

# **‘What do you mean, one or more?’ On the processing of collective/distributive ambiguity in Italian**

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**Introduction** Imagine your partner tells you: ‘My friends are bringing a cake to our party’: would you interpret this as them bringing one cake together, or one cake each? Sentences with plural subjects are ambiguous between a *collective* interpretation (in which the group denoted by the subject acts together) and a *distributive* interpretation (in which each individual in the group acts separately). Formal approaches argue that the collective reading constitutes the default, unmarked meaning of such sentences, whereas the distributive reading is more complex, as its semantic representation includes an additional operator ( $D = \lambda P \lambda x \forall y [y \leq x \wedge \text{Atom}(y) \rightarrow P(y)]$ ) distributing the property *P* of the verb over each atomic member of the plural subject [1-3]. Empirical evidence, however, is mixed: while adults tend to prefer the collective interpretation, children sometimes prefer the distributive [4-7], which questions its presumed greater complexity. Moreover, not only most of the adult data comes from restricted control groups in offline studies with children (e.g., Picture Selection and Truth Value Judgment Tasks), but also the small body of online processing work is restricted to English [8,9]. This leaves formal claims about the underlying semantic representation of this type of ambiguous sentences without adequate empirical grounding.

**The study** In a preregistered Visual World Paradigm experiment, we investigated (i) whether Italian-speaking adults prefer the collective interpretation of ambiguous sentences, and (ii) when in the sentence this preference emerges, if at all. 51 participants (age  $M=26.98$  years; 18 males) saw two juxtaposed pictures – one depicting a collective action (e.g., three boys holding a *kite* together), the other a distributive action (e.g., three boys holding a *balloon* each) – while listening to sentences that remained ambiguous until the direct object, which univocally pointed at one of the two pictures (Figure 1). At the end of each trial, participants pressed a button to match the sentence with the corresponding picture; crucially, their looks were recorded from sentence onset with an Eye-Link Portable Duo. Participants were randomly assigned to one of two lists counterbalancing which direct object was depicted as collective/distributive (‘Target Type’ manipulation) and the position of the pictures on the screen; trial order was fully randomized. Each list contained 48 trials (24 experimental).

**Results & Discussion** Eye movements were analysed using a generalised additive mixed model (GAMM) modeling binomial looks to the target picture as a function of Target Type (collective/distributive), over a time window starting from subject onset (i.e., 2930 ms). Results show that looks to the target picture increased significantly more in the collective condition than in the distributive between 6030.2 and 7437.2 ms ( $s(\text{Time:TargetType})$ :  $\text{edf}=10.99$ ,  $\chi^2=3398.55$ ,  $p<.001$ ); Figure 2). This anticipation pattern appears to indicate that Italian adults by default interpret this kind of ambiguous sentences collectively, consistently with previous findings from English. Importantly, this preference emerges after the verb (offset at 5268 ms, on average) and before the direct object (onset at 6068.5 ms), challenging accounts attributing the collective bias to the definite plural marking on the subject [10]. Our findings thus seem to support formal claims about collective semantic representations being simpler than distributive ones, and provide evidence that the collective/distributive reading arises at the level of the verb – neither early at the level of the subject [11,12], nor after the object has been integrated with the verb [13].

Figure 1 - Example of experimental trial, where participants hear: ‘Guarda! Qui i bambini tengono... un aquilone/un palloncino’ (‘Look! Here the boys are holding... a kite/a balloon’)

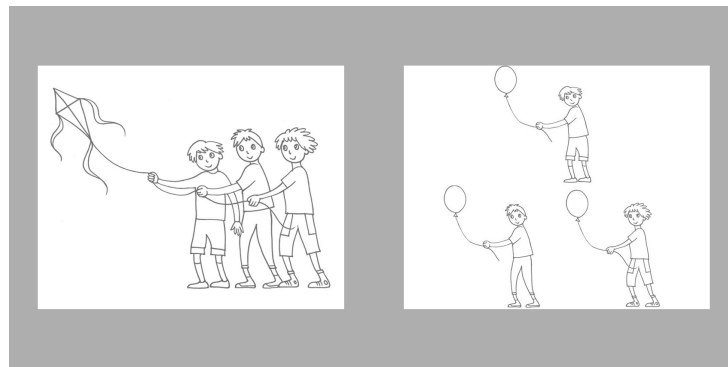
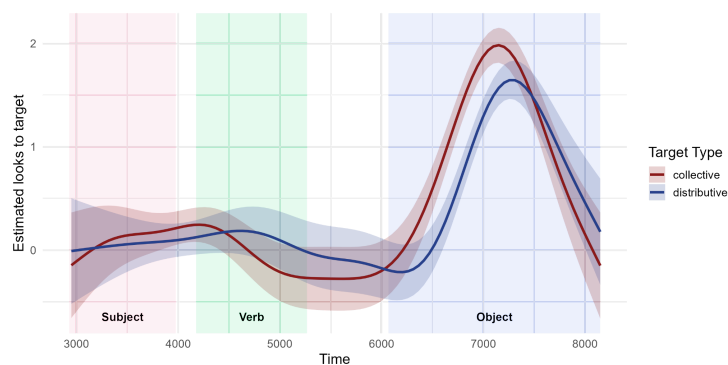


Figure 2 - Estimated time course of looks to the target picture by ‘Target Type’ (collective vs. distributive), averaged across trials.



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