Smiling synchrony predicts rapport in autistic and neurotypical interactions

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Background

Autistic & neurotypical interactions

- Social difficulties in autism may result from both individual behaviour/cognition and from a neurotype mismatch[1] between interlocutors.
- Some studies (and numerous first-person accounts) find interactions of same-neurotype dyads (autistic; AUT or neurotypical; NT) — more successful than mix-neurotype (MIX) dyads[2,3,4].
- The same behaviours may give rise to different social judgements in autistic and neurotypical individuals[5,6]. Thus, we should avoid setting the neurotypical perspective as the ground truth and explore social behaviours in relation to interaction outcomes (e.g., rapport).

Smiling in interactions

- In neurotypical dyads, smiling synchrony predicts social connection and enjoyment[7].
- Neurotypical dyads synchronise their smiling more than mixed-neurotype dyads[8] and autistic dyads[9].
- Autistic children produce less variety of laughter and are less likely to reciprocate smile or laughter than neurotypical children[10].

Aims
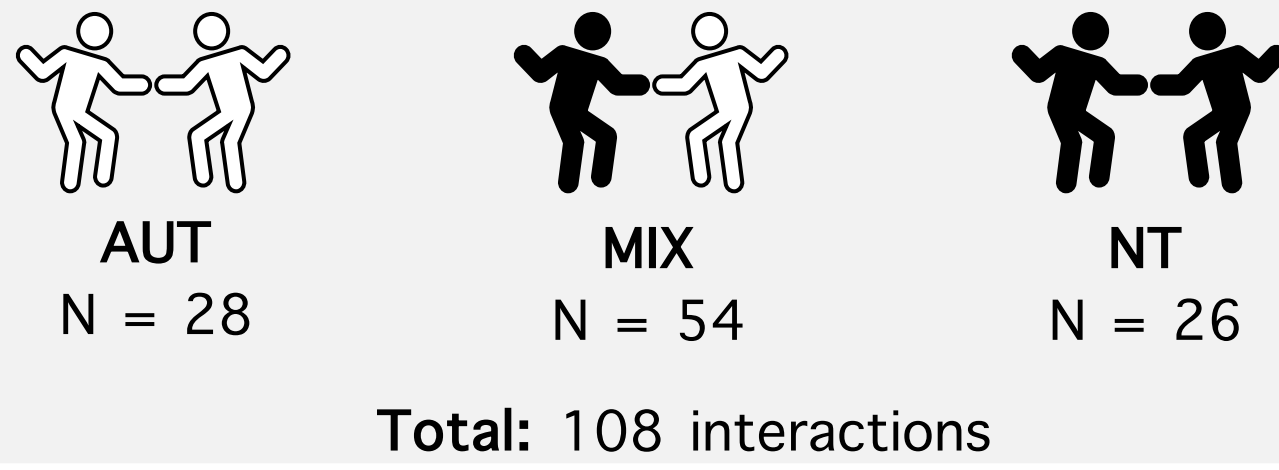
In this exploratory study, we aimed to test:
- whether dyad types (AUT, NT, MIX) differ in terms of self-reported rapport
- whether dyad types differ in smiling behaviour (amount of individual smiling and smiling synchrony)
- whether and how smiling behaviours predict rapport ratings in the three dyad types
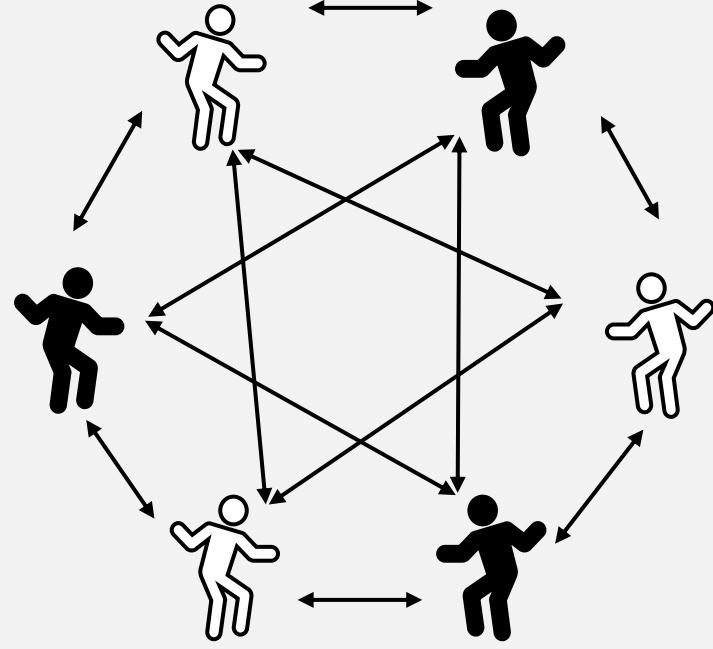
Method

Sample: 57 adults
- 29 autistic & 28 neurotypical
- 20-35 years old
- English/Spanish speakers
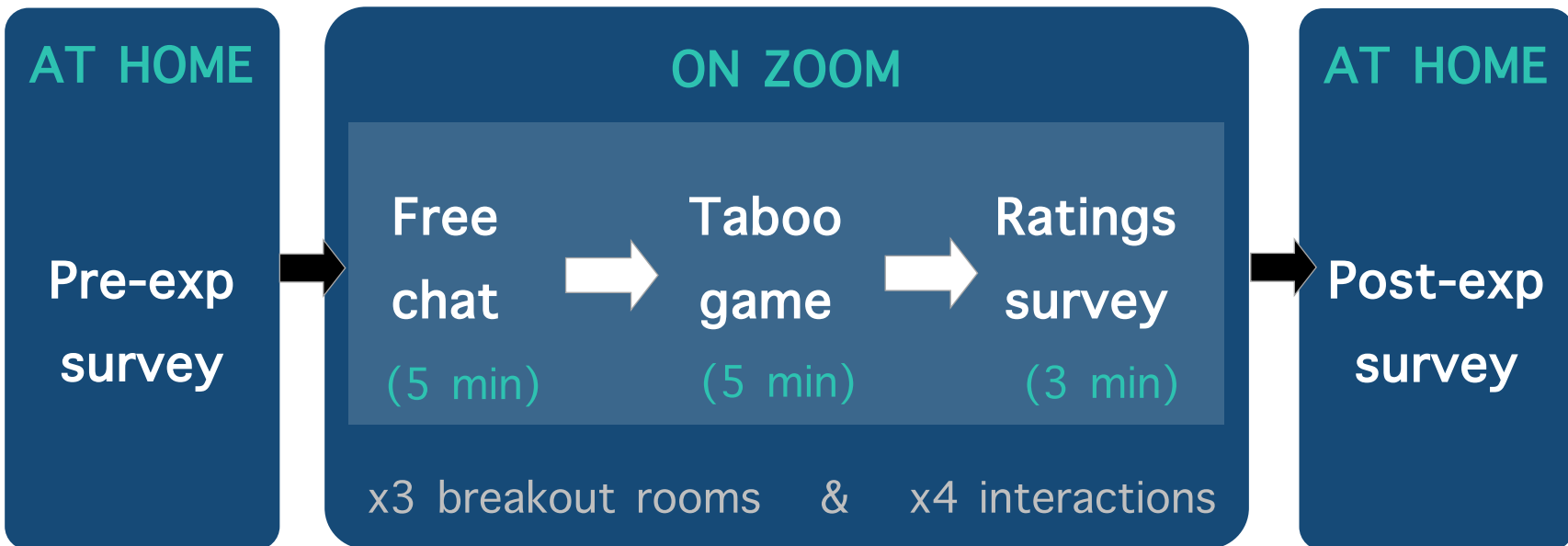- No learning disability, communicating via speech

Types of dyads: same and mixed neurotype

AUT N = 28　MIX N = 54　NT N = 26

Total: 108 interactions

Design: partial round robin

Procedure: two interaction tasks on Zoom

AT HOME — Pre-exp survey
ON ZOOM — Free chat (5 min) → Taboo game (5 min) → Ratings survey (3 min)
AT HOME — Post-exp survey
x3 breakout rooms & x4 interactions

Smiling behaviours: calculation

- **Smile intensity** = intensity of AU6 + AU12 (for both >0) per OpenFace.
- **"% of smile"** = the proportion of time spent smiling relative to the length of the interaction (5 min).
- **"Smile synchrony"** = average cross-correlation for a dyad (30s window, increment 1s, 2 to -2s lags).

Results

Smiling behaviours between the neurotypes and dyad types

A — % of smile vs Neurotype (AUT, NT)
B — % of smile vs Neurotype Match (MIX, SAME)
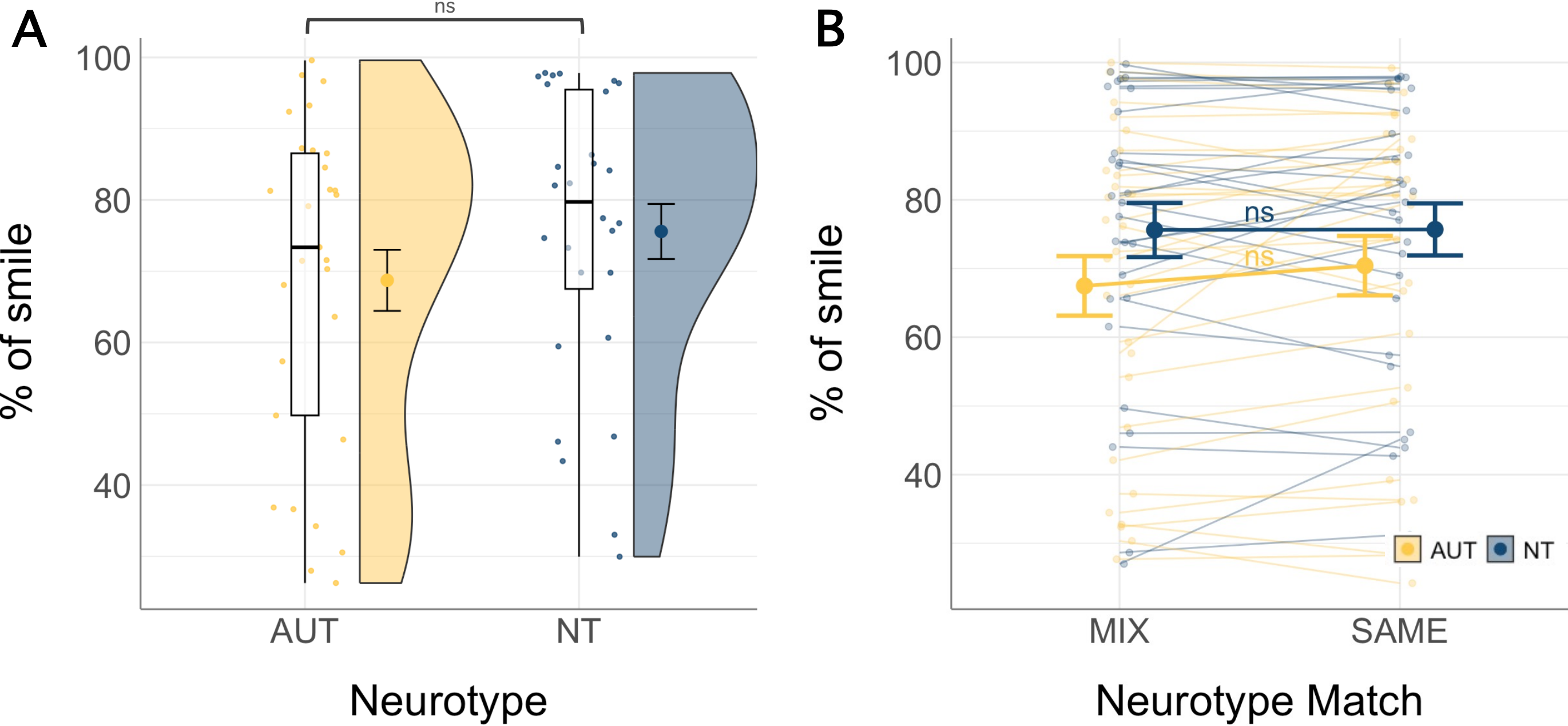
Do the neurotypes (autistic/neurotypical) differ in how much they smile?
No: neurotypes did not differ in average % of smiling, $F_{(1,56.75)}=1.45^{ns}$, $BF_{01}=7$ (A), regardless of whether they interacted with someone of the same (AUT-AUT, NT-NT) or different (AUT-NT) neurotype, $F_{(1,113.09)}=1.59^{ns}$, $BF_{01}=48$ (B).


Smiling synchrony vs Dyad type (AUT, MIX, NT)
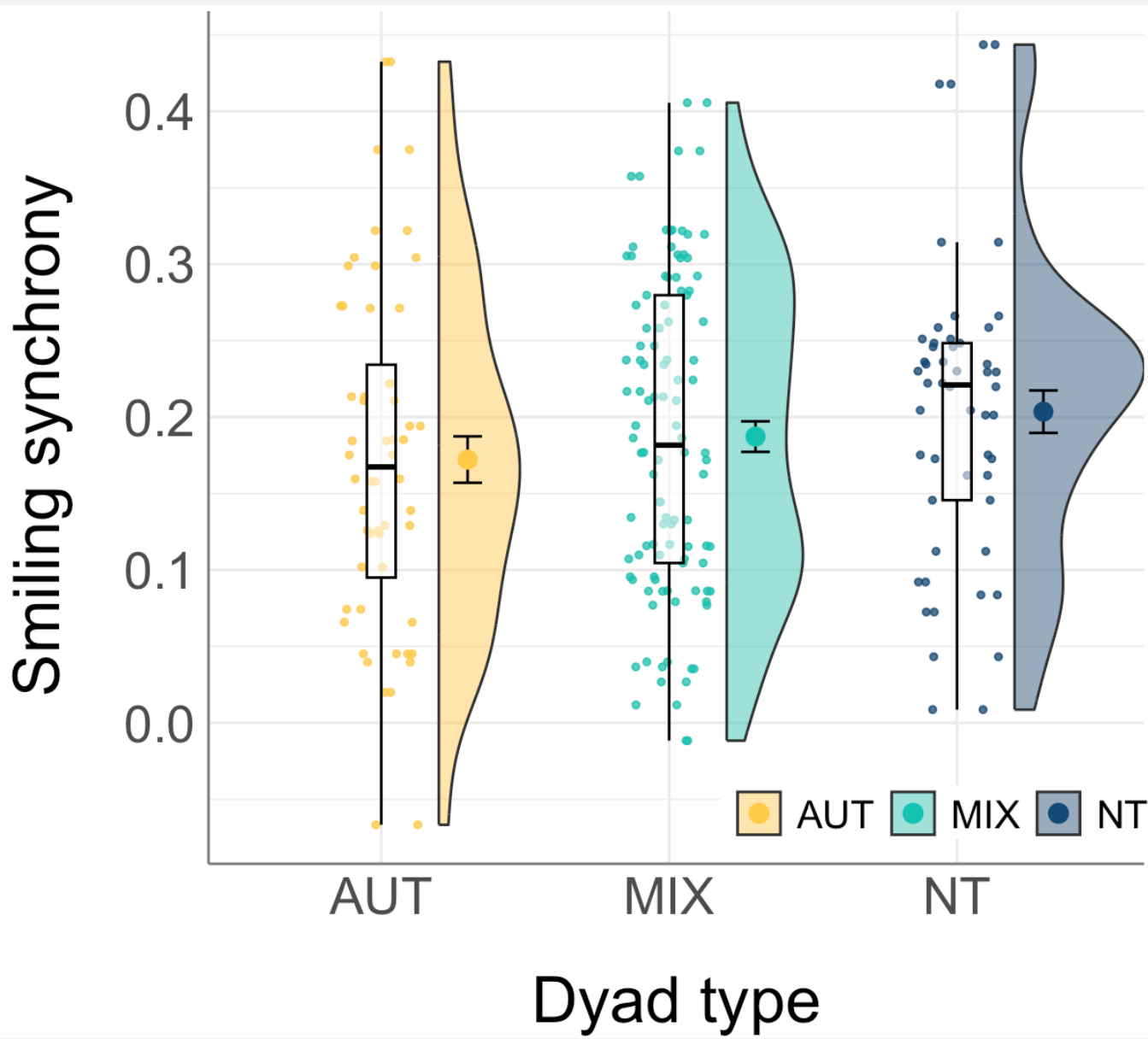
Did participants synchronise their smiling?
Yes: synchrony present in real, $t_{(107)}>15.37^{***}$, but not pseudo-dyads, $t_{(999)}=-0.16^{ns}$, diff: $d>1.9^{***}$.

Do the dyad types (AUT/NT/MIX) differ in smiling synchrony? lm(synchrony ~ dyad type)
No: dyad type was not a significant predictor of smiling synchrony, $F_{(2,213)}=1.19^{ns}$, $BF_{01}=65$.

Self-rated rapport between dyad types

Rapport vs Dyad type (AUT, MIX, NT)
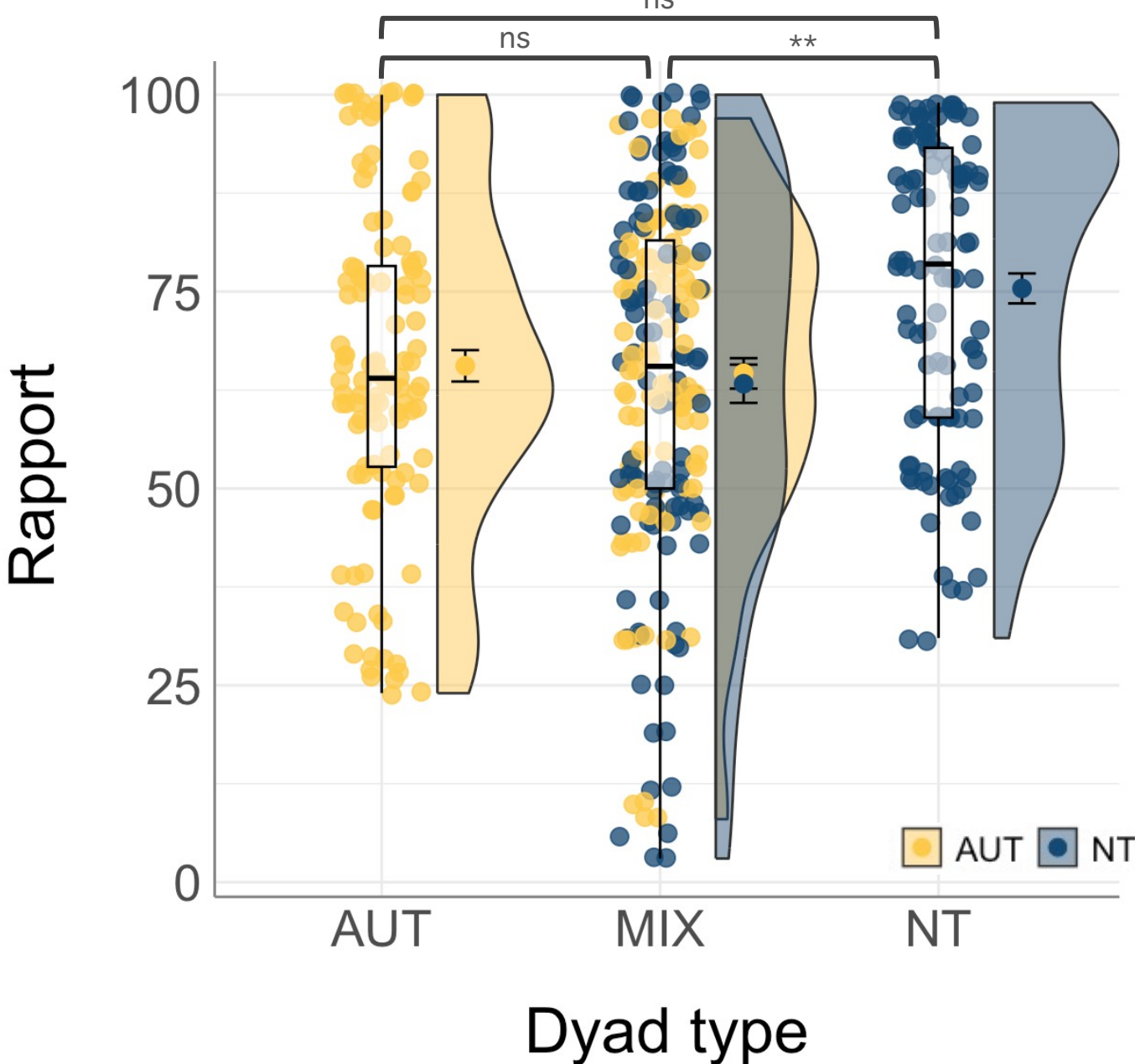
Do dyads differ in their rapport ratings?
Yes: $F_{(2,96.67)}=5.04^{**}$, so that: NT>MIX** (no sig. diff with AUT).

Do neurotypes differ in their general ratings?
No: no neurotype effect on rapport ratings, $F_{(1,49.93)}=0.50^{ns}$, $BF_{01}=16$.

"Who" accounts for the variance in the ratings?
Social Relation Model: Out of 83% explained variance in the null model, participant accounts for 30%, interaction partner for 26%, and dyad index for 44%.

Smiling behaviours predicting rapport

lmer(rapport ~ smile_percent*dyad + smile_synchrony*dyad + (1|ID) + (1|partner) + (1|dyad_index))

Rapport vs Smile Synchrony (AUT, MIX, NT)
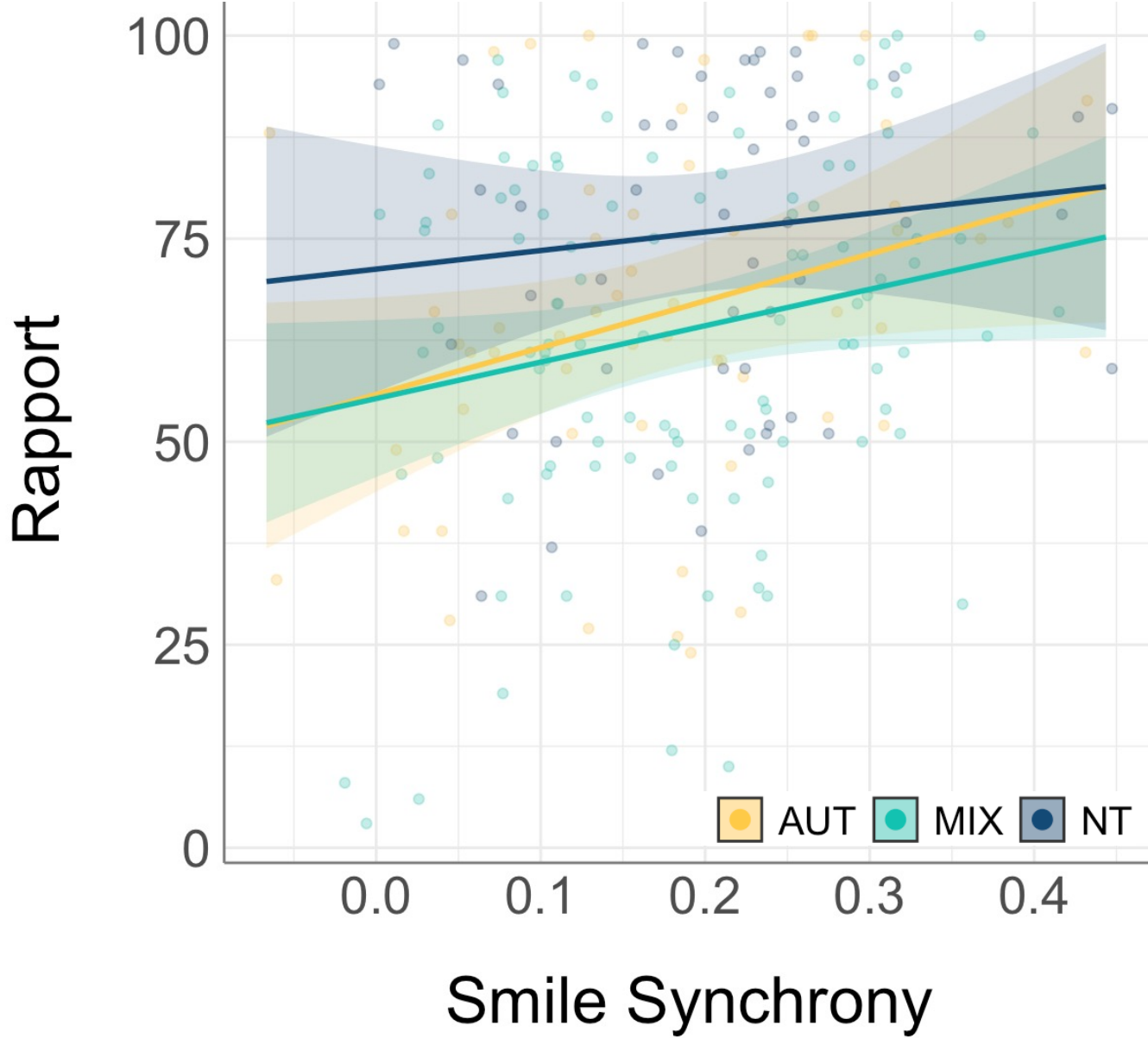
Do smiling behaviours predict rapport ratings in the three dyad types?
- Smiling synchrony predicts higher rapport ratings in general; $F_{(1,111.554)}=5.68^*$.
- % of smile; $F_{(1,96.017)}=0.15^{ns}$ and dyad type; $F_{(2,184.399)}=1.55^{ns}$ do not predict rapport.
- Smiling synchrony did not interact with dyad type; $F_{(2,99.67)}=0.32^{ns}$, but there is very strong evidence supporting the interaction term, $BF_{10}=50.68$.
- % of smile did not interact with dyad type; $F_{(2,153.71)}=0.29^{ns}$, $BF_{01}=1262$.

Discussion

RAPPORT

Neurotypical dyads report higher rapport than mixed-neurotype dyads. Although autistic interactions also showed descriptively lower rapport than neurotypical dyads, this effect was not statistically significant. Rapport is influenced by both partners and their unique interaction, as shown by the Social Relation Model.

SMILING

Autistic and neurotypical adults show **similar smiling behaviours in interactions**, with no differences in the amount of smiling or inter-personal synchrony, regardless of partner neurotype (matching- or mismatching one's own). **Higher smile synchrony predicts higher rapport** in all dyads.

CONCLUSION

Neurotypical dyads rated rapport higher than both mixed and autistic dyads. However, **smiling behaviours are unlikely to drive this difference**, as there was no interaction between dyad type and smiling behaviour in predicting rapport. Other behaviours should be explored as potential factors influencing rapport. These **findings do not support the idea of relational social difficulties in autism**, i.e., that neurotype mismatch, rather than individual difficulties, drives interaction problems.

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DAAD Deutscher Akademischer Austauschdienst German Academic Exchange Service