Integrating social information into pragmatic reasoning in real time

Pragmatic reasoning has been found to be shaped by different sources of social information (e.g. Bonnefon et al., 2009; Yoon et al., 2020; Mazzarella et al., 2018; Fairchild and Papafragou, 2018; Lorenzoni et al., 2022; Mahler, 2022) – including the stereotypical *persona* embodied by a speaker. In particular, Beltrama and Schwarz (2021) show that comprehenders adopt less precise interpretations of numerals (e.g., "$200" as "$190-210") for a **Chill** speaker, socially expected to speak loosely, than a **Nerdy** one, socially expected to speak precisely. These findings raise the question of how social information is integrated in meaning interpretation in real time – and specifically whether (**Hyp.A**) social considerations come into play at later stages of the interpretation process; or (**Hyp.B**) they are integrated from the start. Shedding light on this question would allow a novel perspective on how social information fits in the semantics/pragmatics interface. Support for Hyp.A would suggest that social stereotypes effects on meaning interpretation should be seen as the result or high-level, costly pragmatic reasoning, much like it has been suggested for pragmatic maxims in scalar inferences (Bott and Noveck (2004); Pouscoulous et al. (2007)); support for Hyp.B, by contrast, would suggest that it should be seen as information that is quickly integrated, similar to what is the case for linguistic/semantic information encoded as part of the truth-conditional content.

Methods. Adapting Beltrama and Schwarz (2021)'s task, we presented dialogues – visually represented as a cartoon – with one character asking a question ('How much is the flight?') and the other responding with a numeral utterance ('It's $200.') after checking their phone. The characters either embodied a **Nerdy** or **Chill** persona (between-subjects; see **Fig.1A-B**).

"Rachel and Arthur are looking for a one-way plane ticket"

"Alex and Eva are looking for a one-way plane ticket"

Fig. 1A. Nerdy characters

Fig 1B. Chill Characters

Participants had to indicate which of two phones the answer was based on: one displayed a number (visible screen); and one was shown face-down (covered screen). Participants were instructed to select thevisible screen if they thought the speaker was getting their information from this one; and the covered screen otherwise. Two further factors were manipulated. **Match** manipulated how closely the number on the visible phone matched the utterance, with 3 levels: 2 control levels, *Match* (identical) and *Mismatch* (far-off values); and the critical *Imprecise* level, displaying numbers slightly diverging from the uttered one (5-19%). Visible screen selections in the Imprecise condition indicate an imprecise interpretation; Covered screen selections a more precise one.

Match   MisMatch   Imprecise

Screen Fit manipulation
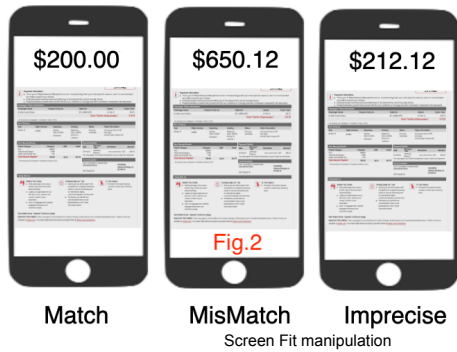
Finally, **Time-Window** varied how long participants had to respond before the trial was aborted, with 4 levels (between-subjects): *SuperShort* (1250 ms); *Short* (2000 ms); *Medium* (2750 ms); *Long* (3500 ms).

24 items were presented in a Latin Square Design – 6 in *Match* and *Mismatch*, and 12 in *Imprecise*, +24 fillers. 768 participants were recruited on Prolific (96 per Persona/Time-Window combination), paid $2.

Results. As shown in Fig.3, covered choices for *Match/Mismatch* are at floor/ceiling as early as the Short window, but show degraded effects in the SuperShort one, suggesting that time-pressure in the latter made picture selection challenging even at the most basic level. We fit a ME logistic regression with random effects for Items/Participants on covered choice rates (excluding the SuperShort window due to lower accuracy in controls) and Persona, Match, Window and their interaction as predictors. We found a main effect of Match (β=0.62, p<.0001), reflecting a stepwise decrease from Mismatch to Imprecise and Match; and Persona (β=0.26, p<.0001), with higher rates for Nerdy speakers. But the Persona effect was dominated by interactions with Match and Window. Planned comparisons revealed a Persona effect in Imprecise (p<0.0001) but not in Match/Mismatch (ps>0.4); and – crucially for present purposes – the effect was significant in the Long window (p<0.05), but not in the shorter ones (ps >0.7).

Discussion. Our findings support **Hyp.A**: information about speaker identities does not affect interpretation in shorter response time windows. This indicates that comprehenders attend to and integrate descriptive linguistic meaning and social meaning in distinct stages, suggesting a stage of combining these two streams of information in processing. Thus, while social information is crucial for resolving meaning, it is dealt with separately from other interpretive cues. These results open a novel perspective on how the sociolinguistic and descriptive dimensions of meaning interact, a growing topic in pragmatics (see also Burnett (2019); Acton (2019)).
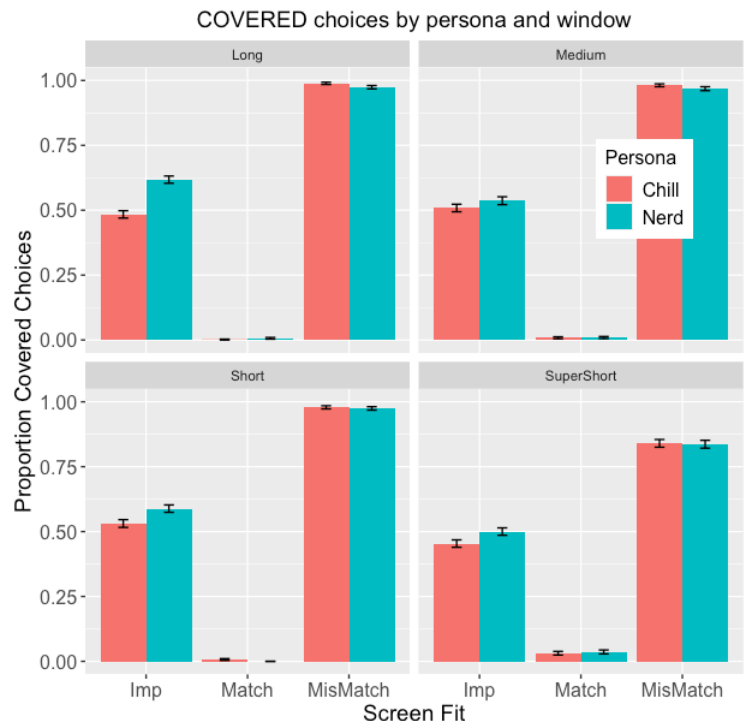

Fig.3. Covered choices by Match, Persona and Window