

“Winning your first game”: functional readings of English possessive superlatives and ordinals

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Abstract

Some English sentences with possessive ordinal or superlative DPs are ambiguous, with a reading where the verbal predicate of the sentence constitutes part of the definition of the domain of comparison. For example, ‘*Mary won her first game*’ has a reading where the game is the first that Mary has won, but not the first she has played: contextual domain restrictions alone do not explain this. I propose a semantic account of these “functional readings” where the ordinal or superlative is interpreted in situ, with a binding relationship between the possessive determiner and the object noun. The denotation of the object noun further incorporates a restriction corresponding to the verbal predicate of the sentence. Ambiguity arises if the sentence predicate does not correspond to any of the meanings that are contextually available to the possessive relation.

Experimental investigation of the conditions under which readers allow the functional reading as an interpretation of a sentence gave only weak support to hypothesised patterns. Eventive (vs stative) verbs and ordinals (vs superlatives) allowed functional readings more readily, but these were not categorical contrasts.

Possessive functional readings add to the already rich body of facts that a semantic account of superlatives and ordinals needs to explain.

Keywords formal semantics, experimental semantics, superlatives, ordinals, possessives

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1 Introduction

This study will focus on a type of English sentence with a possessive Determiner Phrase (DP) containing an ordinal or superlative adjective, as exemplified by (1). This sentence is ambiguous, with two distinct readings that are truth-conditionally different: (1a) entails (1b), but not vice versa.

(1) **Mary_i won her_i first game.**

- a. $\exists g$. [Mary won $g \wedge g$ was the first game that Mary played]
= ‘Mary won the first game that she played.’
- b. $\exists g$. [Mary won $g \wedge g$ was the first game that Mary won]
= ‘For the first time, Mary won a game (not necessarily the first that she had played).’

Analogous readings exist with ordinals other than ‘*first*’, as in (2), and with superlatives, as in (3).

(2) **Mary won her third game.**

- a. $\exists g$. [Mary won $g \wedge g$ was the third game that Mary played]
- b. $\exists g$. [Mary won $g \wedge g$ was the third game that Mary won]

(3) **Mary won her biggest tournament.**

- a. $\exists t$. [Mary won $t \wedge t$ was the biggest tournament that Mary played in]
- b. $\exists t$. [Mary won $t \wedge t$ was the biggest tournament that Mary won]
(Exactly what measure is denoted by ‘*big*’ has some contextual flexibility.)

To win a game presupposes that one plays that game, but this presupposition is not a necessary condition for the ambiguity: for example, (4) is ambiguous in the same way as (1), with (4a) entailing (4b), yet to feed a cat does not presuppose owning it.

(4) **Ammar_i fed his_i first cat.**

- a. $\exists c$. [Ammar fed $c \wedge c$ was the first cat that Ammar owned]
= ‘Ammar fed the first game that he owned.’
- b. $\exists c$. [Ammar fed $c \wedge c$ was the first cat that Ammar fed]
= ‘For the first time, Ammar fed a cat.’

Real-world examples demonstrate that speakers are aware of the potential for ambiguity. Sometimes they explicitly disambiguate: in (5), the writer clarifies that a meaning like (1a) is intended, while the writer of (6) disambiguates to a reading like (1b). In the exchange (7), the reader initially misinterprets the sentence and clarification is required.

- (5) **I just won my first fortnite game... Literally the first time trying this game** (Reddit 2022)
- (6) **I won my first game! It was against my sister xD it's my third time ever playing** (Chess.com 2020)
- (7) **A: Sold my very first painting to a stranger today!**
B: Pretty good for your first painting, you're a natural.
A: It's not my first ever painting, but the first someone liked enough to offer money for it. (Reddit 2023)

1.1 Just context dependence?

The comparison set of an ordinal or superlative is often restricted according to context, as for example in (8) and (9):

- (8) **Mary has a talent for chess. She won her first game.**
 ('*her first game*' = her first game of chess.)
- (9) **Mary has a talent for tennis. She won her first game.**
 ('*her first game*' = her first game of tennis.)

Indeed, there are sentences apparently similar to (1) where a reading analogous to (1b) can be accounted for by a restriction on the comparison set that arises from discourse context or world knowledge. (10) and (12), in the readings given here, resemble (1b); but the ordinal DPs in those sentences have the same meanings as they do in (11) and (13) respectively, where the restriction comes from discourse or extralinguistic context.

- (10) **He wrote his first book last year.**
 (in the reading where '*his first book*' = the first book that he wrote.)
- (11) [Context: He has written ten books altogether.] **His first book was a critical success.**
 ('*his first book*' = the first book that he wrote.)
- (12) **He was given his first book at the age of nine months.**
 (in the reading where '*his first book*' = the first book that he was given.)
- (13) [Context: He was given many books as a baby.] **His first book was full of dinosaur pictures.**
 ('*his first book*' = the first book that he was given.)

However, (1b) is different: the restriction of the comparison set does not seem to be obtainable from discourse context. In (14), discourse context allows the DP '*her first game*' to have the same meaning that it does in (1a), but – despite the existence of '*won*' in the context – not the meaning in (1b) where the restriction is to *won* games.

- (14) **Mary won most of the games she played at the tournament. Her first game was thrilling.**
(‘*Her first game*’ allows the interpretation ‘*the first game of chess that she played*’, but **not** ‘*#the first game that she won*’.)

The presence of the verbal predicate with ‘*won*’ in the sentence itself seems to be required for (1b), where the comparison class is restricted to games that Mary won: so an account of that reading needs to explain why discourse context alone is not sufficient to impose the restriction on the comparison class.

1.2 Terminology

Readings like (1b), where the interpretation of the DP seems to depend on the function that the verbal predicate in the sentence denotes, will be referred to as *functional readings*. A proposed mechanism by which this function restricts the comparison class will be formalised in section 5.1. Readings like (1a), where the DP has an interpretation that it could also have in the absence of the verbal predicate, are *non-functional readings*.

1.3 Time domain restriction

If (1) is interpreted without a restriction on its time domain, then the truth conditions of reading (1a) require Mary to have won the specific game that was the first she played. The truth conditions of (1b), however, are satisfied if Mary has won at least one game of chess: this is not a tautology, but a speaker uttering (1b) likely intends to communicate something more informative. In use, (1b) will have its domain restricted to a particular event or time interval; this restriction may come from explicit context or may be implicit, as it is in ‘*I didn’t turn off the stove*’ (Partee 1973).

1.4 Stative and eventive verbs

The availability of functional readings can differ between parallel sentences with different verbs. Verbal aspect appears to play a role here, with stative verbs often resisting functional readings. For example, ‘*resemble*’, a paradigmatically stative verb (Maienborn 2011), does not in my judgement allow functional readings, either with ordinals or superlatives. The contrasts of (15) with (16), and of (17) with (18), demonstrate the unavailability of functional readings with the verb ‘*resemble*’ even where they are available in parallel sentences with the eventive verb ‘*feed*’.

- (15) **Bill resembled his first dog.**
(does not allow the reading with truth conditions ‘*#Bill resembled a dog, which was the first dog he had resembled*’.)
- (16) **Bill fed his first dog.**
(allows ‘*Bill fed a dog, which was the first dog he had fed*’.)

- (17) **Bill resembled his biggest dog.**
 (does not allow ‘#Bill resembled a dog bigger than any other dog he had resembled’.)
- (18) **Bill fed his biggest dog.**
 (allows ‘Bill fed a dog bigger than any other he had fed’.)

Some ostensibly stative verbs do seem to allow functional readings, as long as the adjective is an ordinal rather than a superlative. The functional reading is available for me in (19) but not in (20):

- (19) **Sunita loved her second cat.**
 (allows ‘Sunita loved a cat, which was the second cat she had loved’.)
- (20) **Sunita loved her smallest cat.**
 (does not allow ‘#Sunita loved a cat smaller than any other she had loved’.)

The functional reading of (19) involves an eventive, inchoative meaning of the verbal predicate, in effect ‘...**came to** love a cat’. Yet (15) and (17) do not allow the equivalent reading with ‘...came to resemble a dog’: the lexical semantics of the verb, not only its aspect, are relevant here.

Among eventive verbs, differences in Aktionsart do not seem to constrain the availability of functional readings. For example, the atelic predicate in (21), and the telic predicates in (22) and (23) (an accomplishment and an achievement respectively in the terminology of Vendler 1957), all allow functional readings.

- (21) **Olga waved her biggest flag.**
 (allows a reading ‘Olga waved a flag bigger than any she had waved before’, which does not entail that the flag she waved is the biggest she owns.)
- (22) **Rashid sang his longest song.**
 (allows a reading ‘Rashid sang a song longer than any he had sung before’, which does not entail that the song he sang is the longest he has written.)
- (23) **Katsumi sold her smallest painting.**
 (allows a reading ‘Katsumi sold a painting smaller than any she had sold before’, which does not entail that the painting she sold is the smallest she has painted.)

1.5 Research approach

The goals of this work are to characterise the conditions under which functional readings of possessive ordinals and superlatives arise, and to propose a formal semantic mechanism that accounts for these readings.

Section 2 reviews relevant prior literature and identifies research gaps. Section 3 specifies the research goals in detail. Section 4 sets out further data on sentences that allow functional readings. In section 5 I propose an account where, similarly to the treatment of comparative superlatives in Farkas & É. Kiss 2000, ordinals and superlative are interpreted in situ, with a binding relationship between the possessive determiner and the object noun. In functional readings, the denotation of the object noun incorporates a

restriction corresponding to the verbal predicate of the sentence. Section 6 describes an empirical survey to test some of the predictions of that analysis. Sections 7 and 8 review the analysis in light of the experimental results and point to potential future work.

2 Literature review

While there is extensive literature on the syntax and semantics of superlatives, much of it motivated by the need to explain ambiguities in superlative sentences, the specific ambiguity in sentences like (1) has not, to my knowledge, been discussed in the literature. Functional readings (in my terminology) of possessive ordinals are mentioned in Zhang 2022, but the ambiguity with non-functional readings is not discussed, superlatives are not considered, and in that analysis the semantic effect of the possessive determiner is identical to that of a definite or indefinite article.

The purpose of a literature review therefore is to identify elements that have been used in the analysis of similar but not identical phenomena, and are potentially relevant to the analysis of my data; and, conversely, to identify constraints on the analysis: i.e., elements that are to be avoided because they would contradict other known facts about the semantics of superlatives and ordinals.

2.1 Semantics of superlative DPs

A superlative description selects from some comparison set the entity that is maximal on some dimension; but exactly how the comparison set and the dimension of comparison are determined depends on sentence structure, discourse context and extralinguistic context. The substantial literature analysing the semantics of superlative DPs aims to characterise this dependency and propose semantic mechanisms for it. While there is largely consensus around the important phenomena that need to be explained, there is no clear agreement on any one account of them: achieving a full and consistent semantic account of every aspect of the behaviour of superlatives remains an unsolved problem.

2.1.1 *A movement-based account*

Heim (1999) develops an account where different readings of superlative sentences are accounted for by a combination of contextual restriction and movement at logical form (which is sometimes, but not always, due to focus effects). For example, the ambiguity of (24) can be explained by assuming that the “absolute” reading (24a) and the “comparative” (24b) differ only in the assignment of the contextually given set of mountains which the superlative selects from.

(24) **John climbed the highest mountain.**

- a. = ‘John climbed the highest mountain (from some contextually relevant set of mountains).’
- b. = ‘John climbed a higher mountain than anyone else (from some contextually relevant set of climbers) climbed.’
= (*equivalently*) ‘John climbed the highest mountain (from the set of mountains that were climbed by a member of that set of climbers).’

In this account, the superlative is a three-place predicate as in (25), taking as arguments a contextually given comparison set C , a degree relation R and an entity x . Both (24a) and (24b) have the same logical form (26): the difference between them is in the value that the context gives to the comparison set C .

$$(25) \quad \llbracket \text{-est} \rrbracket = \lambda C \lambda R \lambda x . [\exists d [R(x, d) \wedge \forall y [(y \neq x \wedge y \in C) \rightarrow R(y, d)]]]$$

$$(26) \quad \text{John climbed [the [[C -est] [high mountain]]]} \\ \text{(here, } R(x, d) = 1 \text{ iff } x \text{ is a } d\text{-high mountain.)}$$

In more complex sentences, focus can play a role, with different “comparative” readings of the same sentence favoured by different focus patterns, as in (27).

(27) **John put the tallest plant on the table.**

- a. = ‘ p is the tallest plant (from some contextually relevant set of plants). John put p on the table.’
- b. = ‘John put plant p on the table. p was taller than any plant that anyone else put on the table.’ (*favoured by focus on ‘John’*)
- c. = ‘John put plant p on the table. p was taller than any plant that John put anywhere else.’ (*favoured by focus on ‘table’*)

Heim posits that where there is focus, the DP ‘*the tallest plant*’ undergoes Quantifier Raising (QR), and the domain of the superlative is restricted to the union of a set of sets of entities C : the resulting logical form (LF) for (27b) and (27c) is (28). In (27b), each element of C is the set of plants put on the table by some alternative person to John; in (27c), each element of C is the set of plants put by John in some alternative location to the table.

$$(28) \quad \llbracket \text{the } [\cup C \text{-est}] \llbracket \text{tall plant} \rrbracket \rrbracket [\lambda x . \llbracket \text{John put } x \text{ on the table} \rrbracket \sim C]$$

However, Heim observes that readings (27b) and (27c) are also available *without* phonological focus. If the context makes one of the corresponding comparison domains (other people’s plants, or John’s plants in other locations) sufficiently salient, then the meanings of (27b) and (27c) can arise without QR, through different contextually provided choices of the comparison set in LF (29).

$$(29) \quad \text{John put [the } \llbracket [C \text{-est}] \llbracket \text{tall plant} \rrbracket \rrbracket \text{] on the table}$$

Heim observes that the superlatives in intensional contexts present a particular challenge. For example, she identifies five readings of (30), and argues that the “upstairs de dicto” reading (30e) cannot be accommodated in the framework presented so far.

- (30) **John wants to climb the highest mountain.**
- a. “*absolute, de re*”: ‘*m* is the highest mountain that exists. John wants to climb *m*.’
 - b. “*absolute, de dicto*”: ‘John wants it to be the case that he climbs whichever mountain is the highest that exists.’
 - c. “*comparative, de re*”: ‘John wants to climb mountain *m*. *m* is higher than any mountain that anyone else wants to climb.’
 - d. “*comparative, de dicto*”: ‘John wants it to be the case that he climbs a higher mountain than anyone else climbs.’
 - e. “*upstairs de dicto*”: ‘John’s mountain-climbing-height ambition exceeds everyone else’s.’

Heim argues that while the absolute and comparative readings (30a) through (30d) can be generated by different combinations of choices as to (i) whether the DP as a whole QRs above ‘*want*’; and (ii) the implicit comparison set of the superlative, the “upstairs de dicto” reading (30e) cannot. The comparison in (30e) is not between mountains as entities, but between climbers’ desire-worlds: this requires ‘*-est*’, but not the whole DP containing ‘*mountain*’, to scope above ‘*want*’. That reading according to Heim is best explained by an analysis where the superlative operator moves out of its hosting DP and raise above it, as in (31). Here, the definite determiner ‘*the*’ is semantically interpreted as an indefinite, represented by ‘*a*’ in (31).

- (31) John [*C -est*] λd . [wants_{w0} λw . [PRO to climb_w a *d-high*_w mountain_w]]
 (λw represents an abstraction over individuals’ desire-worlds.)

Bylinina et al. (2014) argue that ordinals differ from superlatives in not allowing “upstairs de dicto” readings. For example, the superlative sentence (32) and the ordinal (33) constitute a minimal pair. These sentences have several readings in common, but not the “upstairs de dicto” reading, which the superlative allows but the ordinal does not.

- (32) **John wants to take the earliest train.**
 (allows a reading ‘John’s desired train-taking time is earlier than anyone else’s desired train-taking time’.)
- (33) **John wants to take the first train.**
 (does not allow such a reading.)

Motivated by this contrast, Bylinina et al. propose that the superlative operator can move out of its hosting DP, but the ordinal operator cannot, and always remains in situ within the DP. Charnavel (2023) argues that (33) does in fact allow an “upstairs de dicto” reading, though it is harder to access than (32). I myself cannot get this reading for (33): I agree that Charnavel’s modified example (34) does have the same meaning as (30e), but in (34) the comparison set is explicitly supplied as a relative clause within the DP, so no movement of the ordinal out of the DP is needed to explain it.

- (34) **John wants to take the first train that anyone in the group wants to take.**
 = ‘John’s desired train-taking time is earlier than anyone else’s desired train-taking time.’

None of the sentences discussed in this section corresponds exactly to the ambiguity in possessive ordinal and superlative sentences like (1) and (3). At first sight, an account where the functional readings of those sentences involve raising of the superlative operator is attractive: in (1b), *‘first’* seems to scope above *‘win’*, analogously to (30e), where *‘highest’* scopes above *‘want’*. However, assuming Bylinina et al.’s analysis is correct, and ordinals cannot move in the same way as superlatives, this account could not explain the availability of functional readings with ordinals. A further problem is that in Heim’s analysis, the definiteness feature of a determiner in the DP is not semantically interpreted when the superlative operator raises, which leaves the possessive-specific behaviour of functional readings unexplained. Section 5.3.2 sets out in more detail the rationale for not postulating such raising as the mechanism for functional readings.

Heim and Bylinina et al. agree that QR of the whole DP is possible both with ordinals and superlatives. This however requires focus, whereas no focus is needed to obtain the functional readings of (1) and (3). In Heim’s account, readings (27b) and (27c) are available with or without focus; but when there is no focus, there is no QR and the comparison set of the superlative comes instead from implicit context. The examples discussed in section 1.1 demonstrate that context dependence is not enough to account for the restriction of the comparison set in functional readings.

2.1.2 *An in situ account*

An account of superlatives that does not require movement of the superlative operator, or the DP containing it, is presented by Farkas & É. Kiss (2000), who propose an analysis where the superlative always remains in situ in the DP, and the DP itself does not move from its base-generated position. In this account, the comparative reading of superlatives arises when the sentence contains a “licensing variable” (often the variable created by QR of a focused subject) and the noun in the DP receives a “functional interpretation”. That is, the noun is syntactically bound by the licensing variable, and its denotation includes a restricting function which is “established on the basis of the predicate the superlative is an argument of”, i.e. it corresponds to the denotation of the VP predicate in the sentence.

For example, in (35), the subject *‘John’* is focused, and is QRred, creating a λ -abstract with a binding variable i . In its logical form (36), the noun *‘mountain’* takes the denotation (38), incorporating the restriction to mountains climbed by i , and *‘the highest’* identifies the entity that satisfies that predicate and is higher than any mountain climbed by anyone else, giving the DP the denotation (37). (Farkas & É. Kiss note that this is not quite right in the case where John has climbed multiple mountains higher than any mountain climbed by anyone else: one approach to rectifying this would be to replace the $j \neq i$ term in (37) with $y' \neq y$).

- (35) **John_F climbed the highest mountain**
 (= John climbed a higher mountain than anyone else climbed)
- (36) John $\lambda i . i$ climbed [_{DP} the [highest [mountain^{*i*}]]]
- (37) [[the highest mountain^{*i*}] = $\iota y . [\text{mountain}^i(y) \wedge \forall j \forall y' [(\text{mountain}(y') \wedge y' \in f_{\text{climb}}(j) \wedge j \neq i) \rightarrow \text{height}(y') < \text{height}(y)]]$]
- (38) where: [[mountain^{*i*}] = $\lambda y . [\text{mountain}(y) \wedge y \in f_{\text{climb}}(i)]$
 and: $f_{\text{climb}}(i)$ = the set of mountains climbed by i

Farkas & É. Kiss extend this analysis to intensional contexts by postulating that the matrix verb and the subordinate clause verb form a complex predicate: so, in (30e), the denotation of ‘*mountain*’ would be similar to (38), but the functional restriction would be to the set of mountains that John *wants to climb*, with a corresponding function $f_{\text{want-to-climb}}$.

A separate case also covered by Farkas & É. Kiss is the “absolute dependent superlative” in sentences where there is a quantified variable and a superlative which is interpreted individually for each value of that variable. They observe that in (39), like (35), the interpretation of the superlative co-varies with a variable, but unlike (35), the comparison set is specified pragmatically by the context rather than semantically by the logical form. This is possible where the context supplies an association of each value of the quantified variable to a particular comparison set for the superlative (in the example, the mountains assigned to each student i), and hence to a unique entity (the highest mountain climbed by i) as a value for the superlative description.

- (39) [Context: every student was assigned some set of mountains.] **Every student climbed the highest mountain.**
 (= Every student i climbed the highest mountain assigned to i .)

Neither of these cases is identical to the ambiguous possessive superlative and ordinal sentences which are my object of study, but Farkas & É. Kiss’s account has some attractive features as a basis for an analysis of functional readings. Particularly, the restriction of the superlative’s comparison set by a function corresponding to the sentence predicate is potentially appropriate to functional readings – for example, the restriction of (1b) to games which Mary won seems to be possible only when ‘*win*’ is the verb in the sentence, not merely when the idea of winning is contextually salient. The absence of LF movement in Farkas & É. Kiss’s analysis allows it to be applied to ordinals as well as superlatives without conflicting with the facts presented by Bylinina et al. suggesting that the ordinal operator cannot move outside its containing DP. An analysis of functional readings of possessive superlatives and ordinals based on Farkas & É. Kiss’s ideas will be developed in section 5.

2.2 Semantics of ordinal DPs

2.2.1 Temporal-only interpretations

Bylinina et al. point out that although in general, ordinals can have a temporal or non-temporal meaning (for example, according to context ‘*first*’ can mean ‘first in time’, but

also ‘spatially closest’, ‘leftmost’ etc), there are some constructions where they only allow a temporal meaning, such as the “non-modal subject infinitival clause” in (40).

- (40) [Context: several books are stacked vertically. Some of them were published in 2013.] **John read the first book to be published in 2013.**
 (Bylina et al. 2014)
 (‘the first book’ can refer only to the book which had the earliest publication date in 2013, not to whichever 2013-published book is highest in the stack.)

Functional readings of possessive ordinals also appear to be restricted to the temporal meaning of the ordinal. The contrast between the available (41b) and the unavailable (41c) illustrates the requirement for the ordinal to have its temporal meaning in functional readings.

- (41) [Context: Dan has a set S of books laid out on a shelf from left to right.] **Dan read his first book.**
- a. $\exists b \in S$. [Dan read $b \wedge b$ was the leftmost book on the shelf]
 (available non-functional reading with non-temporal meaning of ordinal)
 - b. $\exists b \in S$. [Dan read $b \wedge$ Dan had not previously read any book $b' \in S$]
 (available functional reading with temporal meaning of ordinal)
 - c. $\# \exists b \in S$. [Dan read $b \wedge$ Dan had not previously read any book $b' \in S$ such that b' was to the left of b on the shelf]
 (unavailable functional reading with non-temporal meaning of ordinal)

In Bylina et al.’s semantic account of ordinals, the denotation of ‘ n th’ takes as arguments a comparison class (CC) and a noun phrase predicate (NP), yielding a function of type $\langle e, t \rangle$ which is true of an entity x if and only if at some time t' both $CC(x)$ and $NP(x)$ are true, and x is the n -th in temporal order of such entities, where the ranking is according to each entity’s value of t' .

The concept of ranking entities according to the time at which a predicate becomes true for them is also relevant to functional readings of possessive ordinals (as will be developed in section 5.1.1) because the ordinal in a functional reading is interpreted as a ranking of entities according to the time at which the sentence predicate is true, not to some other temporal property of the entities. The contrast between the available (42a) and the unavailable (42b) illustrates this.

- (42) **John visited his first Roman church.**
- a. $\exists c$. [John visited $c \wedge$ John had not previously visited any other Roman church c']
 (available functional reading where the temporal ranking is over John’s visits)
 - b. $\# \exists c$. [John visited $c \wedge$ John has not visited any other Roman church c' built before c was built]
 (unavailable functional reading where the temporal ranking is over some other property of the entity)

2.2.2 An analysis based on “event kinds”

Zhang (2022) puts forward an account of “DP-internal Event-Kind Elements (DEKEs)”, where a quantifier is pronounced inside a DP but is base-generated and semantically interpreted in a “predicate phrase” (PredP). The quantifier can be a frequency adverb (as in reading (43b) of (43)) or a cardinal number (as in (44)). It can also be an ordinal, as in (45), which in its possessive version resembles ambiguous sentences like (1); although despite its resemblance to (1), (45) is in fact more similar to (11), in that discourse context or world knowledge would allow ‘*her second guitar*’ to get the interpretation ‘*the second guitar that she bought*’ even without the presence of ‘*bought*’ in the sentence.

- (43) **An occasional sailor strolled by.** (Bolinger 1967)
a. = ‘Someone who occasionally sailed strolled by.’
b. = ‘Occasionally, a sailor strolled by.’
= ‘The kind of event where a sailor strolled by happened occasionally.’
- (44) **Four thousand ships passed through the lock.** (Krifka 1990)
= ‘There were four thousand events of the kind where a ship passed through the lock.’ (These did not necessarily involve four thousand distinct ships.)
- (45) **Susi bought (the/a/her) second guitar.** (Zhang 2022)
= ‘For the second time, Susi bought a guitar.’
= ‘This was the second event of the kind where Susi bought a guitar.’

In Zhang’s account, determiners within a DEKE are always “semantically bleached”: possessive and definiteness features are not interpreted, so the meaning of (45) is the same whether the determiner is ‘*the*’, ‘*a*’ or ‘*her*’. This does not predict the possessive-specific behaviour of functional readings. Zhang’s analysis also does not have a straightforward extension to superlatives (as opposed to ordinals). For these reasons, as explained at greater length in section 5.3.1, I have not used this analysis as the basis for explaining possessive functional readings, though it suggests interesting partial parallels with indefinite ordinals.

3 Research goals

My primary research goals are to understand what combinations of noun, verb and (superlative or ordinal) adjective allow functional readings of possessive DPs in English; and to propose a formal semantic mechanism for functional and non-functional readings of sentences containing such possessive DPs. My focus is primarily semantic rather than pragmatic: pragmatic questions around how speakers deal with ambiguous sentences will not be directly investigated. The goal is to understand when a functional reading is *possible*, not on when it is likely to be the preferred interpretation by hearers.

The primary type of sentence to be investigated is of the form (46): like (1), it consists of an animate subject *S*, a finite monotransitive verb *V* (in any tense), and an object DP with a possessive determiner *Poss*, an ordinal or superlative adjective *Sup*, and a singular sortal noun *N*. Examples which vary from this pattern will also be used, where they contribute to describing and analysing the phenomenon of functional readings. In

particular, sentences where the possessor in the DP is not bound by or coindexed with the subject will have a role in supporting the analysis (see section 4.2).

(46) [*S* [VP *V* [DP *Poss* [NP *Sup N*]]]]

Explaining the contrast between the ambiguous (1) and similar, but unambiguous, sentences like (10) is not a primary research goal, although it was my starting point in conceiving this work. The unambiguity of (10) could arise from it allowing only one logical form; but it could also be that (10) has two logical forms corresponding to (1a) and (1b), with both having the same truth conditions. Judgement data cannot distinguish these alternative possibilities: as Matthewson (2004) says, “there is no such thing as an ‘ambiguity judgment’”, as opposed to a judgement of truth or felicity. While I suggest an account of (10), this is tentative.

The research here is restricted to English, though informal discussions with speakers of other languages suggest that similar ambiguities appear outside English, and cross-linguistic comparisons would be a useful area for future investigation.

4 Further data

To characterise more fully the conditions that allow functional readings, and to develop hypotheses for testing in a judgement survey, this section identifies some further apparent patterns. The data here is from my intuitive judgement, except where stated.

4.1 Adjunct vs argument DPs

A possessive DP in an adjunct phrase seems unable to be given a functional reading:

(47) **Amal celebrated after her first goal.**
(does not allow ‘#For the first time, Amal celebrated after scoring a goal; she had scored goals previously but not celebrated’.)

In (47), the DP is within a preposition phrase (PP); but this itself does not prevent the functional reading. DPs within PPs can have functional readings when the PP is an argument as opposed to an adjunct. For example, a functional reading of (48) is available for me:

(48) **Fido chased after his first owner.**
(allows ‘For the first time, Fido chased after his owner; he had previous owners, who he did not chase after’.)

4.2 “Split-subject” functional readings

In the examples presented so far, the possessor in the DP has the same referent as the subject of the sentence. Functional readings are also possible, however, where the possessor and the subject are different. A real-world example is (49):

- (49) Lars Eller scored that goal too. **He won their first game for them** and their last game. (Reddit 2018)
 (*‘their’* refers to the Washington Capitals ice hockey team.)

Both functional and non-functional readings are available for (49), but for the DP *‘their first game’*, the functional reading is true on the facts of the world, and the non-functional reading is false: so the functional reading is presumably what the author intended. (The Capitals lost their first two games in the relevant series, but won the next game due to Eller’s goal (Wikipedia 2020).)

The possessor in a “split-subject” functional reading need not be a pronoun: a proper noun is also possible, as in (50):

- (50) **Lars Eller won (their / the Capitals’) first game for them.**
 (allows ‘Lars Eller was responsible for the Capitals winning the first game that they won [not necessarily the first that they played].’)

“Split-subject” functional readings seem to require some additional pragmatic licensing compared to their “same-subject” counterparts. (50) in its functional reading is awkward if *‘for them’* is removed, but other features of context can allow functional readings, as in (51):

- (51) **The Capitals were useless, but then Lars Eller won their first game.**
 (allows a functional reading equivalent to (50))

4.3 Quantifier-bound possessives

Functional readings are available when the possessive in the DP is bound by a QR-ed element. These include explicit quantifiers (52), “sloppy identity” ((53), (54)) and “fake indexicals” (55), i.e. bound variables with first or second person morphology (Kratzer 2009).

In the following, f denotes the function such that:

$$f(x) = 1 \text{ iff } \exists g_x . [x \text{ won game } g_x, \text{ and } x \text{ had won no game before } g_x]$$

- (52) **Every player won their first game.**
 (allows the reading: $f(i) = 1$ for every player i .)
- (53) **Arjun won his first game, and so did Noah.**
 (allows the reading: $f(\text{Arjun}) = f(\text{Noah}) = 1$)
- (54) **Only Yihan won her first game.**
 (allows the reading: $f(i) = 1$ iff $i = \text{Yihan}$.)
- (55) **Only I won my first game.**
 (allows the reading: $f(i) = 1$ iff $i = \text{the speaker}$.)

5 Initial analysis

My starting point for the analysis of functional readings is the treatment of comparative superlatives in Farkas & É. Kiss 2000, as discussed in section 2.1.2. In that analysis, a superlative DP remains in situ, and the denotation of the noun in the DP is restricted according to a function that expresses the predicate of the sentence. Farkas & É. Kiss stipulate that the function “is established on the basis of the predicate the superlative is an argument of”, not merely from context.

The concept of restriction according to a function is appropriate to readings like (1b), but Farkas & É. Kiss’s analysis of (35) (repeated below as (56)–(59)) is not an exact parallel to my data. In (56), a set of mountains climbed is evaluated for the focused subject ‘*John*’, and separate sets, characterised by $f_{\text{climb}}(j)$, are identified for each other climber j in the set of focused alternatives. The interpretation of (1b), by contrast, involves no games other than Mary’s, and no focus on ‘*Mary*’ is required for the functional reading to be available (so there is no reason to assume that QR of the subject and lambda-abstraction of the VP has taken place).

- (56) **John_F climbed the highest mountain**
 (= John climbed a higher mountain than anyone else climbed)
- (57) John $\lambda i . i$ climbed [_{DP} the [highest [mountain^{*i*}]]]
- (58) [the highest mountain^{*i*}] = $\iota y . [\text{mountain}^i(y) \wedge \forall j \forall y' [(\text{mountain}(y') \wedge y' \in f_{\text{climb}}(j) \wedge j \neq i) \rightarrow \text{height}(y') < \text{height}(y)]]$
- (59) where: [mountain^{*i*}] = $\lambda y . [\text{mountain}(y) \wedge y \in f_{\text{climb}}(i)]$
 and: $f_{\text{climb}}(i)$ = the set of mountains climbed by i

Even when quantifiers are present in sentences which have functional readings, there is no equivalent of this inter-climber comparison: for example in (52)–(55), no comparison is made between different individuals’ games. In that respect, these sentences resemble more closely Farkas & É. Kiss’s “absolute dependent superlatives” such as (39); but again, the parallel is not exact, because in (39) (repeated below as (60)), there is no equivalent of (58)’s f_{climb} . Rather, the comparison for each student is across a set of mountains provided by context, and not reliant on a function expressing the predicate of the sentence: ‘*climbed*’ is not involved in the interpretation of the superlative DP ‘*the highest mountain*’.

- (60) [Context: every student was assigned some set of mountains.] **Every student climbed the highest mountain.**
 (= Every student i climbed the highest mountain assigned to i .)

5.1 A denotation for the possessive superlative DP in functional readings

A viable approach for the functional readings in my data is a “functional dependent superlative”. Like Farkas & É. Kiss’s absolute dependent superlative, the comparison is between entities associated with a single individual; like their comparative superlative, the denotation of the noun is restricted by a function corresponding to the predicate expressed by the VP which the noun’s hosting DP is an argument of. (Functional readings do not

seem to be available when the DP is an adjunct rather than an argument, as illustrated by (47).)

Using the functional reading of (3) as an exemplar, an analysis can be written where the noun ‘*tournament*’ is bound by the possessive ‘*her*’, and its denotation is restricted to entities y such that $f_{\text{win}}(i)(y)$ is true, where f_{win} is the function denoted by the sentence predicate. (Following Farkas & É. Kiss, I write f_{win} with its order of arguments reversed as compared to the monotransitive verb denotation $\llbracket \text{win} \rrbracket$, so that the bound index i is the first argument of f_{win} .)

$$(61) \quad \llbracket \text{Mary}_i \text{ won her}_i \text{ biggest tournament} \rrbracket$$

$$(62) \quad = \llbracket \text{won} \rrbracket (\llbracket \text{her}_i \text{ biggest tournament}^i \rrbracket) (\llbracket \text{Mary}_i \rrbracket)$$

$$\text{where: } (\llbracket \text{tournament}^i \rrbracket) = \lambda y . [\text{tournament}(y) \wedge f_{\text{win}}(i)(y)]$$

$$\text{and: } f_{\text{win}} = \lambda x \lambda y . [x \text{ won } y]$$

In general, if f_V is the sentence predicate, then the bound noun N^i takes on the denotation (63):

$$(63) \quad \llbracket N^i \rrbracket = \lambda y . [\llbracket N \rrbracket(y) \wedge f_V(i)(y)]$$

The superlative operates on the comparison set denoted by the noun ‘*tournament*’ as restricted by the binding index i and the function f_{win} . Like Farkas & É. Kiss, I follow the analysis in Kennedy 1997, where a gradable adjective is of type $\langle e, d \rangle$, denoting a measure function from entities to degrees. Accordingly, the superlative form of a gradable adjective selects the member of the comparison set with the maximal value of the measure function.

$$(64) \quad \llbracket \text{biggest tournament}^i \rrbracket = \lambda y . [\text{tournament}(y) \wedge f_{\text{win}}(i)(y) \wedge \\ \forall z [(z \neq y \wedge \text{tournament}(z) \wedge f_{\text{win}}(i)(z)) \rightarrow \text{size}(z) < \text{size}(y)]]$$

(64) can alternatively be expressed in terms of the emptiness of the set of the entities that satisfy $\llbracket \text{tournament}^i \rrbracket$ and are bigger than y : this formulation more closely parallels the analysis that will be proposed for ordinals in (70).

$$(65) \quad \llbracket \text{biggest tournament}^i \rrbracket = \lambda y . [\text{tournament}(y) \wedge f_{\text{win}}(i)(y) \wedge \\ |\{z : z \neq y \wedge \text{tournament}(z) \wedge f_{\text{win}}(i)(z) \wedge \text{size}(z) \geq \text{size}(y)\}| = 0]$$

Although informally speaking, a superlative selects a single item, (64) and (65) denote not an entity, but the characteristic function of a single-element set, of type $\langle e, t \rangle$. This is consistent with the fact that ‘*biggest tournament*’ is not a complete DP: a determiner must combine with it to denote an entity. In functional readings, the possessive determiner is assumed to retain its usual denotation as in (66), selecting the unique item which i ‘possesses’, in the broad sense that some appropriate relation holds between possessor and possessum. That relation is the sentence predicate (here, f_{win}), even if outside the context of the sentence, it would not be an available meaning of the possessive: the relevance of this to ambiguity will be explored in section 7.4. The possessive determiner, of type $\langle \langle e, t \rangle, e \rangle$, combines with the constituent of type $\langle e, t \rangle$ formed from the superlative adjective and noun, and so the DP denotes a single entity. Combining (65) and (66), the denotation of the DP in the example sentence is (67).

$$(66) \quad \llbracket \text{her}_i \rrbracket = \lambda P . \iota x . P(x) \wedge R(i)(x) \quad \text{where in this case } R = f_{\text{win}}$$

$$(67) \quad \llbracket \text{her}_i \text{ biggest tournament}^i \rrbracket = \iota x . [\text{tournament}(x) \wedge f_{\text{win}}(i)(x) \wedge |\{z : z \neq y \wedge \text{tournament}(z) \wedge f_{\text{win}}(i)(z) \wedge \text{size}(z) \geq \text{size}(x)\}| = 0]$$

5.1.1 Denotation of superlative and ordinal operators

For a generalised **superlative** DP where the adjective denotes a measure function M , and the noun (when bound to the possessor) denotes a predicate P which includes the function denoting the sentence predicate, (65) is consistent with the superlative operator having the denotation in (68). The operator is written here as ‘*-est*’, but it can also be realised as preadjectival ‘*most*’, with the same denotation.

$$(68) \quad \llbracket \text{-est} \rrbracket = \lambda M \lambda P \lambda y . [P(y) \wedge |\{z : z \neq y \wedge P(z) \wedge M(z) \geq M(y)\}| = 0]$$

($\llbracket \text{-est} \rrbracket$ is of type $\langle\langle e, d \rangle, \langle\langle e, t \rangle, \langle e, t \rangle\rangle\rangle$.)

The **ordinal** operator should take a natural number n and select the entity which is n -th in temporal sequence of those that satisfies P . As discussed in section 2.2.1, this temporal sequence needs to order entities according to *the time at which P becomes true for them* (73). Example (69) provides an illustration of this: in functional readings, $P(z)$ incorporates $f_V(i)(z)$, and so if P were not involved in determining the sequence, readings such as (69b), which is akin to (41c) and in my judgement is not available, would be predicted.

(69) **Sally sold her first painting.**

- a. = (in functional reading) ‘Sally sold a painting p . She sold p earlier than she sold any other painting.’
- b. #‘Sally sold a painting p . She painted p earlier than she painted any other painting that she sold, but a painting q exists which Sally painted earlier than p and has not sold.’

The denotation of the ordinal operator can then be written as (70). ‘*First*’ behaves effectively as ‘*1-th*’ (71); ‘*last*’ is most conveniently written by starting from ‘*first*’ and reversing the direction of the temporal comparison (72). I follow Bylinina et al. (2014) in assuming that in (73), the relevant time $\tau(z)$ for each entity z is the *beginning* of the period where $P(z)$ is true.

$$(70) \quad \llbracket \text{-th} \rrbracket = \lambda n \lambda P \lambda y . [P(y) \wedge |\{z : z \neq y \wedge P(z) \wedge \tau(z) < \tau(y)\}| = (n - 1)]$$

($\llbracket \text{-th} \rrbracket$ is of type $\langle n, \langle \langle e, t \rangle, \langle e, t \rangle \rangle$ where n is the type of natural numbers.)

$$(71) \quad \llbracket \text{first} \rrbracket = \llbracket \text{-th} \rrbracket(1)$$

$$= \lambda P \lambda y . [P(y) \wedge |\{z : z \neq y \wedge P(z) \wedge \tau(z) < \tau(y)\}| = 0]$$

$$(72) \quad \llbracket \text{last} \rrbracket = \lambda P \lambda y . [P(y) \wedge |\{z : z \neq y \wedge P(z) \wedge \tau(z) \geq \tau(y)\}| = 0]$$

where:

$$(73) \quad \tau(z) = \text{the earliest time at which } P(z) \text{ is true.}$$

In this analysis, *‘first’* is firmly an ordinal: attempting to model it as a superlative using (68) would instead result in a denotation like that of *‘earliest’*, where P is not involved in determining the relevant temporal sequence.

Figures 1 and 2 show the computations of the denotations of the DPs in the functional readings of a superlative (61) and an ordinal (69) respectively.

Figure 1: Computation for the DP in the functional reading of ‘Mary won her biggest tournament’.

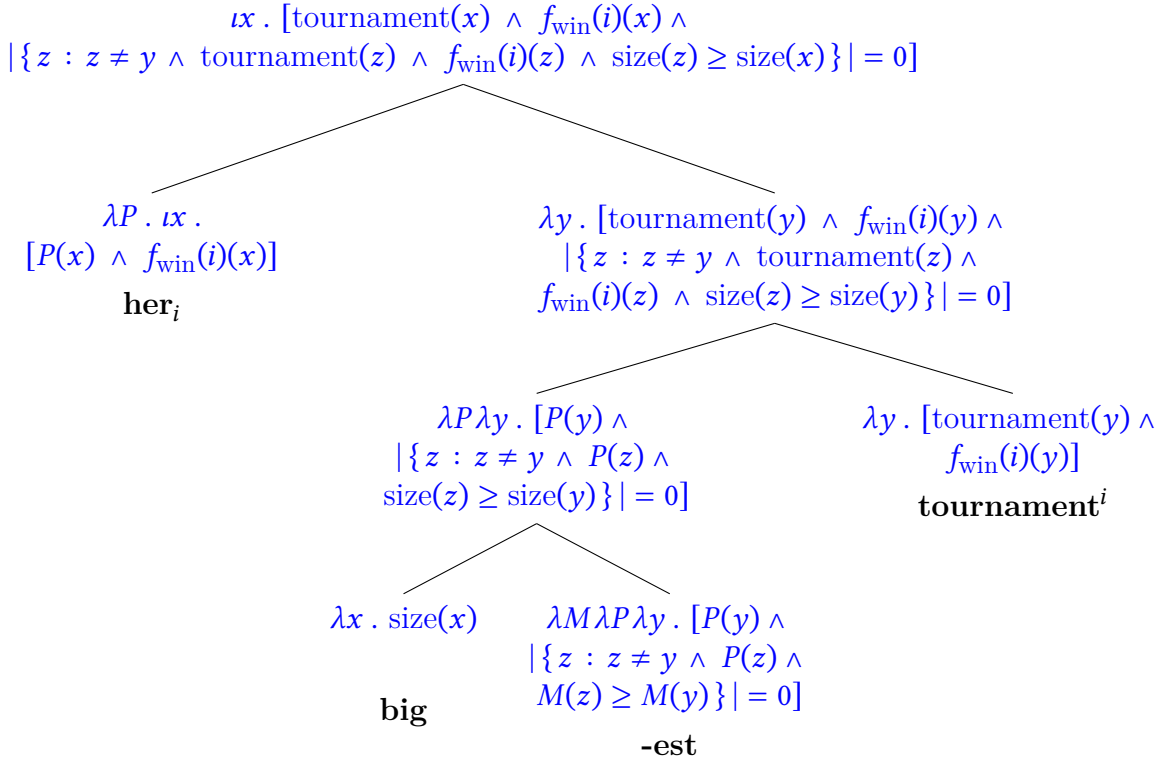
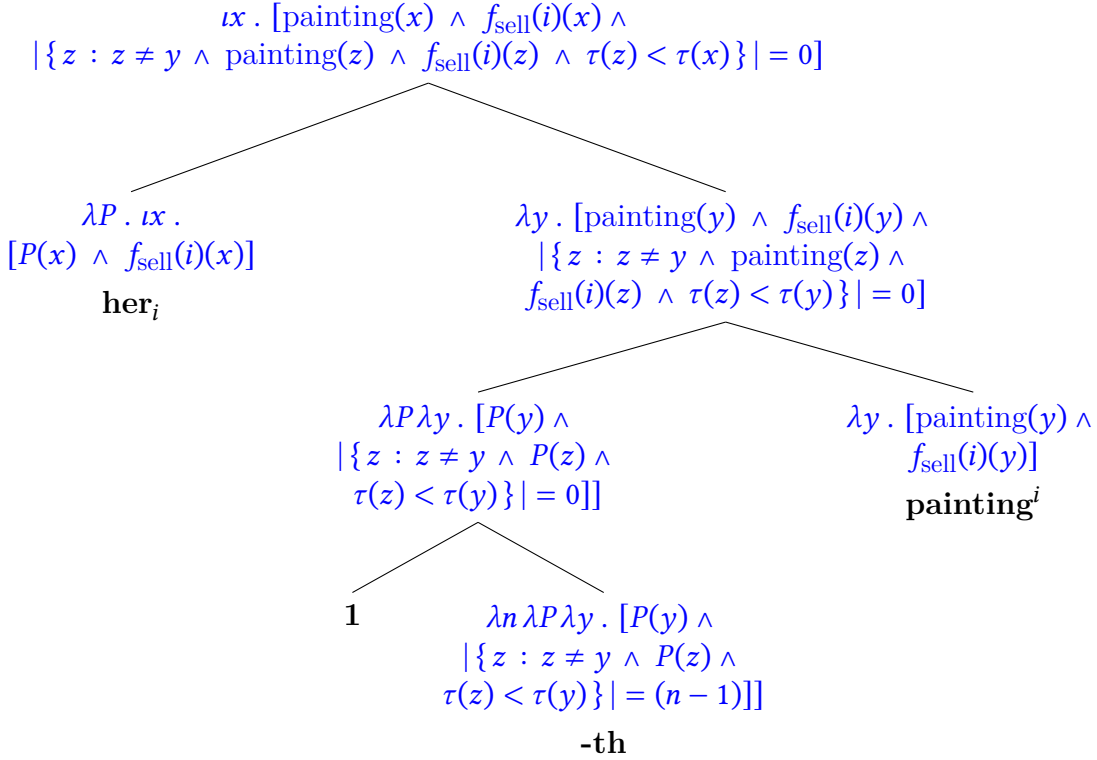


Figure 2: Computation for the DP in the functional reading of ‘Sally sold her first painting’.



5.1.2 Source of the binding index

In (62), the source of the binding index i on ‘*tournament* ^{i} ’ is not clear: it appears that it could equally well have come from the possessive ‘*her*’ or from its antecedent, the subject noun ‘*Mary*’. “Split-subject” functional readings, where the subject is not the antecedent of the possessive, point however to the possessive as the source: (50) is a sentence about the first game that the Capitals won, not (necessarily) the first that Eller won.

Binding to the possessive rather than the subject noun is consistent with the contrast between (74), which allows a functional reading, and (75), which in my judgement does not. If the subject noun were the source of binding, then ‘*first match*’ would have the same denotation in both sentences, yielding a set with a single element, which both ‘*her*’ and ‘*the*’ would select, giving the DP the same meaning in both sentences.

(74) **Yoko lost her first match.**

(75) **Yoko lost the first match.**

5.1.3 Stative and eventive predicates

The structure proposed in this analysis does not itself create the distinction between eventive and stative predicates which seems to be indicated by the data (section 1.4). One possible explanation is pragmatic, and starts from the observation (section 1.3) that

functional readings express a near-triviality unless they are constrained by context to refer to a particular event or time interval. Even though, on the account described, a functional reading exists for a stative predicate, it is uninformative: so hearers always interpret the sentence with its more informative non-functional reading, as in (76).

- (76) **Bill resembled his first dog.**
- a. $\exists d$. [Bill resembled $d \wedge d$ was the first dog that Bill owned]
(*non-functional reading*)
 - b. $\# \exists d$. [Bill resembled $d \wedge d$ was the first dog that Bill resembled]
'There exists at least one dog that Bill resembled.'
(*functional reading; pragmatically disfavoured*)

An ostensibly stative predicate can however be coerced to an eventive reading when it appears within a structure that forces an “event quantity” interpretation. A hypothesis that would explain the contrast between ordinals (which can allow functional readings with some normally stative verbs, as in (19)) and superlatives (which seem to resist such functional readings, as in (20)) is that an ordinal inside the DP can be interpreted (like the various examples in section 2.2.2) as quantifying over events, while a superlative cannot. Ordinals would therefore allow coercion of some stative verbs to an eventive reading, making the functional reading pragmatically available, while superlatives would not. For other stative verbs, such as ‘*resemble*’ in (76), an eventive reading seems to be inaccessible even in the presence of an ordinal.

5.2 Non-functional readings

As illustrated by (1a) and (14), the possessive superlative or ordinal DP in a non-functional reading has an interpretation that is independent of the verbal predicate of the sentence. Some of the semantic analysis of functional readings presented above therefore does not apply to non-functional readings (f_V is not involved), but it remains necessary to account for the fact that in non-functional readings too, the possessive acts as a restriction on the comparison set of the superlative: in the non-functional reading of (3), the comparison set of ‘biggest’ is restricted to tournaments that are Mary’s. One viable approach to the semantics of the non-functional readings of sentences like (3) then is to assume that the noun is bound by the possessive, as it is in functional readings; but rather than the sentence predicate f_V featuring in the denotations of the bound noun and the possessive determiner, it is replaced by a relation R_N which corresponds to an available meaning of the possessive for the noun in the DP.

For many nouns, there can be considerable contextual flexibility in the meaning of the possessive: for example, ‘*John’s book*’ can mean a book that John wrote (as in (11)); a book that he was given (as in (13)); a book that he owns a copy of; a book assigned to him to review; and so on. Consequently, the non-functional reading of a possessive superlative or ordinal may allow several interpretations, according to context and world knowledge.

The counterpart of (65) in the non-functional reading of (3) would be (77):

$$(77) \quad \llbracket \text{biggest tournament}^i \rrbracket = \lambda y . [\text{tournament}(y) \wedge R_{\text{tourn}}(i)(y) \wedge \\ |\{z : z \neq y \wedge \text{tournament}(z) \wedge R_{\text{tourn}}(i)(z) \wedge \text{size}(z) \geq \text{size}(y)\}| = 0]$$

(78) where, in general:

$$R_{\text{tourn}} = \lambda x \lambda y . [y \text{ can be described as 'x's tournament'}]$$

(79) and in likely context:

$$R_{\text{tourn}} = \lambda x \lambda y . [x \text{ played in } y]$$

5.3 Alternative analyses considered

Two alternative hypotheses were considered, but appeared to fit the data less well than the analysis in section 5.1.

5.3.1 “Event kind” analysis

In the account of “DP-internal event kind elements” proposed in Zhang 2022, sentences where a quantifier (including an ordinal) appears to modify a noun within a DP actually have the logical form of a quantification over “event kinds”, as in (45), repeated below as (80).

- (80) **Susi bought (the/a/her) second guitar.** (Zhang 2022)
 = ‘For the second time, Susi bought a guitar.’
 = ‘This was the second event of the kind where Susi bought a guitar.’

This is consistent with the observation that functional readings require the verbal predicate to be eventive (possibly via coercion), and would provide a viable account of functional readings with ordinals, for example in (82):

- (81) **George won his third game.**
 (82) [$\lambda n \lambda k . a \text{ } k\text{-kind event happened for the } n\text{-th time}$] [3] [the kind of event where George won a game]
 (Possible LF of (81) following the principles in Zhang 2022.)

Although Zhang’s account does not explicitly address superlatives, it could plausibly cover functional readings of some, but not all, superlative sentences. Contrast (83), where the superlative adjective could be read as describing an event, with (84) where it cannot.

- (83) **Jennifer passed her most important exam.**
 = $\exists e . e$ was the most important event of the kind where Jennifer passed an exam.
 (84) **Fahim sold his smallest painting.**
 $\neq \exists e . e$ was the smallest event of the kind where Fahim sold a painting.

In Zhang’s analysis, the determiner of the DP is “semantically bleached” and not interpreted: this predicts no contrast between (74) and (75) (repeated below as (85) and (86) respectively), when in fact the functional reading is available in (85) but not (86).

However, a further prediction is that the non-possessive indefinite (87) should have a reading equivalent to the functional reading of the possessive (85). In my judgement, (87) does indeed have this reading: a possible account of this will be discussed in section 7.3.1.

- (85) **Yoko lost her first match.**
- (86) **Yoko lost the first match.**
- (87) **Yoko lost a first match.**
= For the first time, Yoko lost a match.

5.3.2 *Raising of the ordinal or superlative operator*

Heim’s account of the superlative (section 2.1.1) involves, at least in intensional contexts, the raising of the superlative operator in the LF so that it scopes above a VP. This is at first sight an attractive account of functional readings of possessives, since it would provide a compositional mechanism for the comparison set of the superlative to be restricted to entities that satisfy the predicate expressed by the VP.

In the notation of Heim 1999, the functional reading of (3) could be written as (88), where the superlative ranges over the set characterised by the clause that is its sister at LF (the set of tournaments that Mary won) and selects the biggest.

- (88) [-est] λd [Mary_i won a *d*-big tournament of hers_i]

The paraphrase “a ... of hers” represents an indefinite possessive, in line with Heim’s proposal that definite determiners are interpreted as indefinite when the superlative moves out of the DP. In (88) however, the possessive appears to have no semantic effect, since the comparison set is already restricted to tournaments that Mary won. Like Zhang’s account, this analysis therefore seems to predict that ‘*her*’ could be replaced with ‘*the*’ in (3) with no change in available meaning: it does not predict the contrast between (74) and (75).

Moreover, accounts involving raising have difficulty in predicting differences between ordinals and superlatives that exist in some situations, such as Bylinina et al.’s contrast between (32) and (33), repeated below as (89) and (90) respectively. The in situ account proposed in section 5.1 avoids incompatibility with Bylinina et al.’s conclusion that an ordinal never raises out of its hosting DP.

- (89) **John wants to take the earliest train.**
(allows a reading ‘John’s desired train-taking time is earlier than anyone else’s desired train-taking time’.)
- (90) **John wants to take the first train.**
(does not allow such a reading.)

5.4 Recap of proposed analysis

Figure 3 summarises the proposal and its rationale based on the data presented in previous sections.

Figure 3: Summary of proposed semantic analysis.

Data	Theory
Functional readings exist, where the comparison set of the ordinal / superlative is restricted by the verbal predicate; this restriction seems unavailable from extrasentential context.	In functional readings, the denotation of the noun in the DP is restricted by a function that expresses the sentence predicate, with its first argument given by binding to the possessive determiner.
Non-functional readings also exist, where the comparison set of the ordinal / superlative is restricted by the possessor but not by the verbal predicate.	In non-functional readings, the noun in the DP is bound by the possessive determiner, but the sentence predicate does not enter into the denotation of the noun; instead, the function in the restriction represents an available possessive relation.
“Split-subject” cases exist (e.g. (49)), where the restriction is applied with reference to the possessor, not to the subject of the sentence.	The noun in the DP is bound by the possessive determiner (not the sentential subject).
Functional readings exist both for ordinals and superlatives.	The ordinal or superlative in a functional reading is interpreted in situ, consistent with the arguments of Bylinina et al. (2014) that ordinals do not move outside the hosting DP.
Functional readings appear more available with eventive verbs. Stative verbs do sometimes allow functional readings with ordinals, but not superlatives.	Pragmatic effect: functional readings of stative predicates denote a near-triviality, so hearers always prefer the non-functional reading. Stative verbs can be coerced to an eventive interpretation with ordinals, but not with superlatives.

6 Judgement survey

In order to avoid relying solely on my own linguistic judgements, a survey was conducted to test the judgements underlying the analysis in section 5. The survey was designed as a pilot suitable for a small sample of participants, with its scope focused on two of the generalisations which motivated the analysis: firstly, the availability of functional readings with possessive DPs but not with definite non-possessive DPs (the contrast between (74) and (75)), which is predicted to be a robust contrast by the analysis described in section 5.1.2; and secondly, the difference in the availability of functional readings between stative and eventive verbs, including the ordinal/superlative contrast for some stative verbs (section 1.4), which according to the analysis in section 5.1.3 is a pragmatic effect.

6.1 Method

6.1.1 Stimuli

A set of 7 target verbs was selected (Figure 4). This included both primarily stative and primarily eventive verbs, and aimed to cover potential differences in functional reading availability for primarily stative verbs. Based on my judgements, ‘*know*’, ‘*trust*’ and ‘*dislike*’ were expected to pattern like ‘*love*’ in (19) and (20) (i.e., functional readings would be available with ordinals but not superlatives); while ‘*hate*’, despite its lexical similarity to ‘*dislike*’ and ‘*love*’, was expected to disallow functional readings.

Figure 4: Verbs included in judgement survey

Verb	Category
fail	eventive
sell	eventive
win	eventive
dislike	stative
hate	stative
know	stative
trust	stative

A 2x2 design was adopted: for each verb, 4 target sentences for judgement were created such that there was one target with each possible combination of (i) ordinal or superlative adjective, (ii) possessive or non-possessive definite DP. This gave a total of 28 target sentences, to strike a balance between comprehensiveness on the one hand, and on the other hand a manageable size of survey which participants could be expected to complete.

For some verbs, ‘*first*’ was used as the ordinal; for others, ‘*third*’ was used (since, although the analysis in section 5.1.1 does not predict it, it is possible that ‘*first*’ behaves as a kind of superlative, different from other ordinals). This fixed association meant that some combinations of verb and ordinal were not tested. One alternative would have been to use a 3x2 design, with 42 stimuli in total, but this would have given a rather long survey which could have deterred participants or produced satiation effects when each participant saw sentences which differed only according to a choice of ordinal. Another

approach would have been for different participants to see different ordinals for the same verb (reducing the effective sample size of participants who saw each individual sentence). In retrospect, given the higher than expected number of participants recruited, this latter alternative would have been a viable choice.

Since the research aim was to investigate when functional readings are *possible*, rather than when hearers are more or less likely to prefer them, participants were asked to provide categorical truth value judgements. Each target was paired with a prompt describing the facts of a situation constructed such that the target sentence was true on its functional reading and false on its non-functional reading. The judgement question for participants was then: “**Can it be true to say this?**”, followed by the target sentence, with the options “yes” and “no”. A “yes” answer was, due to the construction of the prompt, regarded as evidence that the functional reading was available to the participant. The prompts avoided using the target verb, with the aim of minimising the risk that the target sentence appeared “true” just because the participant had effectively been primed with a similar expression. However, the target *noun* did appear in the prompt, and this may have induced some discourse effects, as discussed in section 7.1.1.

Within each 2x2 group, the prompts for each possessive example and its counterpart with ‘*the*’ were identical except for the name and pronouns of the character in the scenario. Between the ordinal and superlative example, the prompts aimed to differ minimally while still creating a scenario where the functional and non-functional readings clearly differed in truth value. All target sentences were in the past tense. Figure 5 shows an example; the full set of stimuli is given in Figure 9 in Appendix A.

Figure 5: Example 2x2 group of stimuli

Ordinal, possessive	Ordinal, non-possessive
<p>Sally has always really enjoyed pizza, and had never eaten a pizza that wasn’t good. But yesterday Sally ate a pizza and couldn’t stand it.</p> <p>Can it be true to say this? Sally hated her first pizza.</p>	<p>Rashid has always really enjoyed pizza, and had never eaten a pizza that wasn’t good. But yesterday Rashid ate a pizza and couldn’t stand it.</p> <p>Can it be true to say this? Rashid hated the first pizza.</p>
Superlative, possessive	Superlative, non-possessive
<p>Olga has always eaten a lot of pizzas, and always enjoyed them unless they were bland and had no spices. But yesterday Olga ate a moderately spicy pizza and couldn’t stand it.</p> <p>Can it be true to say this? Olga hated her spiciest pizza.</p>	<p>Katsumi has always eaten a lot of pizzas, and always enjoyed them unless they were bland and had no spices. But yesterday Katsumi ate a moderately spicy pizza and couldn’t stand it.</p> <p>Can it be true to say this? Katsumi hated the spiciest pizza.</p>

6.1.2 Procedure

The survey used the Qualtrics online platform. After providing their consent, participants were given a summary of the task to be performed. The goal of the research was not made explicit at this stage (it was summarised on a “debrief” screen at the end of the survey); participants were asked to give their initial reaction to each question, but were made aware that they would see very similar scenarios differing only by the use of a possessive, or *‘the’*.

In order to minimise the impact of any ordering effects on the aggregate results, stimuli were intended to be randomised so that, across participants, no stimulus would appear at a consistent point in the overall sequence. However, a strict alternation between possessive and non-possessive DPs was also desirable, in order to maintain participants’ attention to this difference. Accordingly, a technique of blocking (Cowart 1997, pp.94–95) was used. 7 blocks of 4 stimuli each were created (Figure 10 in Appendix A): within each block, the DP was possessive in items 1 and 3, and non-possessive in items 2 and 4. No target verb appeared more than once within a block. The survey was configured in Qualtrics so that the order between blocks was randomised for each participant, but within each block the fixed order of items was retained. Only one item at a time appeared on screen (participants had no visibility of the grouping into blocks). In order to capture intuitive judgements and minimise the effect of participants “theorising” as they progressed through the survey, the browser back button was disabled to prevent previous answers from being revised. However, participants were allowed to skip questions, to reduce the risk that they would abandon the survey if they found it difficult to provide an answer.

6.1.3 Distribution

The survey was distributed through personal networks, with onward sharing encouraged in order to gather a “friend of a friend” sample. Before beginning the survey, participants were required to self-certify that they were L1 English speakers aged over 18. They were also asked optionally to provide basic demographic information: age, gender and country of upbringing (including UK region, if appropriate). All participants chose to provide the optional information.

6.2 Results

35 participants completed some portion of the survey. Of those, 29 answered all 28 questions, with 3 participants leaving one or two questions unanswered: these participants were included in the analysis. The remaining 3 participants all answered fewer than 40% of the questions: their responses were excluded in full. Of the 32 included participants, 59.4% were female, 37.5% male and 3.1% non-binary; 87.5% reported growing up mainly in the UK, and 12.5% in the USA. The mean age was 55.

Figures 6 and 7 show the percentage of “yes” answers per question, reflecting participants who judged the target sentence as possibly true (and hence were regarded as accepting the functional reading of the sentence, since only this reading was intended to be true in the context of the prompt). “Yes” percentages ranged from zero (for two of the non-possessive targets), to 78.1% for the most frequently accepted target, *“Sita sold her third painting”*.

Figure 8 tabulates the percentage of “yes” answers for sentences where the DP was possessive – which according to the original hypothesis was necessary for functional readings to be available – averaged by verb category (eventive vs stative) and adjective category (ordinal vs superlative). As Figures 6 and 7 show however, there was wide variation *within* each category of verbs: an eventive/stative dichotomy does not seem to explain the verb-level results.

Figure 6: Percentages of participants accepting functional reading per survey question. “Ev” and “St” indicate eventive and stative verbs; “O” and “S” indicate ordinal and superlative targets. Confidence intervals are 95% Wilson score intervals, calculated using *binom* R package (Dorai-Raj 2022).

			% accepting functional reading (with 95% confidence interval)	
Cat	O/S	Target	Determiner	
			Non-possessive	Possessive
Ev	O	failed / third exam	15.6 (6.9–31.8)	53.1 (36.4–69.1)
	S	failed / most important exam	12.5 (5.0–28.1)	6.2 (1.7–20.1)
	O	sold / third painting	25.0 (13.3–42.1)	78.1 (61.2–89.0)
	S	sold / smallest painting	6.2 (1.7–20.1)	34.4 (20.4–51.7)
	O	won / first tournament	6.2 (1.7–20.1)	75.0 (57.9–86.7)
	S	won / biggest tournament	6.2 (1.7–20.1)	71.9 (54.6–84.4)
St	O	disliked / first salad	0.0 (0.0–10.7)	37.5 (22.9–54.7)
	S	disliked / saltiest salad	31.2 (18.0–48.6)	37.5 (22.9–54.7)
	O	hated / first pizza	0.0 (0.0–10.7)	25.0 (13.3–42.1)
	S	hated / spiciest pizza	16.1 (7.1–32.6)	21.9 (11.0–38.8)
	O	knew / first answer	6.2 (1.7–20.1)	37.5 (22.9–54.7)
	S	knew / longest answer	12.9 (5.1–28.9)	15.6 (6.9–31.8)
	O	trusted / third source	45.2 (29.2–62.2)	65.6 (48.3–79.6)
	S	trusted / oldest source	18.8 (8.9–35.3)	38.7 (23.7–56.2)
Overall			14.4 (11.4–17.9)	42.7 (38.2–47.4)

Figure 7: Percentages of participants accepting functional reading per survey question, plotted using R packages *ggplot2* (Wickham 2016) and *gghx2* (van den Brand 2023).

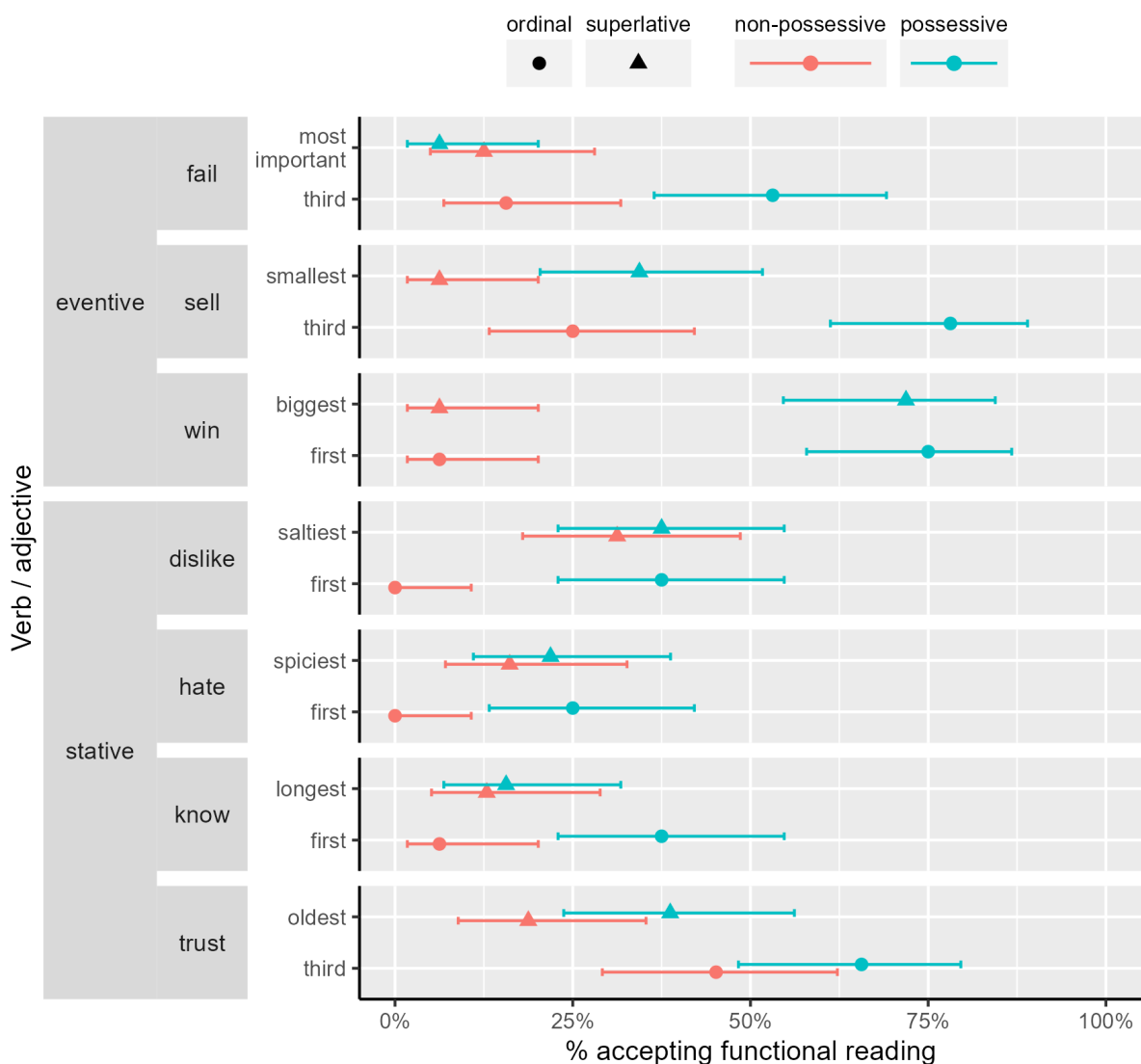


Figure 8: Percentages of participants accepting functional reading for sentences with possessive DPs, averaged by verb and adjective categories.

% accepting functional reading with possessive DP (with 95% confidence interval)			
Verb category	Adjective category		
	Ordinal	Superlative	Overall
Eventive	68.8 (58.9–77.1)	37.5 (28.5–47.5)	53.1 (46.1–60.1)
Stative	41.4 (33.2–50.1)	28.3 (21.2–36.7)	34.9 (29.3–40.9)
Overall	53.1 (46.6–59.6)	32.3 (26.5–38.7)	42.7 (38.2–47.4)

6.3 Discussion

6.3.1 Possessive vs non-possessive DPs

Based on my initial judgements, and the analysis in section 5.1.2, a categorical contrast between possessive and non-possessive definite DPs was predicted, with non-possessive DPs disallowing functional readings regardless of the verb, noun and adjective involved. While in aggregate, functional readings were clearly more available with possessive DPs (the mean “yes” rating was 42.7% for sentences with possessive DPs, compared to 14.4% with non-possessive DPs), the contrast was not as sharp as predicted. The highest-rated non-possessive sentence (“*Yasmin trusted the third source*”) was rated possibly true by 45.2% of participants, higher than several possessive sentences. One non-possessive sentence (“*Emma failed the most important exam*”) was rated higher than its possessive counterpart (12.5% vs 6.2%), and in several other pairings, the difference in rating between possessive and non-possessive DPs was well within the statistical confidence interval.

Two types of explanation could be advanced for this: either the semantics are not as predicted, and a possessive determiner is not required for functional readings; or a pragmatic effect allows the sentences to be judged as true by some participants despite the semantic unavailability of the functional reading with non-possessives. This will be explored in section 7.1.

6.3.2 Eventive vs stative verbs

The initial analysis and my intuitive judgements predicted a contrast between eventive and stative verbs, particularly in the relative availability of ordinal and superlative functional readings within each verb category. Functional readings for stative verbs were predicted to be less available than for eventive verbs; and the functional readings that do arise for stative verbs (through coercion) were predicted to require an ordinal rather than a superlative.

The sentence-level data in Figures 6 and 7 shows substantial variation between sentences in the same verb category. However, for the small sample of verbs tested, functional readings were indeed less available on average for stative verbs (Figure 8). The contrast between ordinals and superlatives for stative verbs was in the expected direction, but was far from absolute, and in fact weaker than the ordinal/superlative contrast for eventive verbs, where ordinals are also more likely to allow functional readings.

6.3.3 Adjectives

There appears to be no clear difference in the availability of functional readings with ‘*third*’ as compared to ‘*first*’. While the comparison is not fully like-for-like (each verb was tested with only one of the ordinals), this is suggestive of ‘*first*’ behaving like an ordinal rather than a superlative, as proposed in section 5.1.1.

The one possessive sentence where the superlative was realised as preadjectival ‘*most*’, namely “*Noah failed his most important exam*”, was the lowest-rated of all the possessives (6.2% “yes”), while its superlative counterpart was rated as 53.1% “yes”. There were no grounds in the semantic analysis to expect a difference in behaviour between ‘*most*’ and the suffix ‘*-est*’, but the experimental finding here, although based on a single test sentence, suggests that further investigation is needed.

7 Reviewing the analysis

7.1 Possessive vs non-possessive DPs

The initial analysis proposed that functional readings require binding of the noun in an ordinal or superlative DP to its possessive determiner (section 5.1.2): this was motivated partly by the expectation that sentences with non-possessive DPs (such as (75)) could not have functional readings. Yet the results of the judgement survey suggest, on the face of it, that definite non-possessive DPs do in fact allow functional readings for some readers, and in some instances are close to their possessive equivalents in the availability of functional readings. There are two potential approaches to accounting for these findings. Firstly, it is possible that functional readings do indeed exist for definite non-possessive DPs, and the theory needs to be modified so that binding between the possessor and the noun of the DP is not required. Alternatively, it is possible that the answers to the survey questions do not measure only the availability of functional readings, as they were intended to.

On the assumption that the “yes” answers in the survey truly reflect the existence of functional readings, a candidate modification to the analysis in section (5) would be to allow the noun in the DP to be bound to the subject, as long as the DP does not have a possessive determiner. (In this approach, the presence of a possessive determiner would still need to block binding to the subject, as shown by (49) and (50), which do not have an interpretation where the game is the first that Eller won, but not the first that the Capitals won.) Sentence (91), which appeared to allow a functional reading for 45.2% of survey participants, would then have a logical form (92): this is parallel to (62), except with binding to the subject rather than the possessive determiner.

(91) $\llbracket \text{Yasmin}_i \text{ trusted the third source} \rrbracket$

(92) $= \llbracket \text{trusted} \rrbracket (\llbracket \text{the third source}^i \rrbracket) (\llbracket \text{Yasmin}_i \rrbracket)$
where: $(\llbracket \text{source}^i \rrbracket) = \lambda y . [\text{source}(y) \wedge f_{\text{trust}}(i)(y)]$

This revised account would then need to explain why, in the aggregate, non-possessive sentences still seem less likely to allow the functional reading. It is plausible that binding at a longer distance could be more difficult to process, making functional readings harder to access for non-possessive than possessive sentences: but this does not explain the variation between sentence pairs. For example, for the verb ‘*win*’, both the ordinal and superlative sentences were rated at over 70% “yes” with a possessive DP, but under 10% “yes” with a non-possessive DP.

7.1.1 Discourse anaphora in the non-possessive DPs?

The full context in which (91) appeared in the survey was (93).

- (93) Yasmin is a researcher using historical sources of information. In her current project, Yasmin has spent a long time reviewing many sources, and had found only two of them appropriate. But yesterday Yasmin found another suitable source for her work.

Can it be true to say this?

Yasmin trusted the third source.

As described in section 6.1.1, in order for a truth value judgement to be a measure of the availability of a functional reading, the provided context had to make the target sentence true on its functional reading and false on its non-functional reading. In (93), ‘*the third source*’ was intended to refer to the third of the ‘*many sources*’ reviewed, not to the third of the sources that Yasmin in fact trusted. Readers could however have regarded ‘*many sources*’ as backgrounded information, so that those sources did not become part of the referent of ‘*the sources*’ in their discourse representation. ‘*The third source*’ would in that case refer to the third of the “foregrounded” sources that Yasmin trusted: and the reader would judge the target sentence in (93) as true without a functional reading being involved: rather, discourse anaphora provides a reading under which the target is true in light of the prompt.

This explanation does not though fully account for the variation in results across the non-possessive sentences. For example, (94) could be expected to create a similar discourse structure to (93), but was judged as possibly true by only 15.6% of participants.

- (94) Sofia is a student who had passed every exam she took at the first attempt, with the exception of two exams 5 years ago. However, last week Sofia took an exam and did not get the required grade.

Can it be true to say this?

Sofia failed the third exam.

In summary, the pattern of results in the survey, with “yes” ratings clearly higher for possessive than non-possessive sentences, does not rule out the proposal that binding to a possessive determiner is necessary for a functional reading: the non-zero ratings for non-possessive DPs have a potential explanation in discourse anaphora. The results do point however to the methodological difficulty in constructing a judgement task which is a fully valid measure of the availability of functional readings. (At the other end of the scale, it is also difficult to construct contexts where all participants accept the target as true in its functional reading: no target reached an 80% “yes” rating.)

7.2 Eventive vs stative verbs

The initial analysis (section 5.1.3) proposed that the logical form of functional readings does not structurally create a contrast between eventive and stative verbs; but that a pragmatic effect makes stative verbs less likely to allow a functional reading, and that when functional readings of stative verbs do arise, they require an ordinal rather than a superlative. The survey results (Figure 8) show that both of these patterns exist; but

the ordinal–superlative contrast for stative verbs is a tendency, rather than a categorical contrast. This is not inconsistent with the hypothesis of a pragmatic effect: but the survey data, particularly the extent of variation within each category of verbs, leaves it unclear whether the eventive–stative categorisation provides a useful explanatory factor.

7.3 Reconsidering the “event kind” analysis

In section 5.3.1, an “event kind” analysis was considered, based on Zhang 2022. This approach had the perceived drawbacks firstly of not explicitly addressing superlatives, with an apparent inability to explain superlative sentences such as (84) where the superlative cannot be perceived as describing an event; and secondly of positing the “semantic bleaching” of the determiner in the DP, and therefore predicting no contrast between a possessive determiner and *the*. In light of the survey’s findings that for some raters, DPs with *the* can indeed generate the truth judgements that would correspond to functional readings, the “event kind” analysis is worth reviewing.

The apparent difficulty in accounting for superlatives could be addressed by allowing an “event kind” phrase to incorporate a degree predicate, as in the revised analysis of (84) as (95).

- (95) **Fahim sold his smallest painting.**
 = $\exists e$. [of all events of the kind where Fahim sold a *d*-small painting, *e* was the *d*-maximising event]

The hypothesis of bleaching of the determiner remains problematic even in light of the survey data. The bleaching hypothesis ‘overcorrects’, predicting not only that functional readings exist for sentences with *the*, but that they are just as available as are functional readings of possessive sentences: this would not explain the overall higher “yes” ratings in the survey for possessive DPs, and particularly not the wide variation between sentence pairs in the *difference* in rating between the possessive and non-possessive members of the pair.

7.3.1 Functional readings with indefinite articles?

Zhang’s hypothesis that the determiner in an “event kind” DP is not semantically interpreted has a further consequence: DPs with *indefinite* articles should have readings whose truth conditions are the same as those of functional readings of possessives. For some sentences with ordinals, this is indeed the case, as illustrated by (45) and (87). A real-world example is (96), where the meaning of the sentence with *‘a first match’* is the same as that of the functional reading of the corresponding sentence with *‘his first match’*. This meaning is not available with *‘the’* as the determiner.

- (96) **Jose De Sousa finally won a first match on the Alexandra Palace stage at the fourth attempt.** (Sporting Life 2020)
 (i.e. for the first time, De Sousa won a match, which was not the first that he had played.)

Corresponding sentences with superlatives (e.g. (97)) do not however seem to be acceptable with any reading:

(97) ***Kazuo won a biggest tournament.**

Not all sentences with a functional reading of an ordinal seem to allow the replacement of the possessive by an indefinite without changing the meaning. In (98), for me the functional reading is at least marginally available with the possessive, but the meaning it expresses is unavailable with ‘*a*’.

(98) **Hugh disliked (his / a) first holiday.**
 (allows ‘for the first time, Hugh disliked a holiday’ with ‘*his*’, but not with ‘*a*’.)

In the cases where an indefinite appears to give the same meaning that a possessive in a functional reading would, there are in fact differences as regards the interaction with surrounding discourse. The version of sentence (99) with ‘*a*’ allows reading (99a), where ‘*second*’ places the guitar bought by Susi in the sequence of guitars in the discourse, and makes no reference to Susi’s guitar-buying history. Replacing ‘*a*’ with ‘*her*’ in (99) allows the meaning in (99b) but not that in (99a).

(99) **Arthur bought a guitar. Susi bought (a / her) second guitar.**
 a. (only with ‘*a*’): = Arthur bought guitar g_1 . Susi bought guitar g_2 . g_2 comes second in the sequence $[g_1, g_2]$.
 b. (with ‘*a*’ or ‘*her*’): = Arthur bought guitar g_1 . Susi bought guitar g_2 . g_2 comes second in the sequence of guitars (bought by / associated with) Susi.

The behaviour of indefinite ordinals does not then seem to be identical to functional readings of possessives; but nevertheless there are similarities which merit further investigation.

7.4 Ambiguity revisited

This work has focused on the semantics and availability of functional readings of possessive ordinal and superlative DPs, rather than on the observations about ambiguity which were its initial motivation. However, from the semantics proposed in sections 5.1 and 5.2 for functional and non-functional readings, an account of ambiguity can be sketched.

According to the proposed analysis, the difference between functional and non-functional readings is the choice of the function that restricts the comparison set: for functional readings it is f_V , which represents the verbal predicate; for non-functional readings it is R_N , representing a meaning of the possessive relation that is available for the noun N . Possessives can denote a wide range of relations between “possessor” and “possessum”, and in many sentences f_V will be one of the meanings that would be available for R_N even in the absence of the specific verbal predicate. For example, in (10) and (12), the meanings that ‘*his first book*’ would have in functional readings are meanings which are already available to ‘*his first book*’ in appropriate contexts. (10) and (12) then are not ambiguous in the way that (1) is – or at least, the possibility of a functional reading does not add any more ambiguity or vagueness than the non-functional reading has as a result of the range of meanings that the possessive relation can denote.

What distinguishes ambiguous cases like (1) is that f_V denotes a relation which the possessive, outside that sentence, cannot express. One situation which seems to generate this ambiguity is where f_V presupposes or entails one of the available meanings of R_N . For example, in (1), to win a game presupposes playing it, and outside a sentence about winning games, ‘*her game*’ can readily mean a game that she *played*, but not a game that she *won*. Why this is so – that is, why the possessive relation, despite its pragmatic flexibility, resists allowing multiple meanings such that one of its meanings entails another – requires a more detailed study of possessive relations. Other factors beyond presupposition and entailment must also be at play: the dialogue in (7) demonstrates that ‘*I sold my first painting*’ is ambiguous, yet selling a painting does not presuppose any particular relation to it.

On the semantic account proposed here, therefore, the specific phenomenon of ambiguity between functional and non-functional readings lies in the semantics and pragmatics of possessives, and the interpretation of nouns, rather than directly in the semantics of ordinals and superlatives.

8 Conclusions

This work has proposed that possessive superlative and ordinal DPs follow structurally similar semantics in their functional and non-functional readings. Both superlatives and ordinals are interpreted in situ within the DP, and in both functional and non-functional readings, a mechanism operates similar to that proposed in Farkas & É. Kiss 2000 for comparative superlatives, where a binding relationship between the possessive determiner and the DP’s noun creates a restriction in the comparison set over which the superlative or ordinal ranges. The difference between readings is that in functional readings, the restriction is to entities which satisfy the verbal predicate of the sentence; in non-functional readings, it is to entities which satisfy an available meaning of the possessive relation. Ambiguity arises when these readings have incompatible truth conditions: i.e., when the sentence predicate does not correspond to an available meaning of the possessive. Pragmatically, functional readings, in order to avoid a near-triviality, require a context in which the sentence implicitly refers to a time period or event.

Some challenge to this view comes from the experimental results described in section 6.3.1, where participants’ reported judgements suggested the availability of functional readings in some definite non-possessive DPs. For ordinals, readings apparently similar to functional readings also seem to be available in indefinite non-possessive DPs, as described in section 7.3.1. These observations do not necessarily invalidate the analysis, but both are worthy of further investigation. The apparent functional readings observed in definite non-possessive DPs were plausibly an artefact of the design of the survey, where the prompts needed in order to create a contrast in truth conditions between functional and non-functional readings could also have created discourse-anaphoric readings of the definite DP that corresponded to the truth conditions of functional readings.

8.1 Future avenues of investigation

Further experimental investigations with different methods, beyond truth-value judgements in constructed scenarios, would help to disentangle potential discourse effects from functional readings. For example, in a “felicitous continuation”-style judgement task like (100) (an adaptation of (93)), the object noun in the target sentence is discourse-novel,

avoiding the anaphora effect postulated in section 7.1.1 – although this is easier to achieve with ‘*first*’ in the target sentence than with other ordinals, or with superlatives.

- (100) Jana is a researcher using historical information. At the start of her research, Jana found all the information she was using to be unreliable.

Could this statement describe what happened next?

Then, finally, Jana trusted her first source.

The hypotheses in section 5.1.3 around which verbs would allow functional readings with ordinals and/or superlatives were only weakly borne out by the experimental results, which showed a general tendency – but no more – for functional readings to be allowed more often with eventive rather than stative verbs, and with ordinals rather than superlatives. While there is variation between verbs in the availability of functional readings, it does not map straightforwardly to an eventive/stative distinction and is worth investigating further in its own right with a wider set of lexical items. Similarly, the effect of different adjectives on the availability of functional readings needs further examination. Based on the limited data from the survey, there was no clear distinction between ‘*first*’ and ‘*third*’ as ordinals: but would this hold for a wider range of ordinals in a larger dataset? The survey data suggested that functional readings were heavily disfavoured with ‘*most important*’ as a superlative: is this general to the ‘*most*’ construction, or for particular types of adjectives; or is it an artefact of the survey stimuli?

The sentences investigated here intentionally conformed to a rigid structural pattern, to focus on the fundamentals of the phenomenon of functional readings. Exploring a wider range of sentence structures would further illuminate the syntactic and semantic mechanisms at work. For example, the study of intensional contexts has been influential in developing semantic theories of the superlative, and functional readings seem to exist in these contexts. In fact, an “upstairs functional” reading is possible in principle in intensional contexts, and seems to be available in (101c), provided the sentence is pronounced with appropriate prosody where ‘*wants to win*’ forms a single unit. It is possible that (101b) and (101c) both follow the structure proposed here for functional readings, with the difference being whether the predicate function f_V denotes winning (in (101b)), or wanting to win (in (101c)). This would correspond to the “complex predicate” analysis of “upstairs de dicto” readings in Farkas & É. Kiss 2000.

- (101) **Mary wants to win her first game.**

- a. (non-functional reading) = ‘Mary has not played before. She wants to win the first game that she plays.’
- b. (functional reading) = ‘Mary has played before, but never won. She wants to win a game, which will be the first that she has won.’
- c. (“upstairs functional” reading) = ‘Mary has won before, without wanting to. She wants to win her upcoming game: this is the first time she has wanted to win.’

Sentences with a meaning that resembles a possessive functional reading, but where the DP is a non-possessive indefinite ordinal (such as (96)), have not been directly investigated here, and need analysis in their own right. They differ in important ways from possessive functional readings (for example, being unavailable with superlatives, and behaving differently in their interaction with surrounding discourse, as (99) illustrates),

but do seem to have the same core feature that the verbal predicate is involved in the interpretation of the ordinal DP.

The work presented here has been a first step in investigating a type of sentence that has so far gone largely unexplored. Possessive functional readings not only pose semantic questions in their own right, but also have the potential to bring an additional angle to long-standing debates in the semantics of ordinals and superlatives.

Data availability

Data from the experimental survey (with potentially identifying demographic data removed), and the R code used to produce the analysis in section 6.2, are available on the Open Science Framework: <https://osf.io/c3sm4/>.

References

- Bolinger, Dwight. 1967. Adjectives in English: Attribution and predication. *Lingua* 18. 1–34. doi: 10.1016/0024-3841(67)90018-6.
- Bylinina, Lisa, Natalia Ivlieva, Alexander Podobryaev & Yasutada Sudo. 2014. A non-superlative semantics for ordinals and the syntax of comparison classes. Ms., Meertens Instituut, Institut Jean-Nicod, Higher School of Economics, and UCL. URL: <https://www.ucl.ac.uk/~ucjtudo/pdf/ordinals-v9.pdf>.
- Charnavel, Isabelle. 2023. Appealing to superlative clauses (or how to split the scope of superlative adjectives across intensional verbs). Ms., Université de Genève. URL: <https://ling.auf.net/lingbuzz/007223>.
- Chess.com. 2020. I won my first game! URL: <https://www.chess.com/forum/view/for-beginners/i-won-my-first-game>.
- Cowart, Wayne. 1997. *Experimental Syntax: Applying Objective Methods to Sentence Judgements*. Thousand Oaks, Calif: Sage Publications.
- Dorai-Raj, Sundar. 2022. *binom: Binomial confidence intervals for several parameterizations*. URL: <https://CRAN.R-project.org/package=binom>.
- Farkas, Donka F. & Katalin É. Kiss. 2000. On the Comparative and Absolute Readings of Superlatives. *Natural Language & Linguistic Theory* 18(3). 417–455. doi: 10.1023/A:1006431429816.
- Heim, Irene. 1999. Notes on superlatives. Ms., MIT. URL: <https://semanticsarchive.net/Archive/TI1MTlhZ/Superlative.pdf>.
- Kennedy, Christopher. 1997. *Projecting the adjective*: University of California, Santa Cruz dissertation.
- Kratzer, Angelika. 2009. Making a Pronoun: Fake Indexicals as Windows into the Properties of Pronouns. *Linguistic Inquiry* 40(2). 187–237. doi: 10.1162/ling.2009.40.2.187.

- Krifka, Manfred. 1990. Four thousand ships passed through the lock: Object-induced measure functions on events. *Linguistics and Philosophy* 13(5). 487–520. doi: 10.1007/BF00627291.
- Maienborn, Claudia. 2011. Event semantics. In Klaus von Heusinger, Claudia Maienborn & Paul Portner (eds.), *Semantics: An International Handbook of Natural Language Meaning*, vol. 1, 802–829. de Gruyter Mouton. doi: 10.1515/9783110589245-008.
- Matthewson, Lisa. 2004. On the Methodology of Semantic Fieldwork. *International Journal of American Linguistics* 70(4). 369–415. doi: 10.1086/429207.
- Partee, Barbara Hall. 1973. Some Structural Analogies between Tenses and Pronouns in English. *The Journal of Philosophy* 70(18). 601–609. doi: 10.2307/2025024.
- Reddit. 2018. Down Goes Brown Called the Caps To Win The Cup. URL: www.reddit.com/r/hockey/comments/8rf6xy/down_goes_brown_called_the_caps_to_win_the_cup/e0qzyc9/.
- Reddit. 2022. I just won my first fortnite game... Literally the first time trying this game. URL: www.reddit.com/r/FortNiteBR/comments/u0pcwo/i_just_won_my_first_fortnite_game_literally_the/.
- Reddit. 2023. Sold my very first painting to a stranger today! URL: www.reddit.com/r/woahdude/comments/1286o00/sold_my_very_first_painting_to_a_stranger_today/jek223c/.
- Sporting Life. 2020. Darts results: Jose De Sousa claims his first World Championship win as Daryl Gurney survives scare. URL: <https://www.sportinglife.com/darts/news/de-sousa-wins-gurney-survives/187571>.
- van den Brand, Teun. 2023. *ggh4x: Hacks for ggplot2*. URL: <https://CRAN.R-project.org/package=ggh4x>.
- Vendler, Zeno. 1957. Verbs and Times. *The Philosophical Review* 66(2). 143–160. doi: 10.2307/2182371.
- Wickham, Hadley. 2016. *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York.
- Wikipedia. 2020. 2018 Stanley Cup playoffs. URL: https://en.wikipedia.org/w/index.php?title=2018_Stanley_Cup_playoffs&oldid=995300698.
- Zhang, Niina Ning. 2022. Kind-Level Predicates of Events Inside Another Predication. *Studia Linguistica* 76(2). 315–353. doi: 10.1111/stul.12174.

Appendix A Judgement survey stimuli

Figure 9 shows the full set of 28 stimuli used in the judgement survey. In the columns categorising the questions, “E/S” indicates eventive vs stative verbs, “O/S” indicates ordinals vs superlatives, and “DP” indicates possessive (P) vs non-possessive (NP) DPs. Figure 10 shows the grouping of these stimuli into blocks, as detailed in section 6.1.2. Each participant saw the 7 blocks in a different random order, but the order of the 4 items within each block was the same for all participants.

Figure 9: Stimuli used in the judgement survey.

E/S	Verb	O/S	DP	Context	Target
E	fail	O	P	Anna is a student who had passed every exam she took at the first attempt, with the exception of two exams 5 years ago. However, last week Anna took an exam and did not get the required grade.	Anna failed her third exam.
E	fail	O	NP	Sofia is a student who had passed every exam she took at the first attempt, with the exception of two exams 5 years ago. However, last week Sofia took an exam and did not get the required grade.	Sofia failed the third exam.
E	fail	S	P	Noah is a student who had passed every exam he took at the first attempt, with the exception of two very unimportant exams. However, last week Noah took a fairly important exam and did not get the required grade.	Noah failed his most important exam.
E	fail	S	NP	Emma is a student who had passed every exam she took at the first attempt, with the exception of two very unimportant exams. However, last week Emma took a fairly important exam and did not get the required grade.	Emma failed the most important exam.
E	sell	O	P	Sita is an artist who had painted many pictures, but only two of them had ever been bought by anyone. Recently, she finished a new painting and immediately found a collector who bought it.	Sita sold her third painting.

E/S	Verb	O/S	DP	Context	Target
E	sell	O	NP	Anika is an artist who had painted many pictures, but only two of them had ever been bought by anyone. Recently, she finished a new painting and immediately found a collector who bought it.	Anika sold the third painting.
E	sell	S	P	Leo is an artist who has painted many pictures in small, medium and large sizes. Previously, only his large paintings had ever found buyers, but recently a collector bought one of Leo's medium-sized paintings.	Leo sold his smallest painting.
E	sell	S	NP	Jennifer is an artist who has painted many pictures in small, medium and large sizes. Previously, only her large paintings had ever found buyers, but recently a collector bought one of Jennifer's medium-sized paintings.	Jennifer sold the smallest painting.
E	win	O	P	Michiko is a chess player who has competed in several tournaments. Until recently, she had never been successful in a tournament, but last week she was declared the champion of a tournament.	Michiko won her first tournament.
E	win	O	NP	Kazuo is a chess player who has competed in several tournaments. Until recently, he had never been successful in a tournament, but last week he was declared the champion of a tournament.	Kazuo won the first tournament.
E	win	S	P	Cleo is a chess player who has competed in several tournaments. The tournaments are ranked as small, medium and large according to the number of participants. Cleo had competed in small and large tournaments, but only succeeded in small tournaments. Last week, she was declared the champion in a medium-sized tournament.	Cleo won her biggest tournament.

E/S	Verb	O/S	DP	Context	Target
E	win	S	NP	Matthew is a chess player who has competed in several tournaments. The tournaments are ranked as small, medium and large according to the number of participants. Matthew had competed in small and large tournaments, but only succeeded in small tournaments. Last week, he was declared the champion in a medium-sized tournament.	Matthew won the biggest tournament.
S	dislike	O	P	Hannah eats a lot of salads, and had never tried a salad she didn't enjoy. But yesterday Hannah ate a salad which she thought tasted unpleasant.	Hannah disliked her first salad.
S	dislike	O	NP	Ben eats a lot of salads, and had never tried a salad he didn't enjoy. But yesterday Ben ate a salad which he thought tasted unpleasant.	Ben disliked the first salad.
S	dislike	S	P	Mina eats a lot of salads, and had always enjoyed them unless they had no salt. But yesterday Mina ate a fairly salty salad and found it unpleasant.	Mina disliked her saltiest salad.
S	dislike	S	NP	Rosie eats a lot of salads, and had always enjoyed them unless they had no salt. But yesterday Rosie ate a fairly salty salad and found it unpleasant.	Rosie disliked the saltiest salad.
S	hate	O	P	Sally has always really enjoyed pizza, and had never eaten a pizza that wasn't good. But yesterday Sally ate a pizza and couldn't stand it.	Sally hated her first pizza.
S	hate	O	NP	Rashid has always really enjoyed pizza, and had never eaten a pizza that wasn't good. But yesterday Rashid ate a pizza and couldn't stand it.	Rashid hated the first pizza.
S	hate	S	P	Olga has always eaten a lot of pizzas, and always enjoyed them unless they were bland and had no spices. But yesterday Olga ate a moderately spicy pizza and couldn't stand it.	Olga hated her spiciest pizza.

E/S	Verb	O/S	DP	Context	Target
S	hate	S	NP	Katsumi has always eaten a lot of pizzas, and always enjoyed them unless they were bland and had no spices. But yesterday Katsumi ate a moderately spicy pizza and couldn't stand it.	Katsumi hated the spiciest pizza.
S	know	O	P	Mary is taking a difficult written test. For the first ten questions, all she can do is guess an answer. Then she reads question 11, and she is certain of the answer.	Mary knew her first answer.
S	know	O	NP	Michelle is taking a difficult written test. For the first ten questions, all she can do is guess an answer. Then she reads question 11, and she is certain of the answer.	Michelle knew the first answer.
S	know	S	P	Haoyu is taking a written test. The first section of the test requires 100-word answers, but he has to guess all of those. The next section requires 1-word answers, and Haoyu is sure of all of them. The final question requires a 10-word answer, and Haoyu is certain of the right answer to that question.	Haoyu knew his longest answer.
S	know	S	NP	Kenji is taking a written test. The first section of the test requires 100-word answers, but he has to guess all of those. The next section requires 1-word answers, and Kenji is sure of all of them. The final question requires a 10-word answer, and Kenji is certain of the right answer to that question.	Kenji knew the longest answer.
S	trust	O	P	Harry is a researcher using historical sources of information. In his current project, Harry has spent a long time reviewing many sources, and had found only two of them appropriate. But yesterday Harry found another suitable source for his work.	Harry trusted his third source.

E/S	Verb	O/S	DP	Context	Target
S	trust	O	NP	Yasmin is a researcher using historical sources of information. In her current project, Yasmin has spent a long time reviewing many sources, and had found only two of them appropriate. But yesterday Yasmin found another suitable source for her work.	Yasmin trusted the third source.
S	trust	S	P	Hugh is a researcher using historical sources of information. Hugh has reviewed sources from 1900 through to 2000, but the only sources Hugh wanted to use were from after 1980. However, yesterday Hugh found a source from 1960 that he considered very useful.	Hugh trusted his oldest source.
S	trust	S	NP	Yoko is a researcher using historical sources of information. Yoko has reviewed sources from 1900 through to 2000, but the only sources Yoko wanted to use were from after 1980. However, yesterday Yoko found a source from 1960 that she considered very useful.	Yoko trusted the oldest source.

Figure 10: Grouping of stimuli into blocks.

Block	Item	Target
1	1	Anna failed her third exam.
	2	Jennifer sold the smallest painting.
	3	Hugh trusted his oldest source.
	4	Kenji knew the longest answer.
2	1	Olga hated her spiciest pizza.
	2	Yasmin trusted the third source.
	3	Mina disliked her saltiest salad.
	4	Emma failed the most important exam.
3	1	Noah failed his most important exam.
	2	Kazuo won the first tournament.
	3	Sita sold her third painting.
	4	Michelle knew the first answer.

Block	Item	Target
4	1	Harry trusted his third source.
	2	Katsumi hated the spiciest pizza.
	3	Haoyu knew his longest answer.
	4	Sofia failed the third exam.
5	1	Sally hated her first pizza.
	2	Matthew won the biggest tournament.
	3	Hannah disliked her first salad.
	4	Anika sold the third painting.
6	1	Michiko won her first tournament.
	2	Yoko trusted the oldest source.
	3	Leo sold his smallest painting.
	4	Rosie disliked the saltiest salad.
7	1	Mary knew her first answer.
	2	Rashid hated the first pizza.
	3	Cleo won her biggest tournament.
	4	Ben disliked the first salad.