**Appendix 1: Results of the analysis of error rates in Experiment 1**

**Data analysis.** Error rates were submitted to separate ANOVAs for each task condition with four within-subject factors: Curtain (no curtain vs. curtain present), Transition (go/go vs. nogo/go vs. go/nogo vs. nogo/nogo trial transition from N-1 to N), Compatibility in trial N-1 (compatibleN-1 vs. incompatibleN-1) and Compatibility in trial N (compatibleN vs. incompatibleN).

**Joint Simon task.**

***JSE and Sequential modulation effects.*** The ANOVA of the joint Simon task condition revealed a marginally significant main effect of CompatibilityN, *F*(1, 21) = 3.287, *p* = 0.084, partial *η*² = 0.14, showing that error rates were numerically higher with S-R incompatibility (2.3%) than with S-R compatibility (1.9%). The main effect of CompatibilityN-1 proofed to be reliable, *F*(1, 21) = 8.90, *p* < 0.01, partial *η*² = 0.30, with lower error rates following S-R incompatible trials (1.9%) than following S-R compatible trials (2.3%). Furthermore, we observed a significant interaction of CompatibilityN-1 × CompatibilityN*, F*(1, 21) = 34.54, *p* < 0.001, partial *η*² = 0.62, showing a larger JSE following S-R compatible trials (1.5%) than following S-R incompatible trials (-0.8%), reflecting the typical sequential modulation of the JSE for error rates. The three-way interaction of Curtain × CompatibilityN-1 × CompatibilityN was significant*, F*(1, 21) = 7.88, *p* < 0.05, partial *η*² = 0.27. The sequential modulation of the JSE was smaller for the curtain condition (JSE of 1.0% following S-R compatible trials and -0.8% following S-R incompatible trials) as compared to the no curtain condition (JSE of 2.0% following S-R compatible trials and -0.7% following S-R incompatible trials). Separate comparisons of trials with S-R compatibility repetitions showed no significant effects of the curtain condition (1.6% for cC-trials [c = compatibleN-1, C = compatibleN] and 1.5% for icIC-trials [ic = incompatibleN-1, IC = incompatibleN] for the curtain condition and 1.5% for cC-trials and 1.6% for icIC-trials for the no curtain condition; *ps* > 0.30). Separate comparisons of trials with partial S-R compatibility repetitions showed a significant effect of the curtain condition for cIC-trials (2.7% for the curtain condition and 3.5% for the no curtain condition; *t*(21) = -2.097, *p* < 0.05), while for icC-trials error rates did not differ significantly (2.3% for curtain condition and 2.3% for no curtain condition; *p* > 0.49).

***Transition effects.*** We found a significant main effect of Transition*, F*(1, 21) = 20.64, *p* < 0.001, partial *η*² = 0.50. Separate comparisons showed significant lower error rates for nogo/go transitions (0.7%) as compared to go/go (1.1%, *p* < 0.05), go/nogo (4.1%, *p* < 0.001) and nogo/nogo transitions (2.6%, *p* < 0.01). Furthermore, error rates of go/go transition trials were significant lower as compared to go/nogo (*p* < 0.001) and nogo/nogo transitions (*p* < 0.01). Error rates of nogo/nogo transitions were significant lower as error rates of go/nogo transitions as well (*p* = 0.001).

Further, the two-way interaction of Transition × CompatibilityN-1 was significant, *F*(1, 21) = 8.20, *p* < 0.001, partial *η*² = 0.28. The interaction of Transition × CompatibilityN-1 × CompatibilityN was also reliable*, F*(1, 21) = 29.09, *p* < 0.001, partial *η*² = 0.58. Separate comparisons showed that the sequential modulation of the JSE differed significantly between go/go and go/nogo, *F*(1, 21) = 39.48, *p* < 0.001, partial *η*² = 0.65, and nogo/nogo transition trials, *F*(1, 21) = 37.82, *p* < 0.001, partial *η*² = 0.64. While for go/go transitions the JSE was 0.1% after S-R compatible and 0.4% after S-R incompatible trials, for go/nogo transitions the JSE was 2.4% after S-R compatible and -1.7% after S-R incompatible trials and for nogo/nogo transitions 3.9% after S-R compatible and -1.8% after S-R incompatible trials. Sequential modulations of the JSE differed significantly between nogo/go and go/nogo transition trials, *F*(1, 21) = 41.33, *p* < 0.001, partial *η*² = 0.66, as well as between nogo/nogo transition trials, *F*(1, 21) = 35.11, *p* < 0.001, partial *η*² = 0.63 (nogo/go transition: -0.3% following S-R compatible trials and 0.1% following S-R incompatible trials). Finally, the four-way interaction of Curtain × Transition × CompatibilityN-1 × CompatibilityN was significant, *F*(1, 21) = 3.40, *p* < 0.05, partial *η*² = 0.14. Separate analyses for Transition revealed a significant three-way interaction of Curtain × CompatibilityN-1 × CompatibilityN for the go/nogo transition, *F*(1, 21) = 8.44, *p* < 0.01, partial *η*² = 0.29. The sequential modulation of the JSE was enlarged when the curtain was present (3.3% following S-R compatible trials and -2.1% following S-R incompatible trials) as compared to the condition when the curtain was absent (1.5% following S-R compatible trials and -1.3% following S-R incompatible trials). All other main and interaction effects of the main analysis were not significant (*Fs* < 3.36, *ps >* 0.08).

**Individual Simon task.**

***Sequential modulation effects.*** The factor CompatibilityN-1 was significant, *F*(1, 21) = 26.34, *p* = 0.050, partial *η*² = 0.17, error rates following S-R compatible trials (2.5%) were higher than error rates following S-R incompatible trials (2.1%). The interaction of CompatibilityN-1 × CompatibilityN was significant, *F*(1, 21) = 20.58, *p* < 0.001, partial *η*² = 0.50, reflecting a typical sequential modulation with a small compatibility effect following S-R compatible trials (0.4%) and a small but reversed effect following S-R incompatible trials (-0.9%). The two-way interaction of Curtain × CompatibilityN-1 was also reliable, *F*(1, 21) = 4.98, *p* < 0.05, partial *η*² < 0.19. Error rates following S-R incompatible trials (1.9%) were significantly lower than following S-R compatible trials (2.8%) when the curtain was applied, *t*(21) = 0.280, *p* < 0.05, while error rates did not significantly differ when the curtain was not applied (2.3% following S-R compatible trials and 2.3% following S-R incompatible trials; *t*(21) = 0.117, *p* = 0.908).

***Transition effects.*** We found the factor Transition to be significant, *F*(1, 21) = 26.91, *p* < 0.001, partial *η*² = 0.56. Separate comparisons showed lower error rates in nogo/go transition trials (0.3%) as compared to go/go (1.0%, *p* < 0.01), nogo/nogo (2.3%, *p* < 0.001) and go/nogo transition trials (5.6%, *p* < 0.001). Error rates of go/go transitions were significantly lower as compared to go/nogo (*p* < 0.001) and nogo/nogo transitions (*p* < 0.01). Finally, error rates of go/nogo transitions were significantly higher as error rates of nogo/nogo transition trials (*p* < 0.001). Furthermore, the two-way interaction of Transition × CompatibilityN was marginally significant, *F*(1, 21) = 2.56, *p* = 0.063, partial *η*² = 0.11. While we observed a compatibility effect of error rates in go/go (0.5%), nogo/go (-0.2%) and nogo/nogo transition trials (0.1%), the effect was reversed and enlarged in go/nogo transition trials (-1.4%). We also observed a significant interaction of Transition × CompatibilityN-1 × CompatibilityN*, F*(1, 21) = 8.25, *p* < 0.001, partial *η*² = 0.28. Separate comparisons showed a sequential modulation of the compatibility effect for error rates that significantly differed between go/go and nogo/nogo transitions, *F*(1, 21) = 13.22, *p* < 0.01, partial *η*² = 0.39. For go/go transitions the JSE was 0.1% following S-R compatible trials and 0.8% following S-R incompatible trials, while for nogo/nogo transitions the JSE was 2.3% after S-R compatible and -2.2% after S-R incompatible trials. The sequential modulation for nogo/go transition differed significantly from go/nogo, *F*(1, 21) = 5.04, *p* < 0.05, partial *η*² = 0.20, and nogo/nogo transitions, *F*(1, 21) = 17.63, *p* < 0.001, partial *η*² = 0.46 (nogo/go transition: -0,3% after S-R compatible and 0% after SR incompatible trials; go/nogo transition: -0.6% after S-R compatible and -2.2% after SR incompatible trials). All other main and interaction effects of the main analysis were not significant (*Fs* < 2.29, *ps >* 0.09).

**Standard Simon task.**

***SE and Sequential modulation effects.*** We observed a significant effect of CompatibilityN, *F*(1, 21) = 13.40, *p* = 0.001, partial *η*² = 0.39, showing that error rates were lower in S-R compatible trials (3.6%) as compared to S-R incompatible trials (5.6%). Furthermore, the main effect of CompatibilityN-1 was significant, *F*(1, 21) = 19.18, *p* < 0.001, partial *η*² = 0.48, indicating higher error rates following S-R compatible trials (5.4%) as compared to error rates following S-R incompatible trials (3.8%). The interaction of CompatibilityN-1 × CompatibilityN was also reliable, *F*(1, 21) = 59.63, *p* < 0.001, partial *η*² = 0.74, showing a larger SE for error rates following S-R compatible trials (5.7%) than following S-R incompatible trials (-1.7%), which reflects the typical sequential modulation of the SE for errors.

***Transition effects.***The analysis obtained no significant main or interaction effects of the factor Transition. All other effects were not reliable as well (*Fs* < 3.43, *ps >* 0.078).

**Appendix 2: Results of the analysis of error rates in Experiment 2**

**Data analysis.** Error rates were submitted to separate ANOVAs for each task condition with four within-subject factors: Music (no music vs. music present), Transition (go/go vs. nogo/go vs. go/nogo vs. nogo/nogo trial transition from N-1 to N), Compatibility in trial N-1 (compatibleN-1 vs. incompatibleN-1) and Compatibility in trial N (compatibleN vs. incompatibleN).

**Joint Simon task.**

***JSE and Sequential modulation effects.*** We found a significant main effect of CompatibilityN*, F*(1, 23) = 5.51, *p* < 0.05, partial *η*² = 0.19, with lower error rates in S-R compatible trials (0.9%) as compared to S-R incompatible trials (1.3). The analysis further revealed a significant two-way interaction of CompatibilityN-1 × CompatibilityN*, F*(1, 23) = 22.71, *p* < 0.001, partial *η*² = 0.50, showing a positive JSE following S-R compatible trials (1.0%), while the JSE following S-R incompatible trials (-0.2%) was slightly reversed. We further found a significant interaction of the factors Music × CompatibilityN-1 × CompatibilityN*, F*(1, 23) = 5.31, *p* < 0.05, partial *η*² = 0.19, showing an enlarged sequential modulation when music was presented (1.3% following S-R compatible trials and -0.6% following S-R incompatible trials) as compared to the condition were no music was presented (0.8% following S-R compatible trials and 0.2% following S-R incompatible trials). Separate comparisons of trials with S-R compatibility repetitions showed no significant effects of the music condition (0.7% for cC-trials and 0.7% for icIC-trials for the music condition and 0.7% for cC-trials and 1.0% for icIC-trials for the no music condition; *ps* > 0.09). Separate comparisons of trials with partial S-R compatibility repetitions showed a significant effect of the music condition for icC-trials (1.3% for the music condition and 0.8% for the no music condition; *t*(23) = 1.724, *p* < 0.05), while for cIC-trials error rates did not differ significantly (1.9% for music condition and 1.5% for no music condition; *p* > 0.12).

***Transition effects.*** We found a significant main effect of Transition*, F*(1, 23) = 17.96, *p* < 0.001, partial *η*² = 0.44. Separate comparisons showed significantly lower error rates for go/go transitions (0.4%) as compared to go/nogo transitions (2.3%, *p* < 0.001) and to nogo/nogo transitions (1.4%, *p* < 0.001). Furthermore, error rates for nogo/go transitions (0.4%) were significantly lower as compared to go/nogo (*p* < 0.001) and to nogo/nogo transitions (*p* = 0.001). Nogo/nogo transitions were significantly lower as compared to go/nogo transitions as well (*p* < 0.01). We further found a significant two-way interaction of the factors Transition × CompatibilityN*, F*(1, 23) = 3.92, *p* < 0.05, partial *η*² = 0.15. Separate analyses revealed a significant smaller JSE for go/go transitions (-0.4%) as compared to nogo/go transitions (0.2%, *F*(1, 23) = 5.80, *p* < 0.05, partial *η*² = 0.20), go/nogo transitions (0.9%, *F*(1, 23) = 5.61, *p* < 0.05, partial *η*² = 0.20) and nogo/nogo transitions (0.9%, *F*(1, 23) = 9.14, *p* < 0.01, partial *η*² = 0.28). All other comparisons were not significant (*F*s < 3.04, *p*s > 0.09). The analysis further revealed a significant interaction effect of Transition × CompatibilityN-1 × CompatibilityN*, F*(1, 23) = 9.54, *p* < 0.001, partial *η*² = 0.29. Separate comparisons showed a sequential modulation of the JSE that differed significantly between go/go and nogo/nogo transitions, *F*(1, 23) = 16.47, *p* < 0.001, partial *η*² = 0.42. For go/go transitions the JSE was -0.3% following S-R compatible trials and -0.4% following S-R incompatible trials, while for nogo/nogo transitions the JSE was 2.8% after S-R compatible and -1.0% after S-R incompatible trials. Furthermore, the sequential modulation for nogo/go transitions differed significantly from nogo/nogo transitions, *F*(1, 23) = 19.21, *p* < 0.001, partial *η*² = 0.46 (nogo/go transition: 0.3% following S-R compatible trials and 0.2% following S-R incompatible trials). Comparison of sequential modulation effects between go/nogo and nogo/nogo transitions revealed a significant interaction as well, *F*(1, 23) = 7.87, *p* = 0.010, partial *η*² = 0.26 (go/nogo transition: 1,3% after S-R compatible and 0.4% after SR incompatible trials). All other main and interaction effects of the main analysis were not significant (*Fs* < 2.44, *ps >* 0.07).

**Individual Simon task.**

***Sequential modulation effects.*** The analysis revealed a significant two-way interaction of CompatibilityN-1 × CompatibilityN*, F*(1, 23) = 7.25, *p* < 0.05, partial *η*² = 0.28, showing a small and positive compatibility effect following S-R compatible trials (0.4%), while the compatibility effect following S-R incompatible trials (-0.9%) was negative.

***Transition effects.*** We found no significant main or interaction effects with the factor Transition. All other main and interaction effects of the main analysis were not significant (*Fs* < 2.31, *ps >* 0.08).

**Standard Simon task.**

***SE and Sequential modulation effects.*** The main effect of CompatibilityN was significant, *F*(1, 23) = 11.27, *p* = 0.01, partial *η*² = 0.33. Error rates were significantly lower in S-R compatible trials (3.7%) as compared to S-R incompatible trials (5.5%). We further found the main effect of CompatibilityN-1 to be significant, *F*(1, 23) = 10.37, *p* < 0.01, partial *η*² = 0.31, indicating higher error rates following S-R compatible trials (5.1%) than error rates following S-R incompatible trials (4.2%). The interaction of CompatibilityN-1 × CompatibilityN was also significant, *F*(1, 23) = 58.23, *p* < 0.001, partial *η*² = 0.72. The SE for error rates following S-R compatible trials (5.7%) was enlarged as compared to the SE for error rates following S-R incompatible trials (-2.1%), reflecting the typical sequential modulation of the SE for errors.

***Transition effects.***We found no significant main or interaction effect of the factor Transition. All other effects were not reliable as well (*Fs* < 1.37, *ps >* 0.25).