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When asked which memory skill they wanted to improve most, 61% of older adults mentioned learning and remembering of names among their top four choices (Leirer, Morrow, Sheikh, & Pariante, 1990). Such a high agreement does not come as a surprise because we all at one point or another had the opportunity to suffer through a potentially highly embarrassing encounter with a person who treated us with outmost familiarity but about who we had not the faintest clue. If we were lucky we recognized the face and only missed her or his name... It appears that these situations are difficult to prepare for - quite unlike the situation in the worn out story about the grocery store where assembling a shopping list ahead of time quite effectively takes care of potential memory problems in the store.   Moreover, not remembering the face or the name of a person is a communication failure of very high personal relevance. If face and name memory can be improved effectively, or if at least we have better understanding of the boundary conditions under which this were possible, we may take care of at least one very salient aspect of older adults' communication problems.

There is much evidence that in principle healthy older adults are able to acquire new cognitive and in particular mnemonic skills (for a recent review see Camp, 1998, Verhaeghen, Marcoen, & Goossens, & 1992). For example, Kliegl, Smith and Baltes (1989) trained young and old adults in the method of loci for the recall of word lists. Shortly after instruction in the mnemonic both age groups exhibited a noticeable improvement of their performance. Indeed old adults scored higher than untrained young adults - a result of considerable practical importance because this is about the level most old adults wish to achieve in a training program. Mnemonic training also led to a clear

separation of age groups (Baltes & Kliegl, 1992): Only one young and one old adult scored in the range of the other age group, respectively. This is also important because training programs should keep expectations about maximum levels of performance in a reasonable range; presumably age-related limits of brain biology will most likely not allow old adults to compete with young adults for the highest score in such tasks. Moreover, cognitive skills are quite stable over extended periods of time. After a similar mnemonic training, Stigsdotter Neely and Bäckman (1993) reported maintenance of memory skill for recall of concrete nouns and displayed objects in a 3-year follow-up.

So far this is good news. Surprisingly, despite the high practical relevance of face-name memory there has been hardly any training research on this topic. Moreover, as far as we know, there is no evidence that face-name interventions that worked in the laboratory were actually put to use in everyday life. Thus, the long-term goals of our research program are (1) to develop an effective face-name memory training program that (2) effectively eliminates a potentially highly embarrassing communication disorder in older adults in everyday life.

The chapter is structured in five sections. First we present the background for our research: a review of face-name memory training research, a few highlights of unsuccessful and successful transfer of mnemonic skill from lab to life, and our cognitive engineering approach for skill acquisition. Then we summarize results from three experiments in which we had young and old adults acquire a skill in face memory. To foreshadow the results, our success ranged from complete failure in the beginning to modest success at the end. The final section outlines how this program, in particular the third experiment, will be continued to achieve our long-term goals.

Research Background

Face-name memory training

Face-name training modules are invariably part of any memory course, book or audio book about how to improve ones memory (e.g., Lorayne, 1988). Typically, participants/readers are told to form vivid mental images or associations between visually salient features of the face and the name. Such images are easier to construct if both name and facial feature can be related to a concrete object (Morris, Jones, & Hampson, 1978). Therefore, it is not too difficult to remember a person named "Hawk" bearing a nose in classic Roman style. A person named "Crake", however, does not afford such a simple image. In this case a recoding of the name into a phonologically similar one, like "crack", could be used. Perhaps a tiny gap between the front teeth lends itself for the construction of a durable memory trace. Obviously, the second case is much more difficult and requires considerable creativity or specialized knowledge. Novices most likely are overwhelmed by the dual-task of conducting a conversation and coming up with memorable links of this kind but, as has been shown for many cognitive skills, one should not discount practice. Moreover, an expert is likely to deploy many more than only one such device to secure multiple encodings of a new face and name.

There has been little research on training of face-name memory strategies. McCarty (1980) found improvements for young adults with instruction in visual imagery mnemonic as outlined above. Facial features to be used in the visual image were provided by the experimenter. Similarly, Yesavage, Rose, and Bower (1983) reported training benefits for old adults after 4 training sessions. They also found that self-genereated cues for visual images led to similar levels of recall as those provided by the

experimenter. In the most effective training group participants improved from 2 to 6 face-name pairs out of 12. In a later study with only two sessions young, middle-aged, and elderly adults differed in baseline scores but showed the same amount of benefit from training (Yesavage and Rose, 1984). In this study mnemonic cues were provided by the experimenter. Moreover, this skill was maintained over a 6-month period (Sheikh, Hill, and Yesavage, 1986). Note, however, that the task trained in the studies by Yesavage and colleagues was carried out under comparatively easy conditions: there was hardly a time pressure during encoding (i.e., 1 minute study time per pair). Also in the age-comparative study old adults with a mean age of only 61.4 years doubled their recall from pretest to posttest but that meant they improved from recalling 1.4 to 2.8 out of 12 face-name pairs. Obviously, even with generous encoding times a larger number of training sessions is required to achieve a noticeable training gain.

From lab to life

Camp (1998) described three phases of memory intervention research. The first phase mostly built on laboratory paradigms, most notably recall of word lists. Accordingly, research questions reflected primarily narrow theoretical issues of memory researchers and less the practical needs of participating older adults. In the second phase, the effectiveness of training programs moved into the focus leading to proposals of combinatorial and multifactorial interventions. For example, Stigsdotter Neely and Bäckman (1995) combined standard mnemonic instruction with tasks highlighting the relevance of attention in remembering and with relaxation exercises. Oswald and Rödel's (1998) memory training focused on practice of specific cognitive functions as well as training of mnemonics oriented towards everyday needs. The program includes training

of perceptual speed in addition to that of specific memory functions, mnemonic techniques (e.g., method of loci), and provided knowledge about memory and their age-related trends. The role of meta-cognitive aspects of memory performance has been a major focus in general. In a meta-analyses of 27 studies Floyd and Scogin (1997) examined the impact of participation in a memory training program on a subjective rating of its usefulness. Results suggested a change of memory-related believes in older adults. Finally, memory interventions also took a "broad look" at the problems. Consequently, interventions focused not only on internal mnemonic devices but instructed people in the use of external devices (e.g., notes, calendars) if this was the most effective solution for a specific memory problem (e.g., keeping appointments).

The third phase of intervention research addresses the issue that skills acquired in the laboratory were rarely put to use in everyday life (see Camp, 1998, for a review). The low impact of such memory training was probably due to the laboratory character of the tasks. There are now quite a few examples of successful transfer to real-life issues. For example, Leirer, Morrow, Pariante, and Sheikh (1988) reported that recall failure led to medication nonadherence levels of 31% in alert older adults and that simple mnemonic designs can improve this situation. Park and Jones (1997) reported similar positive results with devices such as 7-day organizers including time of day and other external aids. Finally, the chapters by Czaja and Rogers in the present volume provide good examples that cognitive training can indeed reliable change everyday behavior.

In summary, past research documented reliable positive results for objective and subjective evaluations of memory training programs with old adults. Old adults can learn and use the instructed strategies in the laboratory. Also behavioral strategies that reduce

or externalize the memory load appear to be effective. Whether these training programs can reduce memory problems in everyday life is still an open question. Our hypothesis is that with respect to face-name memory this will only be the case for persons who achieve an expertise-like level of performance.

Cognitive engineering

Memory for faces and names is the top-rated complaint about age-related cognitive changes. Moreover, as the above review showed, this memory problem appears to be quite resistant against training interventions, especially as far as it concerns their impact on everyday behavior. To prove our case we plan to cognitively engineer a face-name memory skill in the laboratory following the principles implemented in a training program for the acquisition of skilled digit memory (Kliegl & Baltes, 1987). We distinguish the following three components to illustrate this difference: skill assembly, deliberate practice, and tailored learning.

Skill assembly. The core idea of traditional skill acquisition was to change the representation of knowledge and practice specific subcomponents of the task to achieve a high level of automaticity in behavioral routines readily available in normal persons. In cognitive engineering this is only the second step. Using expert behavior both as a model and a goal for the training program, the first step is to build up new knowledge and implement new procedures that effectively circumvent normal processing limitations associated with working memory which hold for normal persons and experts alike (Kliegl & Baltes, 1987). Thus, expertise is not normal behavior executed more efficiently but based on a qualitatively different organization of behavior. The idea of circumventing general constraints is quite consistent with the observation that expertise is not a function

of general intelligence. It is also compatible with limited transfer to tasks outside the specific expertise; that is, experts usually surpass normal persons only in a a narrowly defined domain (Ericsson, 1996; Proctor & Dutta, 1995).

Deliberate practice. The final component of the training program is deliberate practice. In this context Ericsson, Krampe and Tesch-Römer (1993; see also Charness, Krampe, & Mayr, 1996; Krampe & Ericsson, 1996) distinguish between effort, intensity and motivation. Effort; described with global measures such amount of practice (e.g., hours), is not sufficient but must be coupled with intensity. "Exercising" a skill at a moderate level does not lead to the desired improvement. Rather detailed feedback, ideally by a master coach in one-on-one instructional settings, must be available to uncover weaknesses in the performance and to develop appropriate strategies for their compensation.

Tailored learning. Tailored learning implements our conceptualization of keeping a high-level of motivation to reduce chances of the permanent problem of expertise acquisition: *burn-out*.. Burn-Out can result from exaggerated training as well as from setting unrealistic goals as well as from inadequate social comparisons. Long-term expertise acquisition requires control of demand and performance levels by the individual or a trainer. Acquisition of a real-life expertise is a typically a process spanning many years of devoted practice and execution of the skill. Acquisition of an expertise in a laboratory setting can optimize practice in some ways. For example, we can provide training software that keeps task difficulty at an intermediate level to avoid boring as well as frustrating learning situations. We can develop a large variety of training programs tailored to the individual needs.

To sum up, we propose that an expertise-acquisition approach to face-name memory will provide conclusive evidence that the top ranking cognitive complaint of healthy old adults can be fixed for their everyday life. We used a typical practice schedule with tailored learning in each of the three experiments to be reported below. In addition, in Experiment 3 we provided very detailed instruction in task-specific knowledge and practice in bringing this expert knowledge to bear in the memory task. (For information about procedural details see Kliegl, Krampe, Philipp, & Luckner, 1999)

Experiment 1: Transfer of a Mnemonic Skill to Face Name Memory

The first experiment of face-name memory was a follow-up study with participants of the age-comparative memory training program reported in Baltes and Kliegl (1992; Kliegl, et al., 1989). Regression analyses confirmed that participants used different mechanisms before and after instruction in the method-of-loci mnemonic (Kliegl, 1995; Kliegl, Smith, & Baltes, 1990). In this study, participants had overlearned a mental walk past 30 Berlin landmarks. Participants encoded the concrete nouns to be remembered in the order of presentation at these landmarks by forming vivid visual images combining the landmark and the noun. At recall, activation of a landmark leads to the recall of the current image from which the current noun can be retrieved. Obviously, the imagery component is critical and received much practice. Therefore, we expected that the mnemonic skill would transfer to a new face-name memory task because training programs invariably emphasize the relevance of visual imagery for linking a person's face and name. In addition, we recruited new samples of old and young adults without prior mnemonic expertise for the face-name memory training.

Fifteen young (24.0 years; range: 19 to 29 years) and 16 older adults (71.3 years; range: 65 to 80 years) from the Baltes and Kliegl (1992) study participated in 6 sessions of face-name memory training. For further details see Kliegl et al. (1989). In addition, 20 young ($M = 24.1$ years, range: 21 to 28 years) and 19 older adults ($M = 73.9$ years, range: 65 to 81 years) without prior mnemonic experience were recruited as a control group for the memory experts.

Experts were instructed to use their mnemonic skill in the face-name memory task which used line-drawings of faces scanned from Berlin newspapers and names sampled from the telephone directory. Similarly, all novice participants were given an instruction about imagery techniques and how these could be used to remember faces and names prior to any test. Following these instructions all of the expert and half of the novice participants were given four sessions of mnemonic practice; the other half of the novice group performed an unrelated mouse click training. At pretest and posttest (sessions 1 and 6) six lists with ten face-name pairs each were presented for cued recall (lists 1 to 3) and in a forced-choice format (list 4 to 6). Face-name pairs were presented for 15 s, 10 s, and 5 s in this order within each test format.

Results of Experiment 1 are in line with previous research. First, young adults profit more from mnemonic instruction and training in face-name memory than older adults (see left panel of Figure 1). This has also been reported for metaanalyses of training studies (Verhaeghen et al., 1992). In the present study, this was true only for the novices in the present experiment; the interaction was not significant for young and old adults who had participated in the Baltes and Kliegl (1992) study. Note, however, that the interaction between age, expertise, and pretest/posttest was not reliable in the comparison

across experiments.   So we can not conclude strongly that prior memory training eliminated the age-differential effect in face-name skill acquisition.

- Insert Figure 1 about here -

Second, the across-experiment comparison did not reveal any immediate transfer of mnemonic skill for word lists to the pretest in the face-name memory task (see pretest scores in right panel of Figure 2) . This was the case despite the fact that all participants had been told to use visual imagery to encode names and facial features by means of visual imagery. This result can be construed as evidence for the well-documented limits of transfer of cognitive skills (e.g., Proctor & Dutta, 1995).

The third result suggests that while transfer effects were not immediate, they did show up eventually (see posttest scores in right panel of Figure 2). Prior expertise in memory for word lists led to larger training gains in the subsequent face-name memory task compared to control groups. Thus, some practice with the face-name memory task was needed to adapt the available skill-relevant knowledge to the new situation. Four hours of practice does not seem like much of an investment to achieve transfer to a new situation. Previous skill research may have underestimated the transfer potential by not providing enough time for similar adjustments.

Finally, if we limit the analysis to novices, old adults without prior mnemonic skill did not improve across four sessions of practice in cued face-name memory. Note, however, that our participants had been instructed in the imagery technique *prior* to the pretest whereas in previous research such instruction typically takes place *after* the pretest. Even with prior instruction, pretest performance was rather low and even for experts in the mnemonic skill four sessions of practice resulted in a gain of only one more

face-name pair recalled correctly. Obviously, the face-name memory task was very difficult and it is unclear whether the difficulty of the task resides primarily in encoding the faces, in encoding the names or in the combination of integrating these two pieces of information. Experiment 2 was a first attempt to localize the source of the difficulty.

Experiment 2: Face Place Memory Training

Names vary widely in the ease with which they can be used in interactive imagery. There are names that are identical to concrete nouns (e.g., canon), professions (e.g., baker) or colors names; typical mnemonics should work fine for them. Most names, however, are not of this sort and recodings are required. In the present experiment we bypassed this difficulty by changing the task to a face-place memory task, that is participants had to remember at which place (e.g., bridge, theater) a specific face had been presented. We know from method-of-loci studies that even a limited set of places works very well for encoding and recall of concrete nouns. If there are still no practice gains, a special problem with encoding faces would be indicated.

We also changed the face stimuli. Instead of line drawings of real people we used faces generated with a computer program (Mac-a-Mug) from a limited set of features (hair, eyes, nose, etc.) and variants of these features. Overall the similarity of the faces used in the present experiment was much higher than that in Experiment 1 and this increased task difficulty.

Finally, we also changed the format of the practice sessions. In Experiment 1 we adjusted presentation time but participants received only four practice lists with 15 face-name pairs in each session. Consequently, there were only three adaptations of time per session. In the present experiment we adapted the difficulty of the training list by

changing the number of faces to be remembered. With a criterion of perfect recall for an increase in list length we could administer 20 lists per session.

Eight young (*M* = 24.5 years, range: 20 to 28 years) and 8 older adults (*M* =73.8 years, range: 69 to 79 years) participated in 11 sessions. At pretest and posttest we assessed word-place memory and face-place memory with 4 lists of 15 pairs each; two of the lists were presented with 4 s per item and 2 lists with 2 s per item. After pretest, participants received imagery instructions and a demonstration of the task on the computer. In each of the following nine practice sessions participants memorized 25 lists of face-place pairs. All participants started with a list of 3 items. Subsequently, list length (i.e., the number of face-place pairs) depended on performance in the last list. The list length was increased by 1 to a maximum of 15 after a perfect recall of a list and decreased by 1 to a minimum of 2 items otherwise.

Results are shown in Figure 2. Young adults scored higher in the face-place task than older adults and this age difference increased from pretest to posttest. Performance was higher for the 4-s presentation rate for both age groups but training and presentation rate interacted only for young adults who improved more in the 4 s-condition. Most importantly, for old adults there was no change in performance from pretest to posttest; there was actually a slight trend towards worse performance at posttest!

- Insert Figure 2 about here -

The main result for the present context was the failure to engineer a new cognitive skill in a positively select sample of older adults. Data from practice sessions showed the same pattern. There can be many reasons for failures of training programs. If indeed it is

not possible for old adults to acquire a cognitive skill for face-place memory, the result needed at least a replication in the context of a modified training program.

Experiment 3: Five Case Studies in Face Memory Skill Acquisition

In Experiment 3 we followed up the null result of Experiment 2 with the following modifications. We worked with a small sample of only five older participants to allocate a maximum of individual coaching. These participants had exhibited high motivation and performance in previous experiments in our lab (i.e., three of them acutally scored above the mean of young adults in the digit symbol substitution test). They were also informed about our previous failures of training old adults in this task (i.e., Experiments 1 and 2) which led them to accept this study as especially challenging. Their mean age was 72 years (range: 69 to 77 years). The experiment comprised 19 sessions.

In the first five sessions we replicated the training regime of Experiment 2. Then we implemented two new interventions to establish the type of expert knowledge we hypothesized to be critical for overcoming normal performance limitations.   First participants learned to recode the facial features of our experimental material into task-specific knowledge.   That is, rather than having participants come up with creative recodings of faces "on-line" as is implied by standard mnemonic instructions, we had them acquire a large amount of task-specific knowledge "off-line" at home and in the lab. To this end we prepared a complete set of cards with examples for each of the five facial features (i.e., 14 variants of eyes, 13 noses, 13 mouths, 13 chins, 2 x 13 and hair styles) used in the construction of the experimental material. The effect of this intervention was assessed in the first posttest in session 11.

As a second intervention, we changed the type of practice such that participants could work effectively on the weak spots of their expert knowledge. In each of these sessions participants were presented 2 or 3 lists with 15 items until they perfectly recalled the list. Presentation time was self-paced up to a maximum of 15 s for a given pair. Thus, within this 15-s limit per item, participants could selectively allocate study time to those face-place pairs which they failed to recall. Obviously, by repeating the same list participants noticed problematic features and could adjust their task-specific knowledge accordingly. Such a training procedures is clearly much more in the general spirit of coaching someone in the context of skill acquisition.

The experiment comprised 19 sessions. At pretest and in the two posttests two lists face-place lists were presented at 8 s and two lists at 4 s per face-place pair; the presentation time manipulation had no reliable effect. As shown in Figure 3, there was also no reliable improvement from pretest to the first posttest - indeed, as in the previous experiment there was a tendency in the opposite direction. Thus, we replicated the results of Experiment 2 with an even more select group of older adults. Moreover, task-specific knowledge acquired in independent studies was not sufficient to improve on the face-place memory task.

- Insert Figure 3 about here -

Performance at posttest 2 was, however, reliably better than at previous assessments. After participants had optimized their knowledge by practicing with the same list until a complete recall of the list was possible, they showed a better recall of face-place pairs. Importantly, this improvement was reliable for each of the five participants in individual time-series analyses of the data collected in practice sessions. In these sessions list length

was increased by one face-place pair after correct recall of a list and decreased by one otherwise. As in previous experiments, there was no transfer to a related task in which participants were shown pairs of female and male pairs using the material of Experiment 1. At recall they were shown one of the faces and had to select the partner face among four alternatives. Obviously, performance gain in the face-place task was related to the specific knowledge that had been acquired for this type of experimental material.

Discussion

Face-name and face-place memory proved surprisingly resistant to practice-related improvement in old adults. This conclusion holds despite some expertise-related transfer in the first experiment and the eventual success in the third experiment. These results are in contrast to many other cognitive tasks (such as memory for word lists or psychometric intelligence tasks) for which improvements in the order of 0.5 to 1 standard deviations have been reported with a few hours of instruction. The limit of about four items in face-place span across many lists in the practice sessions (i.e., 225 lists in Experiment 2, 120 list in Experiment 3) in the absence of the opportunity to selectively optimize task-relevant knowledge is similar to results reported for training of the digit-span task. As in the case of the digit-span task, individual refinement of this knowledge allowed participants to overcome the four-item limit in the face-span task (Ericsson, 1985). These results bear on theoretical notions of skill acquisition theory. They also set up constraints for improving everyday face-name memory.

Theoretical Issues

Skill-acquisition theory/deliberate practice

The results of the series of experiment is in support of a number of tenets of skill-acquisition theory, focusing the role of deliberate practice (Ericsson et al., 1993; Charness et al., 1996; Krampe & Ericsson, 1996). One of tenet of skill-acquisition theory is that expertise is not just an enhancement of processes used by all people but is based on special knowledge and procedures that allow the circumvention of common processing limitations. Thus, in contrast with normal behavior, expert performance is based on a qualitatively different organization of cognitive performance. This transition, tied to the build-up of special knowledge, was evident in the participants of Experiment 3, even if changes were not very dramatic overall.

A second tenet of skill-acquisition theory is that expertise-like levels of performance require a highly individualized training with systematic elimination of weaknesses, attention to detail, and optimal feedback. The amount of such deliberate practice is the prime signature professional expertise in arts and sports and is the most important predictor of maximum levels of performance achieved (Ericsson, et al. 1993). The relevance of this distinction between "general practice" and "deliberate practice" is probably best captured in the absence of improvement in the face-place span task until features of this proposal were implemented in the final intervention.

Finally, acquisition of an expertise requires a strong motivational commitment to sustain the stretches of sometimes boring and strenuous practice. For this reason, and after the "failures" of the first two experiments, we decided to focus on select individual cases. We explicitly informed them about our previous failures with training this task

and presented the problem as a challenge to them. We also told them about their high cognitive status relative to their same-age peers and that, if not them, we were not sure that any old adult would succeed. Participants accepted the challenge of the task and granted us generous credit for the claim that eventually this might very well benefit their everyday problems in face-name recall.

Skill resilience and development of compensatory strategies

There seemingly exists a paradox in skill research. On the one hand, expertise is characterized by a high degree of domain specificity. In the present research, for example, an improvement in face-place span was limited to facial features of the experimental material. On the other hand, it is a common-sense characteristic of experts that, owing to their large amount of specialized knowledge, they typically handle unforeseen problems much better than novices. In real-world examples, this often appears to be equivalent to a transfer of expertise. One result of the first experiment may indicate the solution of this puzzle: Transferring a word-list mnemonic to face-name memory was not immediate but, with a few sessions of practice, word-list mnemonists significantly outperformed persons without prior memory skill. Thus, for a better understanding of skill transfer we need to allow time and practice for the skill to develop in the transfer domain. As far as we know, these processes are hardly researched at this point in time. Laboratory research and case studies are needed for a better understanding of skill resilience and the development of compensatory strategies (Kliegl & Baltes, 1987).

In experimental analogs of skill acquisition we are clearly in better position to map out the boundary conditions of the expertise by manipulating critical parameters such as

presentation time or memory load. Moreover, we can selectively interfere with critical component processes because in the course of skill acquisition we built the components into the skill. By giving expert a change to adjust to this new situation we experimentally inducing compensatory behaviors which in the end will broaden the domain of the expertise (Kliegl & Baltes, 1987). For example, in a continuation of Experiment 3 we will determine the impact of exchanging the list of places participants have been working with. We would expect a temporary disruption and quick adaptation to this change in the task environment. Exchanging places for names, that is converting the task to a face-name span task, represents a much more dramatic change which most likely will not succeed without additional knowledge build-up (e.g., a dictionary of names with recodings into concrete nouns). We point out that sometimes such testing-*beyond*-limits induces compensatory efforts to maintain expert level functioning because experts are typically very reluctant to accept a limit of their expertise. Solutions are often novel, creative, and unpredictable (for examples from the domain of a word-list mnemonic see Kliegl & Baltes, 1987).

Practical Issues

Face-name memory problems are a genuine everyday problems. Any practical solution will require people to pay close attention to facial features and probably also joint recodings of these facial features and name. Attention to these details needs to be practiced and habitualized. Obviously, the results of our research suggest that more and different measures are required if we want to impact everyday life. In the following we will outline a number of additional components to augment the training program sketched in Experiment 3. If implemented as a package they will highlight the relevance of faces

and names in daily life and perhaps even generate a substantial preoccupation with this aspect of life. Of course, this is to be expected from what we know about experts in other domains.

New training components

 Assessment and monitoring of face-name problem prevalence. There is a need to establish the baselines of face-name retrievals and retrieval failures. We are not aware of any statistics detailing the number of names we routinely retrieve in a given day or week although there were some diary studies recording memory failures (e.g., Cavanaugh, Grady, & Perlmutter, 1983). We know that we sometimes can not recall a name and, as this frequently generates discomfort, the event may be quite salient for some time. Persons interested in doing something about their face-name problem should know their failure statistics and be able to calculate the costs (mostly in terms of practice time) of acquiring a face-name expertise. To this end, we plan to equip participants in our training program with mechanical counters to obtain reliable information about the frequeny of successful name retrievals and name retrieval failures.

 Dictionary of names. The goal of this research project is to develop an effective face-*name* memory skill but even the acquisition of a face-*place* memory skill which we had planned as an intermediate step proved quite strenuous for older adults. Nevertheless the next step must be taken eventually. Face-name memory artists (e.g., Lorayne & Lucas, 1974; Wilding & Valentine, 1985) recommend to compile a dictionary of abstract names with proposals for an effective recoding into a noun that can be imaged (e.g., "Crake" intro "crack"). A large compendium of name recodings serves to speed up the image creating process in a real-time encounter with a new person. The difficulty

associated with recoding of names is evident in the fact that the skill is sometimes restricted to the recall of first names which obviously is much smaller set of items to deal with.

On-line strategies for encoding of new face-name pairs. Face-name mnemonics, as instructed in the present experiments, is but one strategy that may lead to a durable memory trace. Others are (a) the immediate and repeated use of the name in the conversation, (b) pretending that one did not understand the name and force the person to articulate it a second time, (c) asking for the person's calling card and reading the name slowly, and (d) engaging the person in a conversation about the name, for example by asking about possible ethymological roots or about potential relations with another person of that name. The basic idea is that any activity involving the new name will increase the likelihood of a successful retrieval at a later time. An effective management of face-name memory problems must also address the embarrassing situation of a name or face retrieval failure. (Eventually, this should happen only for names that were not encoded according to face-name mnemonic principles!) We want to practice effective excuses (which can range from plain admittance of the failure to creative or humorous statements) and teach the participants to use such situations for an effective encoding or re-encoding of the forgotten name and face.

Off-line strategies. Most importantly, ideally as part of a daily or weekly routine, face-name expert apprentices should reserve time to work on faces and names of new persons they were introduced to lately. This activity involves filing new calling cards (or making new ones if not available) and reviewing the ones in store already. A calling card can be used as a retrieval cue for the person's face. This is also the time to rehearse and

elaborate the associated face-name mnemonics written on the back of the card. Participants of the training study will be asked to keep diaries about these online and off-line activities. They will also be asked to record instances of successful name retrievals which they attribute to the training program and instances of failures of name retrieval despite the training program for which a revision or embellishment of the face-name mnemonic would be required. Obviously, these activities are quite analogous to those of experts in many professional domains, such as for example chess masters who typically work through their matches after a tournament.

Transfer of technology use

Our training programs are tailored to individual levels of proficiency. There is broad agreement that such a training context will be conducive to fast skill acquisition. It also implies that computer technology is used to administer the tasks and to monitor the progress. Indeed, we furnished the apartments of participants of Experiment 3 with computers to increase the amount and intensity of training. And we hope to observe computer literacy as a collateral benefit of computer-assisted tailored learning and deliberate practice, ideally in the spirit of the study reported by Bikson in this volume. One implication is that cognitive skill acquisition (such as a face-name memory expertise) may provide the ideal learning context for joining modern technology and that it will be clearly within reach of healthy older adults. You learn to value modern technology by doing something useful with it.

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Author Note

Figure Captions

Figure 1.   Face-name recall scores for two reliable interactions in the cross-experiment analysis. Left panel: Young adults profit more from practice than old adults. Right panel: Word-list experts and novices differ only at posttest (Experiment 1)

Figure 2. Face-place recall scores for young and old adults at pretest and posttest for two presentation rates. Only young adults show practice-related gains (Experiment 2

Figure 3.   Pretest-posttest scores in recall of face-place and face-pairs for five participants (Experiment 3).