4.62	14 – 34
Number of diseases	0.22	0.54	0 – 2	1.5	1.25	0 – 4
Satisfaction with						
life	4.22	0.43	4 – 5	3.78	0.73	2 – 5
physical health	4.17	0.71	3 – 5	3.33	0.91	2 – 5
mental health	4.28	0.58	3 – 5	3.67	0.69	2 – 5

As can be seen in Table 4, the age groups differ significantly with respect to visual, $t(33) = 6.1$, $p < .001$, and auditory acuity, $t(33) = -7.36$, $p < .001$, grip, $t(34) = 3.88$, $p < .001$, knee extension, $t(34) = 4.17$, $p < .001$, and ankle flexion strength, $t(34) = 2.48$, $p < .05$. Older adults, in comparison to their younger counterparts, reported having been treated for more diseases on average, $t(34) = -3.98$, $p < .001$. However, both subsamples were engaged in one or more sport activities with no significant age-group difference in the distribution, $\chi^2(1) = 1.19$. In general, older adults were less satisfied than their younger counterparts with their lives, $t(34) = 2.22$, $p < .05$, physical, $t(34) = 3.07$, $p < .01$, and mental health, $t(34) = 2.90$, $p = .01$. Nevertheless, the older participants can be characterized as being satisfied with their lives, physical, and mental health because the means of the older subsample are above 3 (“satisfactory”). The age-group differences in the health status can be considered representative, at least in terms of the above measures.

4.1.3.3 Life Management

In order to find out whether the two age groups differ in life-management strategies that could be relevant for the performance of the experimental tasks two questionnaires were included: a self-report measure of SOC-Strategies (P. B. Baltes et al., 1995, 1999) and a self-report measure on tenacious goal pursuit versus flexible goal adjustment (Tenflex; Brandtstädter & Renner, 1990). The means and standard deviations are given in Table 5.

Table 5. *Individual Resources: Life-Management as a Function of Age Group*

Variable	Young (n = 18)			Old (n = 18)		
	M	*SD*	Range	*M*	*SD*	Range
SOC-strategies [a]						
ELS	0.40	0.30	0.00 – 1.00	0.65	0.30	0.00 – 1.00
LBS	0.63	0.26	0.17 – 1.00	0.75	0.22	0.33 – 1.00
Opt	0.53	0.27	0.00 – 1.00	0.55	0.22	0.17 – 1.00
Com	0.64	0.24	0.17 – 1.00	0.58	0.28	0.17 – 1.00
Tenflex						
Tenaciousness	4.74	0.84	3.00 – 6.30	4.29	0.80	2.50 – 5.70
Flexibility	4.48	0.91	3.00 – 6.10	5.04	0.60	3.80 – 6.10

[a] ELS = elective selection; LBS = loss-based selection; Opt = optimization; Com = compensation.

Similar to previous studies (see, e.g., Freund & Baltes, 2002), the analyses revealed that older adults scored higher only on the elective selection scale, $t(34) = -2.54$, $p < .05$. No age-group differences were found for loss-based selection, $t(34) = -1.51$; optimization, $t(34) = -.32$; and compensation, $t(34) = .71$. With respect to the tenacious goal pursuit versus flexible goal adjustment, the age-group comparisons revealed the pattern of results known in the literature (e.g., Brandtstädter & Renner, 1990): Young and older adults scored similarly on the tenaciousness scale, $t(34) = 1.64$. However, older participants had higher values on the flexibility scale, $t(34) = -2.20$, $p < .05$.

Summarizing the findings on the age-group differences in the individual resources, the following conclusions can be drawn: The younger half of the study participants possessed more resources in terms of cognitive and health status. Both subsamples were, however, comparable on the life-management strategies. The older adults scored even higher than their younger counterparts on the elective selection and flexibility scale.

4.1.3.4 Comparison With the "Young Old" Participants of BASE

As the present study exclusively relies on older volunteers (i.e., the sample is not fully representative of the general population), the expected age-related differences may therefore not accurately reflect the true age-related differences in the population (see Salthouse, 2000). To learn about the representativeness of the older subsample, its relative position (e.g., percentile) in the relevant distributions from the representative "young old" subsample of BASE participants was determined. In the first step, the age distributions of both samples were considered. Figure 2 shows that, but for age 71, 77, 78, 79, and 81 years, there was at least one present study participant in each year. The comparisons with the "young old" subsample of the BASE were possible only for the perceptual-motor speed and visual and auditory acuity. As is typical for most cognitive aging research involving volunteer samples, the sample represented in this study has a positive selection bias.

Specifically, with regard to perceptual-motor speed, which was measured by Digit-Symbol-Substitution test, almost all older participants of the present study performed similarly to those older participants of the BASE subsample whose scores are in the 70th to 100th percentile (see Figure 3). As can be seen in Figure 4, similar picture emerges for the auditory acuity. However, the distribution of the older adults of the present study begins at the 50th percentile of the BASE subsample. Figure 5 demonstrates that the visual acuity of the majority of older participants corresponds to the scores within the 60th to 100th percentile of the BASE distribution. In sum, the comparisons with the "young old" BASE participants imply that the older individuals who participated in the present study possess more cognitive and health resources, at least in terms of perceptual-motor speed, visual and auditory acuity, than a representative older population.

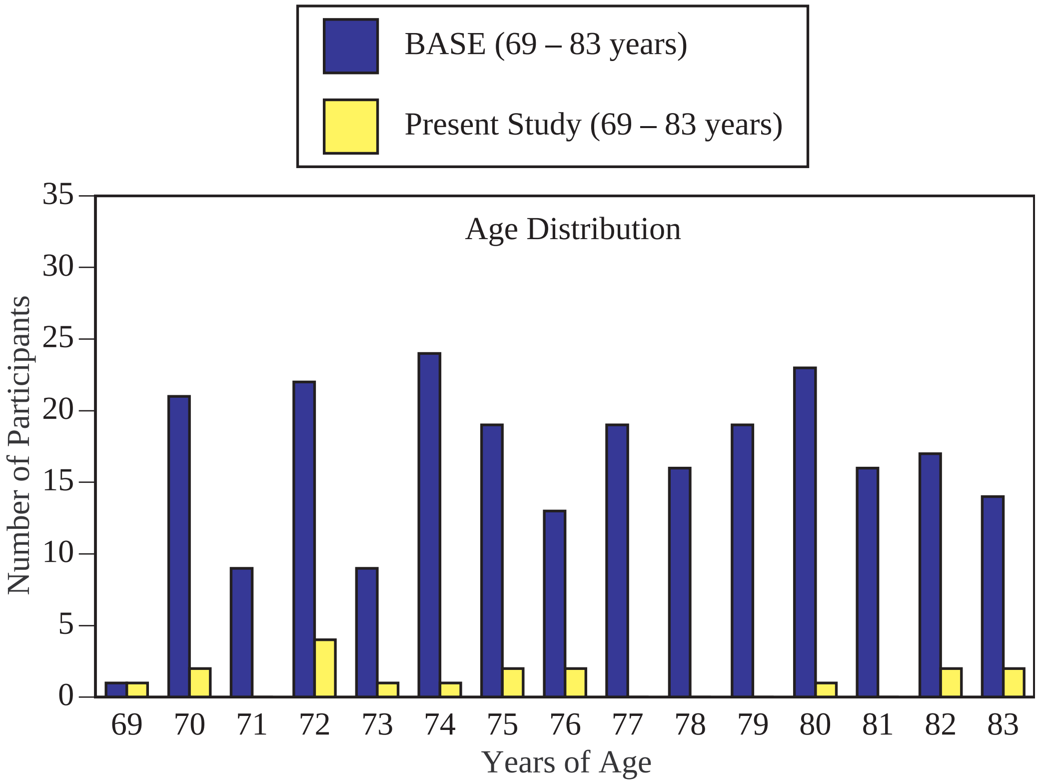

Figure 2. Comparison of the older subsample of the present study with the "young old" participants of BASE: Age distribution

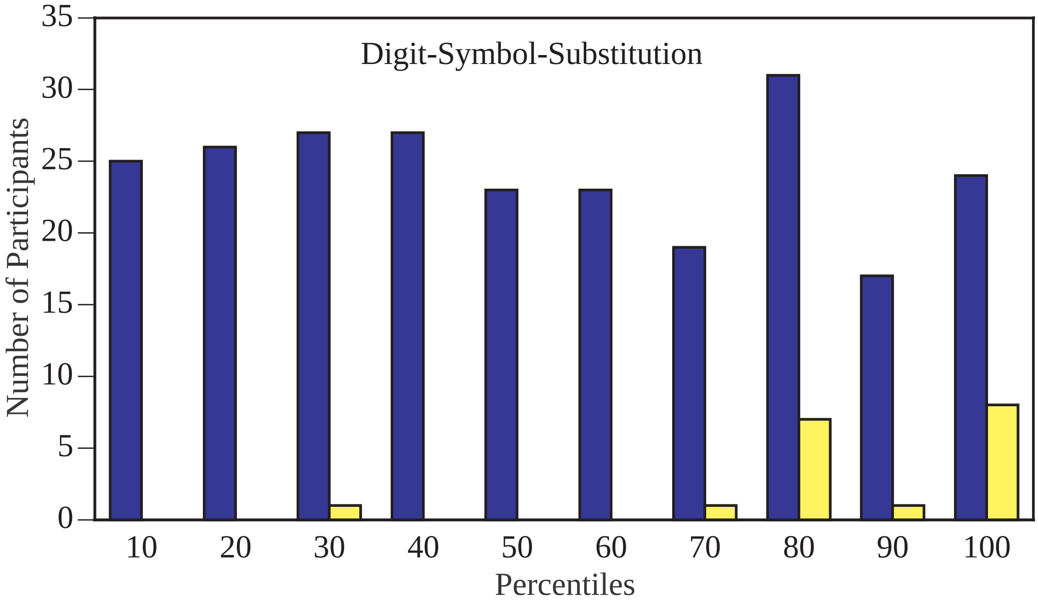

Figure 3. Comparison of the older subsample of the present study with the "young old" participants of BASE: Perceptual-motor speed

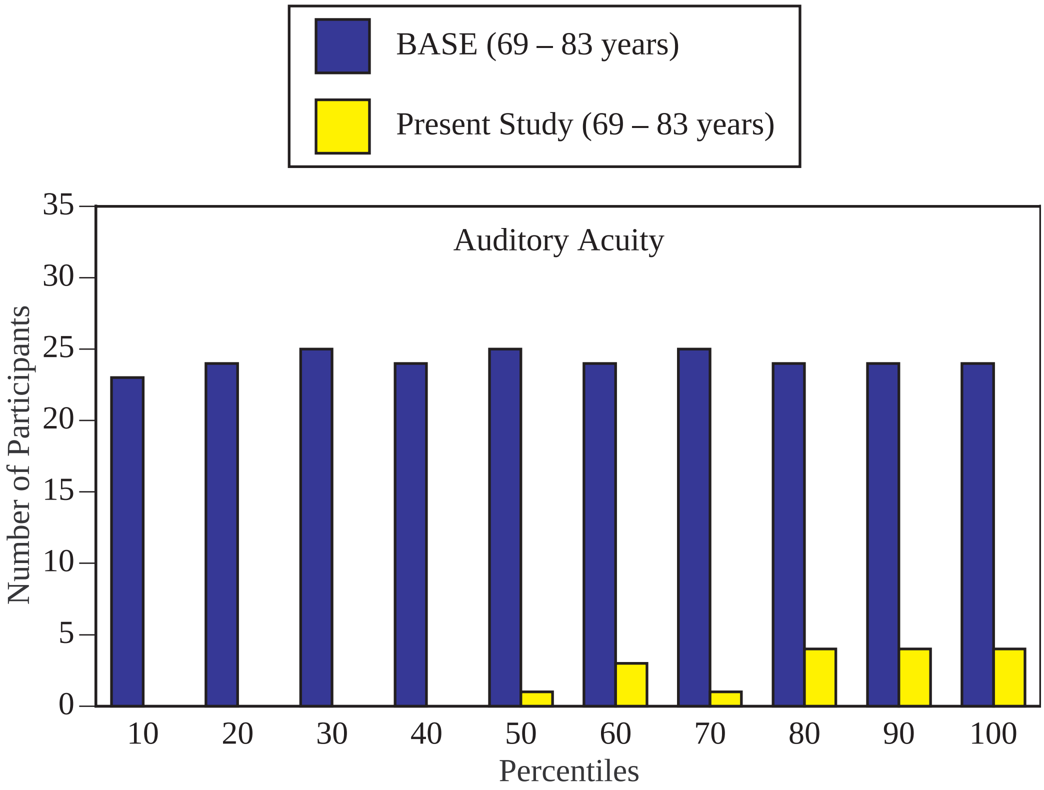

Figure 4. Comparison of the older subsample of the present study with the “young old” participants of BASE: Auditory acuity

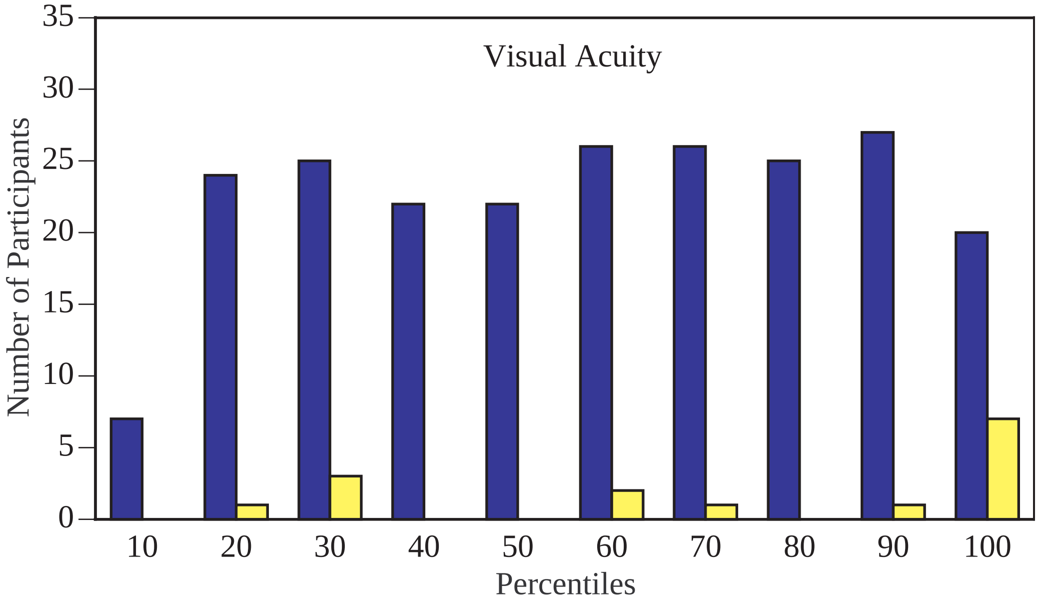

Figure 5. Comparison of the older subsample of the present study with the “young old” participants of BASE: Visual acuity

4.2 Apparatus and Experimental Tasks

4.2.1 Apparatus

The apparatus consisted of a dynamic force platform (60 cm x 40 cm; Kistler force platform 9286AA, Kistler Instrumenten AG, Winterthur, Switzerland) and three computers. The motor-driven force platform tilted up and down sinusoidally in the anterior-posterior plane about a central axis. The platform was mounted in the center of a raised plinth that had safety handrails on each side at waist level (see Figure 6). One of the computers (μ-MUSYCS; m-M-S-Eth-RJ45) quantified the postural sway. The second computer (NEXOS Pentium III, 500 MHz, PC / NT) visualized the position of the center of pressure (COP), that is, provided either an on-line or off-line visual feedback of the balance behavior. The third computer (Power Macintosh 7100/66AV), which had an infrared sound transmitter, allowed the presentation of the auditory stimuli per headphones and response collection.

The postural sway was quantified by collecting the components of the ground reaction force (force X- medial-lateral component, force Y – anterior-posterior component, and force Z – vertical component) and corresponding moment (see Figure 6). The forces and the moments were sampled at a rate of 1000 Hz. To remove any high-frequency artifacts, all signals were filtered with a Butterworth second-order filter (6 Hz cut-off). The COP position, which is a representation of the body's neuromuscular response to movements of the center of gravity (Winter, 1992), within the coordinate system was then calculated using the force platform signals. The distribution of the COP points or the area within which the COP moves, reflects the amount of shifts in the forces applied on the platform by the body in its effort to maintain its upright stance. The better individuals have their equilibrium under control during and after each platform perturbation, the smaller the area of the COP movement they produce. The rationale for using the area measure to quantify sway was that it represents the portion of the base of support utilized during platform perturbations. The area of the COP movement may be treated thus as a measure that provides a rather accurate value about the control of body's center of pressure. Figure 7 provides examples of a large and a small area of the COP movement.

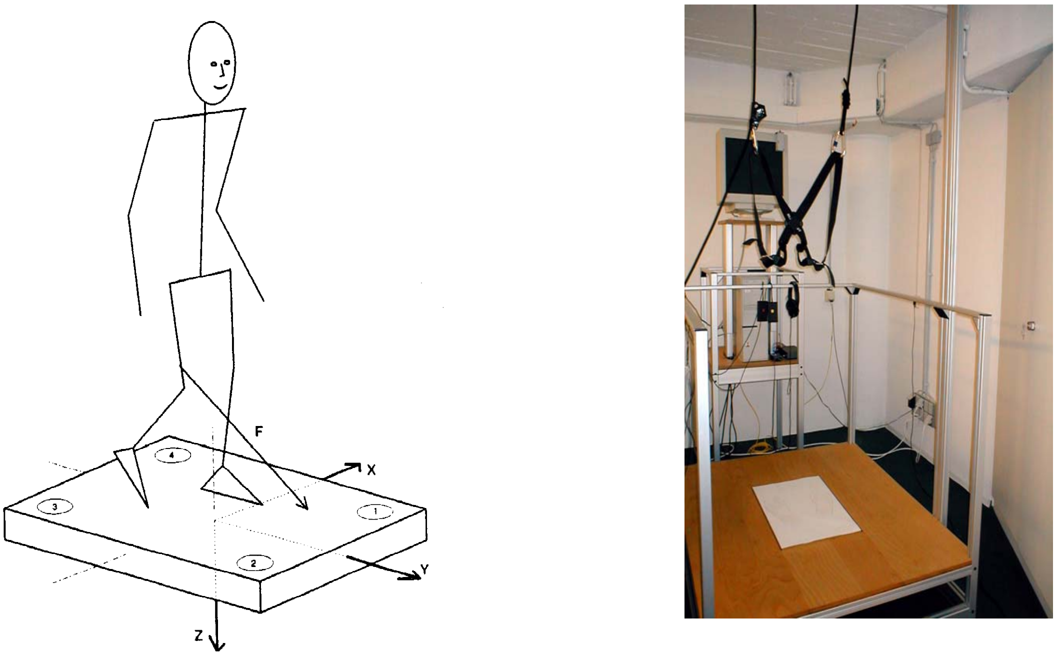

Figure 6. Schematic diagram of the components of the ground reaction force (left panel) and the experimental apparatus (right panel) showing the motor-driven force platform in the center of a raised plinth

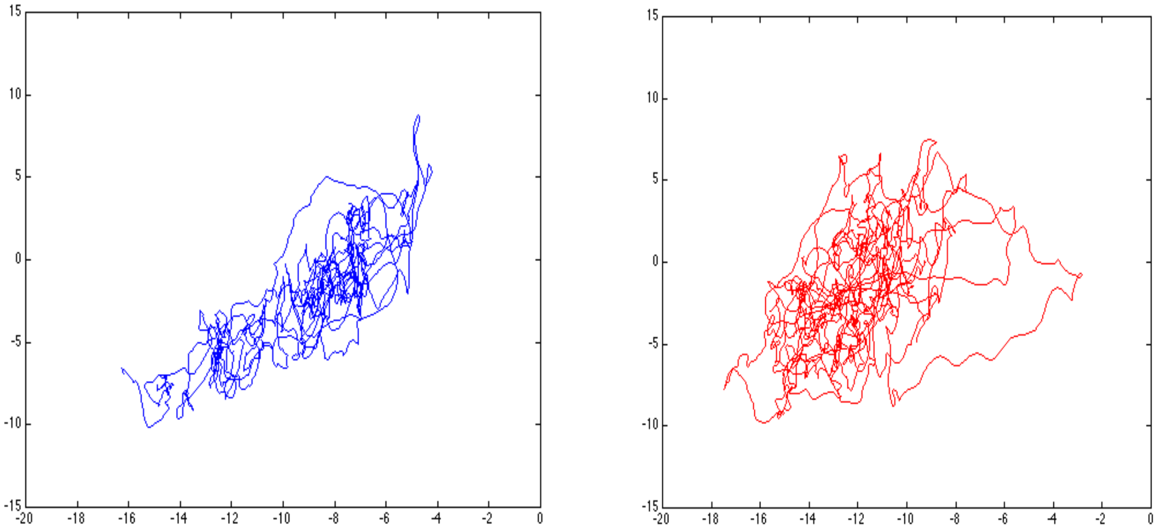

Figure 7. An example of a small (left panel) and a large (right panel) area of the COP movement

4.2.2 Experimental Tasks

4.2.2.1 Balance Task

The balance task involved standing upright on the balance platform and stabilizing the body's equilibrium as quickly as possible after each platform tilt. The adults were asked to put on sneakers for the testing. While standing on the platform with arms at their side, participants found the most comfortable posture, looked straight ahead focusing the gaze on the computer screen that was individually adjusted to eye level at approximately 1m distance. The position of the feet was marked on the platform during each participant's first trial and reused thereafter through the experiment. The participants were instructed to keep the area of COP as small as possible. To prevent falling or injuries, the individuals wore a safety harness.

To minimize anticipation effects, six unpredictable platform perturbations of three different degrees (i.e., 3°, 4°, 5° for the easy condition and 7°, 8°, 9° for the difficult condition) were intermixed at random and included in a serial order in one experimental trial. Based on pilot data, I picked the perturbations' frequency (0.2 Hz) and duration (5 s) so that all older adults could complete the tests without requiring support, making a compensatory step in order not to fall, or moving their arms. Participants had a 5-s preparatory interval at the beginning of each trial to reach steady-state sway and 3 – 5 seconds of stabilization time after each perturbation. Balance behavior before, during, and after perturbations was measured on line and displayed on the monitor in terms of the area of the COP movement at the end of the trial. Evaluating the feedback of the balance task performance, the experimenter motivated the study participants to maintain equilibrium as well as they could during both the perturbation and the stabilization phases. The area was the dependent variable in the analyses of the balance performance. A larger area indicated poorer postural stability (for examples of small and large area of the COP movement, see Figure 7).

4.2.2.2 Reaction-Time (RT) Task

The RT task required the study participants to react manually in response to the acoustically presented stimuli that they heard through the headphones. Participants stood on the stable platform, held the button boxes in their hands, and pressed the buttons with their thumbs. As the RT task was a serial task, one trial was always composed of several intermittent decisions. Beginning of each trial was signaled by a 200-ms warning tone, followed by a 1s preparatory interval, after which 60 stimuli were presented within one 60-s trial. In the easy condition, the simple reaction-time task (SRT) was performed. As a manipulation of task difficulty the two-choice reaction-time task (CRT) was included.

The simple reaction-time task involved a single stimulus (either a low- or a high-pitched tone). The assignment of tones was counterbalanced across participants. The stimulus onset asynchrony (SOA; the time between the onsets of the two stimuli) varied between 600 ms, 900 ms, and 1200 ms and occurred equally often in a fixed random order. Participants were told to press two buttons with both hands as quickly and as accurately as possible. The reaction time was the duration between the start of the tone until the participants' first reaction in terms of pressing any of the two buttons. A 100-ms interval occurred after each reaction. RTs under 100 ms were considered premature and counted as errors.

In the two-choice reaction-time task, the participants' task was to identify computer-generated tones as either low- or high-pitched tones and to react by pressing either the left or the right button depending on the stimulus pitch. The SOA of 900 ms was played in a random order and occurred with the same frequency. Participants were told to press the appropriate button as quickly and as accurately as possible. A 100-ms interval occurred after each reaction. The assignment of hands to tones was counterbalanced across participants. Two types of errors were defined for the CRT task: false-response and time-out errors. False-response errors meant that participants reacted in time, but pressed the wrong button. A time-out error was counted if participants pressed buttons outside the tone duration or did not react at all.

At the end of each trial of the RT tasks, participants received feedback (number of incorrect responses, mean of their reaction times, and standard deviations). The experimenter made sure that participants were paying attention to both speed and accuracy information when evaluating the feedback on the reaction-time task, and, if necessary, reminded participants to optimize both.

Both experimental tasks were performed separately (single-task condition) and concurrently (dual-task condition).

4.2.2.3 Single- and Dual-Task Condition

Under the single-task condition, the instruction to concentrate attention exclusively on the experimental task was repeatedly emphasized before each trial. The single-task condition comprised 9 trials for the RT tasks and 7 trials for the balance task and was referred to as baseline for the performance under the dual-task condition. In order to accurately assess age-group differences in the baseline performance and to consider for effects of dual-task experience, single-task performance was examined before and after dual-task trials.

In the dual-task condition, the study participants stood on the balance platform that produced unpredictable perturbations and tried to keep the area of COP as small as possible while reacting quickly and accurately to acoustic stimuli (see Figure 8).

Figure 8. The experimental setup showing an older adult performing a dual task: The person listens to the acoustically presented stimuli and presses buttons while keeping balance on the movable force platform

The dual-task performance was measured under the task-priority instructions that were presented in a counterbalanced order within each session and were referred to as "Focus on Balance", "Focus on RT", and "Equal Emphasis". Participants were instructed to perform both tasks simultaneously, but to emphasize one task over the other in two of those conditions. The instruction to concentrate attention mostly on one of the tasks according to the respective emphasis condition was repeatedly stated before each trial. The experimenter made sure that participants were paying attention to the task under emphasis when evaluating the feedback, and, if necessary, reminded participants to try to focus their attention according to instruction. The dual-task condition consisted of one block per instruction. Each block comprised two trials.

4.3 Design

The study consisted of two main parts: practice and test (see Table 6 for the design of the study). To familiarize the participants with experimental tasks, the first four sessions provided extensive practice at each experimental task (i.e., easy and difficult) under single- and dual-task condition. Moreover, both the practice and the test sessions began with practice trials. Typically older adults are more disadvantaged when learning novel tasks (e.g., McDowd, Vercruyssen, & Birren, 1991; Nesselroade & Labouvie, 1985). For this reason, tasks were administered in an ascending order of difficulty and the component tasks of two difficulty levels were measured in different sessions[11].

All participants were tested individually during 8 sessions. The dual-task performance under three task-priority instructions (i.e., "Focus on Balance", "Focus on RT", and "Equal Emphasis") was assessed in Sessions 2, 4, 5, and 6. The research hypotheses were tested based on the data collected in the test sessions (i.e., Session 5 and 6).

Table 6. *Design of the Study*

Study phase							
Practice (Session 1 – 4)				Test (Session 5 – 8)			
Easy condition SRT & Balance (3°, 4°, 5°)		Difficult condition CRT & Balance (7°, 8°, 9°)		Easy condition SRT & Balance (3°, 4°, 5°)		Difficult condition CRT & Balance (7°, 8°, 9°)	
1st Session	2nd Session	3rd Session	4th Session	5th Session	7th Session	6th Session	8th Session
- ST	- ST - DT	- ST	- ST - DT	- ST - DT	- ST	- ST - DT	- ST

Note. SRT = simple reaction-time task; CRT = two-choice reaction-time task; Balance (3°, 4°, 5°) = easy balance task; Balance (7°, 8°, 9°) = difficult balance task; ST = single-task condition; DT = dual-task condition. In the dual-task condition, performance was measured under 3 instructions: "Focus on Balance", "Focus on RT", and "Equal Emphasis". In the first and the second sessions, demographic information was collected, and cognitive- and health-status measures were taken. In the eighth session, life-management strategies were assessed.

---

[11] The analyses of training effects revealed no significant Age Group x Training interactions. The ordering of difficulty conditions was justified.

4.4 Procedure

In order to ensure that particularly older adults did not experience the sessions in which the experimental testing took place as novel, the structure of the practice and test sessions was similar. The sessions always began with several practice trials of the balance task: three blocks of 15-s trials, which comprised one perturbation. The first trial was performed in on-line feedback mode. The on-line mode means that the COP movement was continuously shown on the PC screen while participants were performing the balance task. The off-line feedback means that the area of the COP movement appeared on the screen after the balance task had been accomplished. The practice trials always had the same structure (i.e., 5 s stance on a stable platform, 5 s perturbation, and 5 s stabilization) and varied only in angle degrees of the platform perturbations that were presented in ascending order. In the easy condition, the single perturbations were of 3, 4, and 5 degrees. In the difficult condition, they were of 7, 8, and 9 degrees. This protocol ensured that in particular older adults would not be exposed to balance disturbance without being accustomed to the task demands. The performance on these trials was always collected but not considered for analyses. For the reaction-time task, one 30-s practice trial was included in each session. The balance task and the reaction-time task had different numbers of practice trials because preliminary testing showed that performance on the RT tasks stabilized faster. Moreover, repeated practice of the CRT in particular was exhausting, so that the study participants lacked motivation during the test trials. After the practice trials, the performance under the single- and dual-task conditions was measured[12]. Feedback for all tasks was provided and evaluated after each trial.

To encourage the participants' adherence to the task-priorities instructions, the self-estimate of the ability to follow the experimental instructions was assessed at the end of each dual-task session. It is possible to assume that generally older adults perform worse than their younger counterparts in the difficult condition because they perceive difficult tasks as extremely demanding. To check for this possibility, the self-report on the individually perceived difficulty of the experimental tasks was assessed at the end of the study. The experimental procedures adopted in the present study were approved by the local research ethics board.

[12] In order to investigate whether the pattern of results is task specific or stable independent of the type of the cognitive task, three trials of a monitoring-task were included at the end of each session. Analyses of these data are beyond the scope of this thesis.