Social Orienting Impairment in Autism: Relations Among Look Length, Disengagement, and Symptom Severity

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Background

Children with autism spectrum disorders (ASD) show impairments in social orienting, with slower times to orient and less looking to social as compared with nonsocial events (Dawson et al., 2004). Our prior study (Newell, Bahrick, Vaillant-Molina, Shuman, & Castellanos, 2007) investigated differences in attention in children with ASD and typically developing (TD) children for social and nonsocial events in the presence versus absence of competing stimulation. Results revealed social orienting impairments in children with ASD. They showed reduced looking to social events (infant directed speech, IDS) but comparable looking to nonsocial events relative to TD children. Infant directed speech, particularly affectively positive IDS, exaggerates intersensory redundancy (rhythm, tempo, and intensity changes common to audible and visible stimulation). Intersensory redundancy is highly salient to humans and animals, especially in early development, and underlies the typical development of social orienting (Bahrick, in press; Bahrick & Lickliter, 2002).

Objectives

To more precisely characterize social orienting impairments in children with ASD and their relation to symptom severity, we explored in finer detail the nature of attention to social versus nonsocial events in children with ASD and TD children from our prior study. We expected that social orienting impairments in children with ASD would be reflected by more frequent disengagement and shorter looks to social events, particularly affectively positive social events. We also expected that greater symptom severity among children with ASD would be related to greater social orienting impairments.

Method

Eleven children with ASD (M = 3.63 yrs; range = 2.75 – 4.92) and 11 TD children (M = 2.06 yrs; range = 1.83 – 2.33) matched for functional age on the Adaptive Behavior Assessment Scale (TD: M = 2.11 yrs, SD = .53 and ASD: M = 2.12, SD = .79) were tested in the Behavioral Attention Assessment Protocol (Newell et al., 2007). In this procedure, children receive trials of a central stimulus (3 s) followed by two side-by-side peripheral events (10 s) along with the soundtrack to one event. On half the trials, the central stimulus remains on during the peripheral events (disengagement trials), while on the other half, it ends before the peripheral events begin (orienting trials). Blocks of trials depicted nonsocial (NS) events (objects striking a surface), social neutral (SN) events (women speaking with neutral affect), and social positive (SP) events (women speaking in IDS with positive affect). The proportion of available looking time, number of disengagements per minute, and average length of look to the peripheral events were calculated.

Figure 1
Disengagements per minute as a function of diagnostic group (ASD, TD) and event type (SN, SP, NS)

★ $p < .05$
★★ $p < .01$

Main effect of diagnostic group: $F(1, 20) = 10.90$, $p = .004$
Main effect of event type: $F(2, 40) = 6.86$, $p = .003$
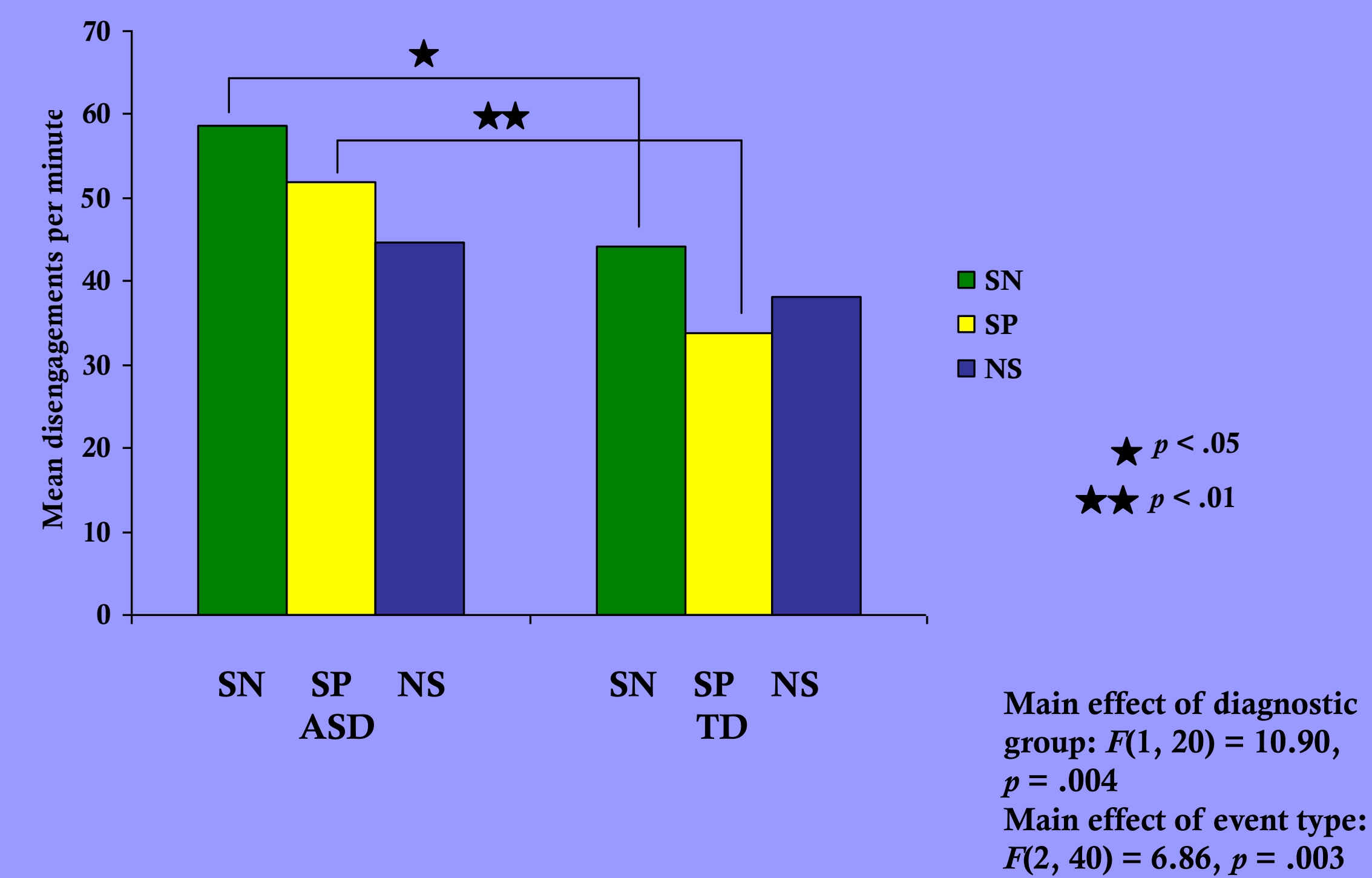
Figure 2
Average length of look as a function of diagnostic group (ASD, TD) and event type (SN, SP, NS)

★ $p < .05$
★★ $p < .01$

Main effect of diagnostic group: $F(1, 20) = 16.59$, $p = .001$

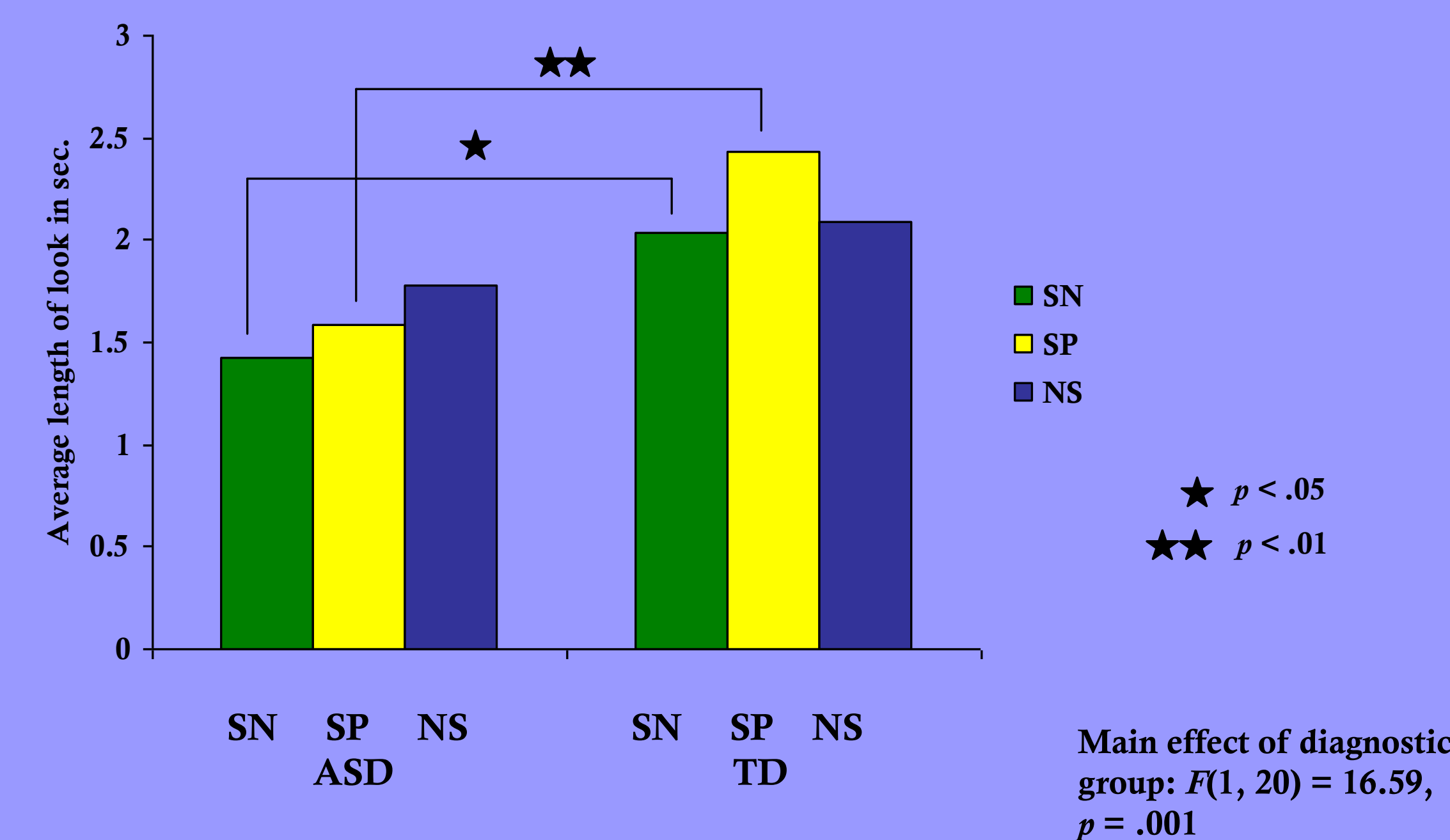### Figure 3
Proportion of available looking time as a function of diagnostic group (ASD, TD) and event type (SN, SP, NS)

★ $p < .05$
★★ $p < .01$

Main effect of event type: $F(2, 40) = 13.25$, $p < .001$
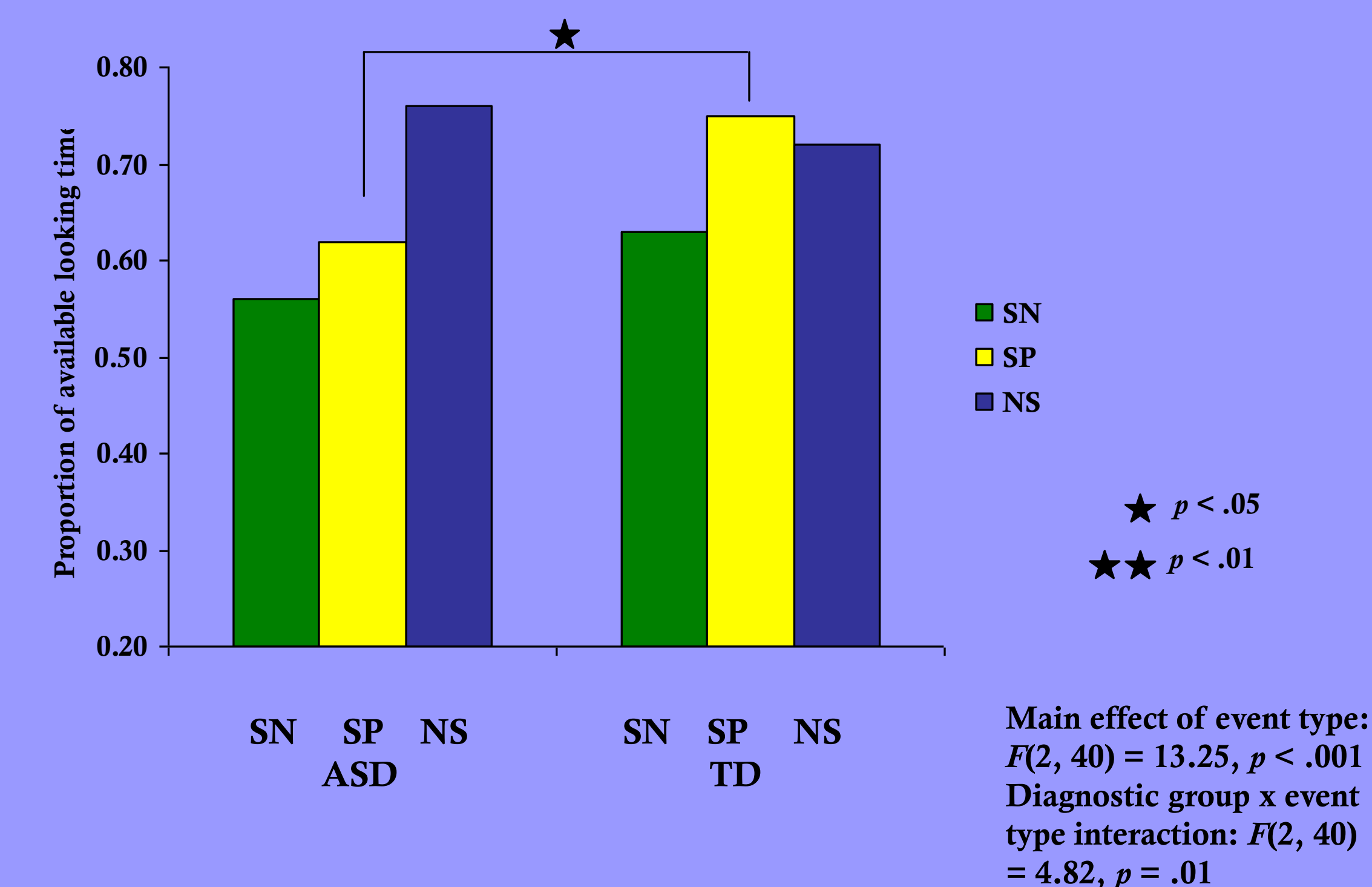Diagnostic group x event type interaction: $F(2, 40) = 4.82$, $p = .01$

Figure 4
Disengagements per minute as a function of symptom severity (High ASD, Low ASD, TD) and event type (SN, SP, NS).

★ $p < .05$
★★ $p < .01$
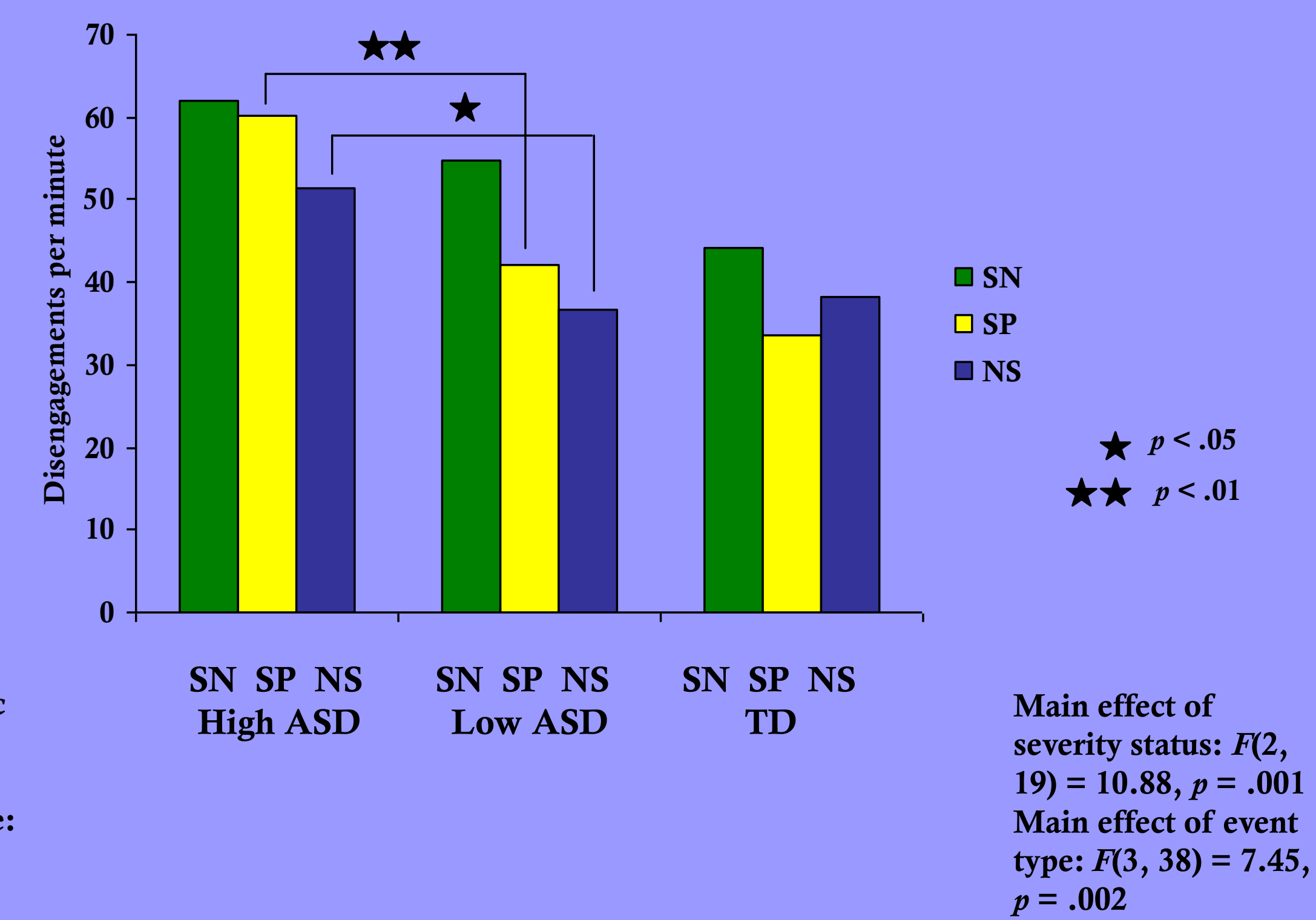
Main effect of severity status: $F(2, 19) = 10.88$, $p = .001$
Main effect of event type: $F(3, 38) = 7.45$, $p = .002$

Figure 5
Average length of look as a function of symptom severity (High ASD, Low ASD, TD) and event type (SN, SP, NS).

★ $p < .05$
★★ $p < .01$

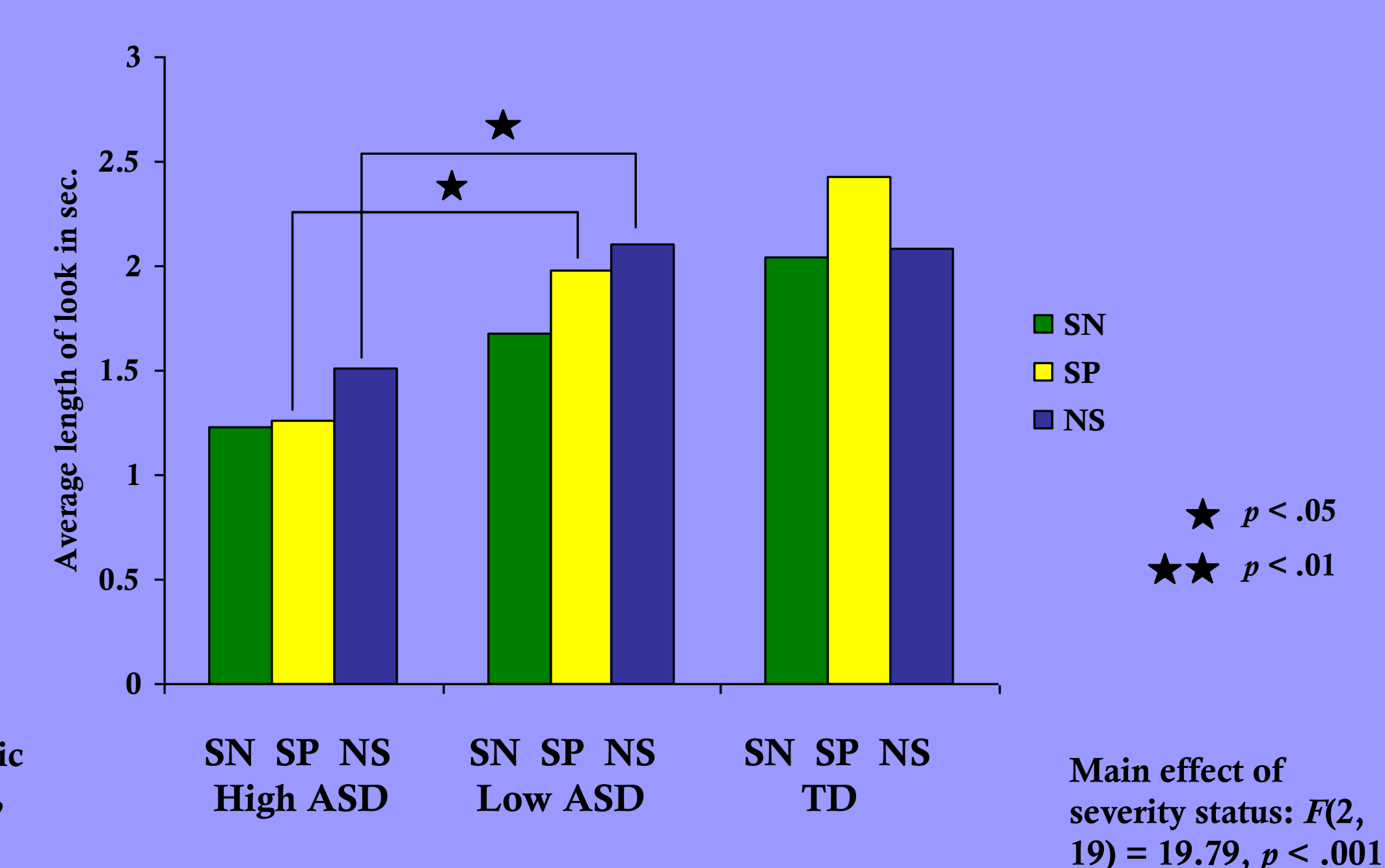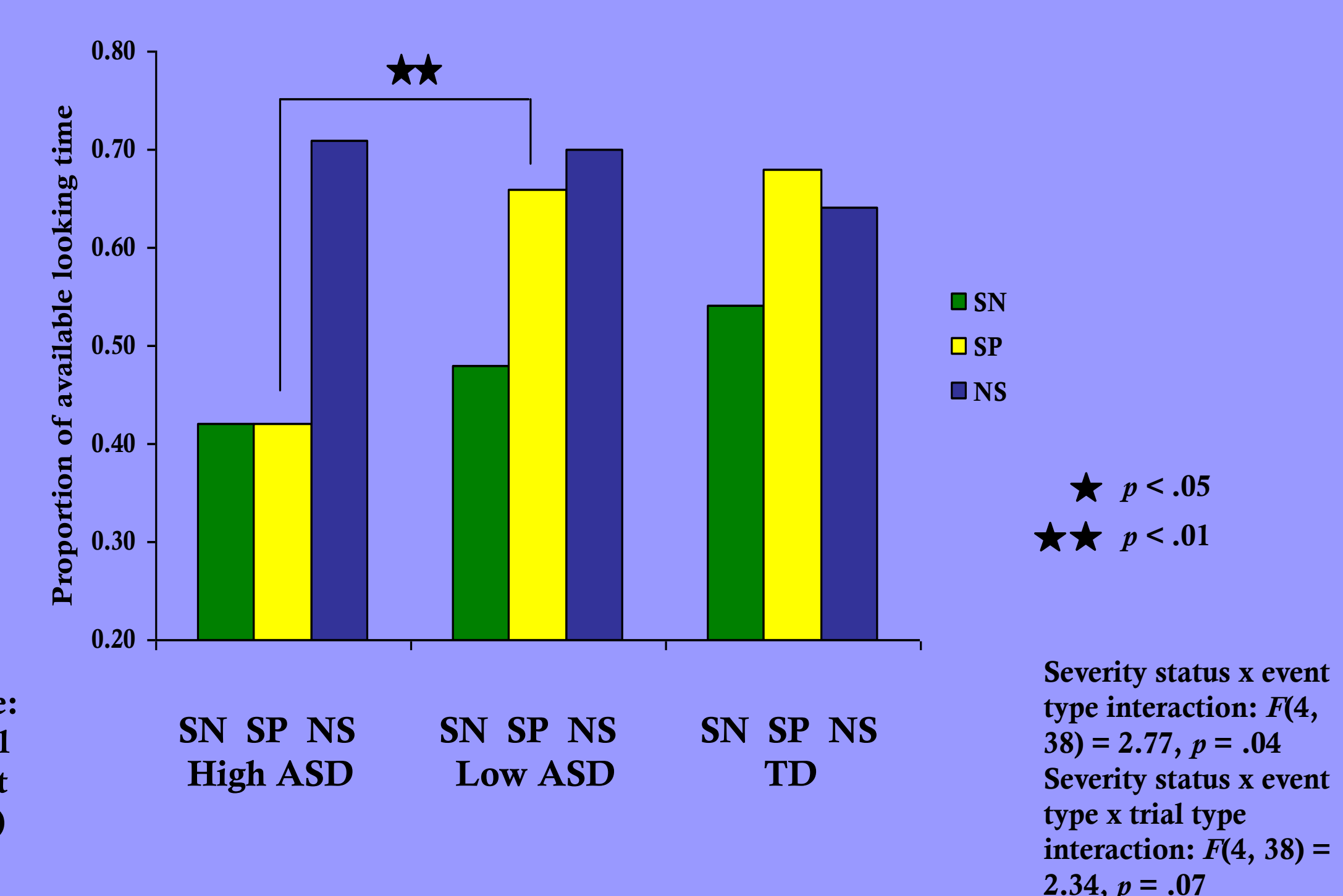Main effect of severity status: $F(2, 19) = 19.79$, $p < .001$

Figure 6
Proportion of available looking time as a function of symptom severity (High ASD, Low ASD, TD) and event type (SN, SP, NS) for disengage trials only.

★ $p < .05$
★★ $p < .01$

Severity status x event type interaction: $F(4, 38) = 2.77$, $p = .04$
Severity status x event type x trial type interaction: $F(4, 38) = 2.34$, $p = .07$

Results

Group (TD, ASD) x event type (SN, SP, NS) x trial type (disengage, orient trials) ANOVAs were conducted on all three measures. Results of the ANOVAs indicated that, overall, children with ASD showed more disengagements per minute and shorter looks than TD children, particularly for social ($ps < .02$), but not nonsocial events (see Figures 1 & 2). Children with ASD showed reduced overall looking to social positive events compared with TD children ($p =.02$), but comparable looking times overall (see Figure 3).

Analyses of symptom severity (measured by the Social Communication Questionnaire) revealed a significant negative correlation between severity and looking time to social positive events (*Pearson's r* = -.74, $p < .01$), with less looking associated with more symptoms. In addition, children with ASD with more symptoms (according to a median split) showed shorter looks ($p = .02$) and more disengagements, particularly for social positive events ($p = .007$; see Figures 4 & 5), and less overall looking to social positive events (particularly in the presence of competing stimulation) than children with ASD with fewer symptoms ($ps < .01$; see Figure 6). Furthermore, children with ASD with more symptoms differed from TD children on all measures (overall looking time, disengagements, and average length of look, $ps < .01$), whereas those with fewer symptoms did not.

Conclusion

Overall, these results demonstrate that children with ASD show social orienting impairments as indexed by less looking time, more disengagements, and shorter looks to social events, particularly affectively positive infant directed speech, but no difference in attention to nonsocial events as compared with TD children. Affectively positive events provide a great deal of intersensory redundancy, an important basis for social orienting in typical development (Bahrick, in press). Moreover, these effects were carried by children with ASD who showed greater symptom severity. Children with more symptoms showed increased social orienting impairments, particularly for affectively positive infant directed speech. Our findings suggest that impairments in ASD can be effectively indexed by measures of disengagement, look length, and overall looking time. These measures reflect important individual differences in attention underlying social orienting and may have implications for determining which children could best benefit from interventions of different types. Together, these findings suggest a link between symptom severity and intersensory processing disturbance in autism.

References

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