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Priming with Age Stereotypes Influences the Performance of Elderly Workers

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Abstract

Studies have shown that priming with *negative* age stereotypes can degrade the performance of older adults on typical *laboratory* tasks. Here we evaluate whether priming with *positive* age stereotypes can improve performance on an *ecologically valid* task, modelled after the subjects' duties at work. Twenty healthy employees (age: Ø 52.75 years; SD = 9.45) from the receiving department of a wholesale company were primed with the scrambled sentence task. The experimental group (n = 10) was primed with positive age stereotypes such as "wise". In the control group (n = 10) no age stereotypes were presented. Both groups were subsequently tested with a delivery-verification task, in which the contents of a parcel had to be checked against an invoice. The experimental group completed the verification task within 4.31 minutes (SD = 2.22), and the control group within 7.18 minutes (SD = 2.12). The difference was statistically significant ($t(18) = 2.8$; $p < 0.05$). Positive supraliminal priming appears to be a promising technique to enhance the job-related performance of elderly employees.

1. Introduction

As our workforce grows older due to demographic change, it becomes increasingly important to maintain the working efficiency of older employees. Policies and procedures should target not only the age-related decay of biological and psychological functions, but also the impact of societal attitudes towards the elderly. Since people behave in ways that are consistent with prevailing societal stereotypes (Wheeler & Petty, 2001), it stands to reason that elderly persons act in accordance with the largely negative preconceptions about old age (Kite, Stockdale, Whitley, & Johnson, 2005) and thus perform less well than they would otherwise. Experimental evidence

for such a self-fulfilling prophecy comes from studies that induce positive or negative attitudes towards old age by means of priming. In this approach, memory contents are activated by semantic or figurative cues that either are presented at full awareness (explicit priming), are disguised by integration into another task (supraliminal priming), or are flashed so briefly that conscious processing is excluded (subliminal priming); it is yet unknown which of these methods is most effective (Horton, Baker, Pearce, & Deakin, 2008).

Studies using the subliminal method observed improvements following positive age primes and impairments following negative age primes on performance measures as different as cardiovascular function (Levy, Hausdorff, Hencke, & Wei, 2000), handwriting (Levy, 2000), locomotion (Hausdorff, Levy, & Wei, 1999), sensorimotor plasticity (Bock, Grigorova, & Ilieva, 2013), cognition (Hess, Hinson, & Statham, 2004) and the will to live (Levy, Ashman, & Dror, 2000). Other studies used the supraliminal "scrambled sentence task" (Bargh, Chen, & Burrows, 1996): under the pretext of a language proficiency experiment, subjects are instructed to form meaningful sentences from lists of five words, where unbeknownst to them one of the five words represents an age stereotype. This priming method was found to affect subjects' performance on a walking (Bargh et al., 1996), a driving simulator (Branaghan & Gray, 2010), and a memory-recall task (Hess et al., 2004).

In light of these findings, it is tempting to speculate that positive age primes might also improve on-the-job performance of older workers, and thus help society to meet the challenge of an aging workforce. However, it remains to be shown that the effects of priming, previously documented with standardized laboratory tasks, extend to natural behavior such as duties at work. In fact, laboratory and everyday-like conditions can differ dramatically with respect to motor behavior (Bock & Züll, 2013), to age-related motor deficits (Bock & Beurskens, 2010; Bock & Steinberg, 2012), and thus possibly also to effects of priming on those deficits. We therefore decided to design a task that closely mimics delivery verification in a commercial goods receiving department, and to test the effects of priming on the employees of such a department, i.e., on persons who perform similar tasks as part of their daily routine. As a corollary, we wanted to find out whether priming affects not only on the subsequent task performance, but also on the overall appraisal of one's own job competence. To this end, we asked the primed subjects to complete an established occupational self-efficacy scale.

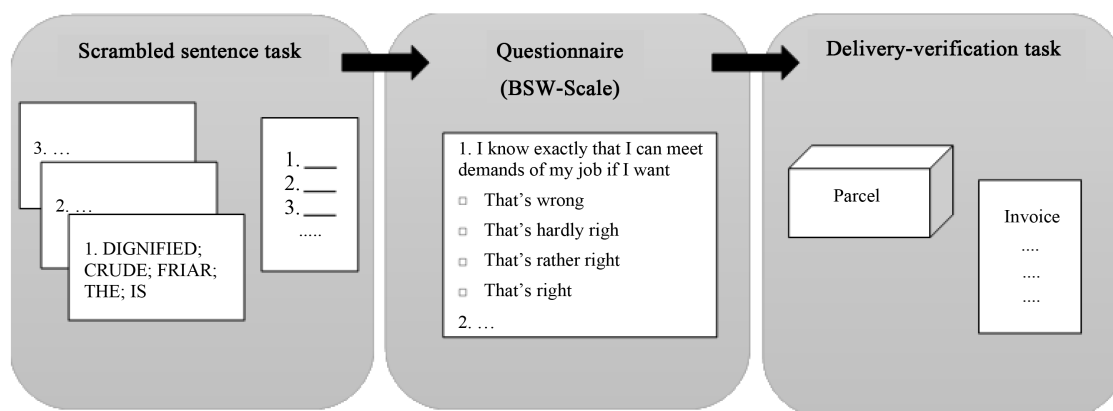## 2. Methods

2.1. Participants

Twenty healthy older employees of a wholesale market (mean 24.11 ± 9.89 years professional experience in the goods receiving department) participated. They were randomly assigned either to a positive (3 men; 7 women, Ø 54.6 years, SD = 6.72) or to a neutral group (2 men; 8 women, Ø 50.9 years, SD = 11.65). All participants were healthy by self-report (questionnaire concerning actual human condition and medication), had normal or corrected to normal vision, gave informed consent, and were fluent in reading and speaking the German language. The study was approved by the Ethics Committee of the German Sport University.

2.2. Task Design and Materials

Experimental procedures consisted of three steps, as illustrated in **Figure 1**. Testing took place directly at the participants' workplace.

In the first step, the scrambled sentence task was administered as described by Bargh et al. (1996). Twenty sets of five words each were printed on paper cards with Arial 20 font. The cards were sequentially presented, and subjects were asked to form a meaningful sentence with four words from each card, without modifying any word. For example, a card with the words "DIGNIFIED; Crude; Friar; The; Is" could be used to create the sentence "THE FRIAR IS DIGNIFIED". Subjects were asked to write the sentence on a sheet of paper and the next card was then shown, allowing a maximum of fifteen minutes per all cards. One subject out of the neutral group could not meet that limit and was excluded and replaced. For subjects in the positive group, each card included one word reflecting a positive stereotypes about old age ("ACCOMPLISHED, ACTIVE, ALERT, DIGNIFIED, DISTINGUISHED, EXPERIENCE, GENEROUS, INDEPENDENCE, INSIGHTFUL, INTERESTING, KINDNESS, KNOWLEDGEABLE, LOVING, PATIENCE, PRIDE, RESPECTED, SOCIABLE, SUCCESSFUL, UNDERSTANDING, WISE") whereas for subjects in the neutral group, age stereotypes were absent.

As a second step, the BSW-Scale on occupational self-efficacy (Abele, Stief, & Andrä, 2000) was administered. This scale consists of six questions to be answered on a four-level Likert scale (cf. **Figure 1**). The BSW-

Figure 1. Workflow of the experiment.

Scale is an upgrade of the general skill expectations scale (Schwarzer & Jerusalem, 1995) which focuses on job specific terms.

As a third step, subjects were given a delivery-verification task. They had to check whether the contents of a parcel corresponded with an invoice comprised of seventeen articles. The test persons had to mark fault or correctness with a pen on the invoice. Mistakes could occur when an item was in the parcel but not on the invoice, or when an item was on the invoice but not in the parcel. Dependent variables in this task were "duration", i.e., the time needed to complete the task, and "mistakes", i.e., the number of items erroneously marked on the invoice as present or missing.

After finishing the experimental procedure participants were asked three questions according to Hess et al. (2004) to check their awareness of the nature of the study ("What do you think the purpose of the study was?"; "How could the words in the scrambled sentence task have affected your behavior?"; "Did you notice any relation between the words in the scrambled sentence task and the concept of age?").

2.3. Statistical Analysis

Data from the positive and the control group were compared with t-tests for independent means, and with an analysis of covariance that used the factor "group" (positive, neutral), the covariates "mistakes" and "BSW-score", as well as the dependent variable "duration".
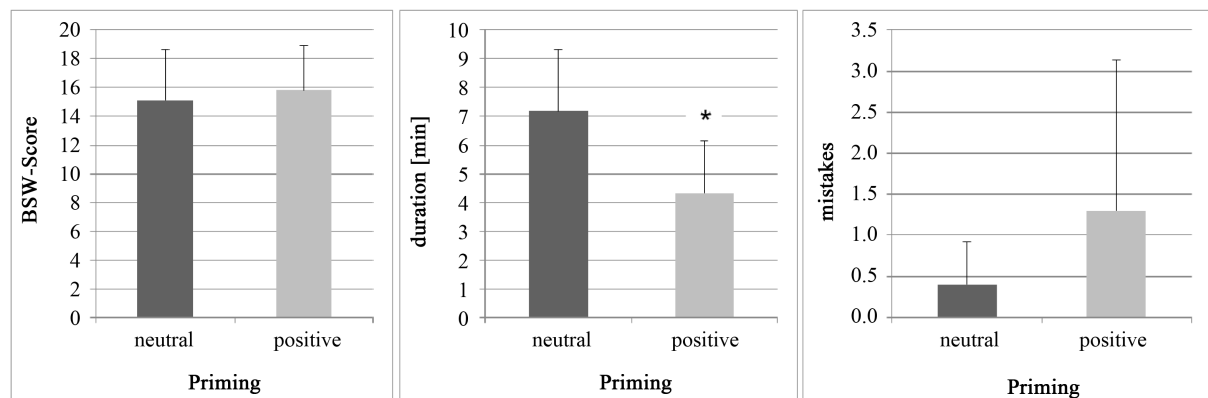
3. Results

Figure 2 shows the means of either group for the dependent variables "BSW-score", "duration" and "mistakes". t-tests yielded statistical significance only for "duration" ($t(18) = 2.8$, $p < 0.001$, $p < 0.05$ after Bonferroni-Holm adjustment for multiple comparisons), not for "mistakes" and "BSW-score" (both $p > 0.05$).

The analysis of covariance produced no significant covariates (both $p < 0.05$), and "duration" remained significant ($F(1,16) = 5.03$, $p < 0.005$).

4. Discussion

The present study documents for the first time that priming with positive age stereotypes is beneficial for the performance of elderly workers on a task modeled after real duties at work. It thus extends earlier research that used age stereotypes and typical laboratory tasks. The latter distinction is important, since motor performance on laboratory tasks is dramatically different from that on real-life like tasks-even if the biomechanical constraints are identical (Bock & Hagemann, 2010; Bock & Beurskens, 2011; Bock et al., 2013).

Interestingly, the benefits of positive priming emerged only with respect to task duration: the positive group was about 38% faster than the neutral group. We attribute the absence of benefits with respect to task mistakes to the realism of our delivery-verification task: it is not acceptable for receiving-department workers to commit verification errors on the job, elderly employees therefore likely sacrifice speed to maintain accuracy, and benefits of priming thus could only manifest in speed. The analysis of covariance confirmed that those benefits can't

Figure 2. Means of the dependent variables in group neutral and positive; error bars indicate standard deviations.

be attributed to spurious effects of the other two variables.

The absence of priming benefits with respect to the BSW-scores might indicate that self-efficacy is immune to priming, or that it needs a higher dose of priming than provided in our study, or that the sample size of n = 10 was too small to ascertain a priming benefit. However, we favor a fourth interpretation: the BSW-Scale assesses self-efficacy of one's whole past working life, not just of the momentary situation. If so, the present data would indicate that priming with positive age stereotypes has anterograde effects on the upcoming task, but no substantive retrograde effects on the preceding years at work. It would be desirable to scrutinize this view with a variant of the BSW-Scale that specifically addresses self-efficacy with respect to the upcoming task rather than with respect to one's own working life in general.

5. Conclusion

We conclude that priming is a method to activate age stereotypes and thus affect performance in a positive way. The results indicate that priming with positive age stereotypes—e.g. through posters, messages and speeches with interspersed relevant words—might help older employees to achieve a higher work efficiency and thus also a higher job satisfaction.

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Appendix

Neutral words used in the scrambled sentence task:
1) FLIEGT; LILA; WEIT; DAS; FLUGZEUG
2) HOCH; WÄCHST; DIE; RASIERER; PFLANZE
3) GROß; TOR; DAS; IST; SCHNELL
4) MIETE; IST; WEITLÄUFIG; GARTEN; DER
5) DIE; HAARE; GESPRÄCHIG; LANG; SIND
6) SCHÖN; RIECHT; GUT; PARFUM; DAS
7) DAS; MUSIZIEREN; BLAUE; PFERD; AUTO
8) HIMMEL; GRÜN; IST; DER; BEWÖLKT
9) SIE; DAS; IST; GRÜN; BLATT
10) LAUT; DER; BELLT; HUND; AHORNBLATT
11) TIEF; IST; HUND; GRABEN; DER
12) VOGEL; LANG; IST; DIE; PAUSE
13) ROLLT; DER; KÄFIG; BALL; RUNDE
14) SCHLECHT; SAFT; SCHMECKT; FUCHS; DER
15) ERKLINGT; EINE; MELODIE; LEISE; IHR
16) TIEF; BLAU; DER; BRUNNEN; IST
17) AUSSERDEM; WEIN; BERAUSCHEND; IST; DER
18) GEHEIMNISVOLL; MACH; WALD; IST; DER
19) GROß; DIE; GESCHICHTE; FANTASTISCH; IST
20) FESSELND; KÖNIG; DAS; IST; BUCH