

Tracking (in)definiteness in a language without determiners: Revisiting the Tangram task

In the classic Tangram task, one participant (Director) gives instructions to a partner (Matcher) to order and reorder a set of abstract images without conventional names [1,2]. Over time, the labels produced in this task have been shown to: (i) increase in efficiency (measured through a decrease in the number of words); (ii) converge on a conceptualization for each image; (iii) move from indefinites to definites (e.g., “11 looks like an ice skater” to “4 is the ice skater”) [3,4,5]. These measures have been taken as evidence for collaboration and the growth of common ground. However, this task has been carried out in languages with a definite determiner. Considering that 62.5% of the world’s languages, including Mandarin Chinese, lack an overt definite determiners [6], we ask: what would this indefinite to definite progression look like in these languages?

The choice of definite determiners has largely centered on uniqueness and familiarity meanings: in contrast to indefinites that are used to introduce new referents, definite descriptions are used to refer to familiar referents, either previously mentioned (“strongly familiar”) or contextually unique (“weakly familiar”: [7]). In Mandarin Chinese, *one*-classifier constructions are used for indefinites, whereas definite contexts give rise to bare nominals and demonstrative descriptions [8,9]. Jenks (2018) [10], based on [7], argues for a distinction, whereby Mandarin demonstrative descriptions denote *strong* definites, used in anaphoric contexts, and bare nominals denote *weak* definites, used in uniqueness contexts. In contrast, Dayal and Jiang (2022) [11] argue that bare nominals denote both uniqueness and familiar definites, and demonstrative descriptions are “regular demonstratives” that presuppose anti-uniqueness [cf. 12]. Recent studies involving acceptability judgment [13] reveal that both demonstratives and bare nominals are felicitous in familiarity contexts, with demonstratives being strongly preferred.

Here we repurpose the Tangram task to study (in)definiteness in Mandarin by directly examining uniqueness and familiarity. The task itself, having 6 rounds, leads to increased familiarity over time. To manipulate uniqueness, we adapted the set of twelve tangrams from [4]. In the Uniqueness condition, each tangram is expected to be conceptualized as one of six highly discriminable mammals (e.g., roughly the Mandarin equivalents of *goat*, *squirrel*, *giraffe*, *weasel*, *dog*, and *camel*). In the Non-Uniqueness condition, the six lowly discriminable tangrams are expected to be conceptualized as *birds*.

Fig. 1. Tangrams adapted from Duff et al. (2012) [4].



RESULTS (n=14). Each dyad’s conversation was machine-transcribed, before manual correction. Previous analyses of the (in)definiteness progression did not distinguish whether the noun was the head of the referring expressions. We coded for (a) whether the target noun (e.g., “*goat*” or “*bird*”) was the head noun; (b) the locus of modification: whether it appeared in its canonical position in Mandarin (pre-nominally) or whether it appeared post-nominally, as an elaboration; (c) the ‘determiner’ of the head NP: one-classifier, demonstrative, or nothing (=bare nominal).

Replication of known effects. Our implementation of the Tangram task in Mandarin replicates effects observed from previous studies [1,2]. First, we replicate the increased efficiency over time (mean number of words by the director: 83, 41, 33, 33, 18, 17). Next, to measure conceptualization, we segmented the data using the *jieba* package on Python, and extracted triplets of the most frequent content words (nouns, modifiers, verbs, locatives) per tangram per pair. We find that within each pair, the triplets of lexical items are never identical. As such, each dyad converged on a *different* conceptualization for each tangram.

Grammaticalization of labels. Fig. 2 plots the use of the “target” noun over time in purple. Often, “target” nouns first occur as properties in earlier rounds (e.g., “*looks like a camel*”), and their use as head noun (“*4 is camel*”) increases over time ($\beta = 0.66$, $p < .001$). We ran a logistic regression model and found an interaction between Round and Uniqueness, where speakers are quicker to converge on a head noun in the uniqueness condition ($\beta = -0.53$, $p < .001$), (e.g., “*dog*”).

Modification (green). Overall, we find that canonical pre-nominal modification is more likely for non-unique referents ($\beta = -1.244$, $p < .005$). While there is no significant main effect of Rounds,

Fig. 2. Mandarin Tangram results.

there is a significant interaction between Rounds and Uniqueness ($\beta = 0.230, p < .005$): pronominal modification increases at a steeper rate for non-unique referents, since modification is required to distinguish among tangrams.

Determiner-use. First, we find main effects of Uniqueness and Round for use of the overt indefinite one-classifier (yellow). They are more likely in the non-uniqueness condition ($\beta = 1.53, p = .008$), but this decreases over time ($\beta = -1.48, p < .001$), as expected when the referent becomes familiar.

For the bare nominals (blue), we find a main effect of Uniqueness: they are more likely to be produced for unique referents (73% vs. 51%) ($\beta = -1.245, p = .009$). Further, there was a main effect of Round: in the Unique condition, bare nominals increase in use by 13.4% per round [R1: 29.0% \rightarrow R6: 96.0%] ($\beta = 0.843, p < .001$) (cf. an increase of 10.2% per round in the Non-Unique condition). These results are partially consistent with [10], who predicts that Mandarin bare nominals are used under contextual uniqueness. However, [10] would also predict bare nominals to be replaced by demonstrative descriptions as the referents become more familiar (i.e., across rounds), an effect that is clearly not observed here. Specifically, demonstratives (red) do not differ in their rates across the uniqueness manipulation ($\beta = -0.221, p = .66$), but Uniqueness does interact with Round: demonstratives are more likely to be used for non-unique referents over time ($\beta = 0.443, p = .006$). This pattern is partially consistent with [11], who posit that both bare nominals and demonstrative descriptions are possible in anaphoric cases, and that demonstratives are “regular demonstratives” with an anti-uniqueness presupposition.

CONCLUSION. This study reveals that referential strategies in the tangram task in a language without overt determiners, here – Mandarin, can mirror those used in English, in terms of efficiency and convergence of labels. This allows us to repurpose this task to examine determiner-use, where we find (i) the expected drop in use of the overt indefinite one-classifier over time, as the referent becomes familiar, (ii) that Mandarin demonstrative descriptions do not seem to function as definite descriptions, and (iii) that bare nominals emerge as the preferred strategy for what in English would surface as definite descriptions. More generally, this shows how the Tangram task, which elicits naturally-occurring referential forms, allows us to easily manipulate properties such as uniqueness, with familiarity built in. Further insights into the distributions of bare nominals and demonstrative descriptions may be gained by expanding the range of languages using naturally produced data in well-defined contexts, so as to further develop theories of (in)definiteness.

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