Dual Number in Kazym Khanty: Not-at-issue content that does not project[1]

Fedor GOLOSOV — *University of Maryland, College Park*

Abstract. The Projection Principle (Beaver et al. 2017) states that semantic content projects iff it is not-at-issue. This paper presents a counterexample to this claim: the dual number in Kazym Khanty featuring the duality implication that is not-at-issue content that does not project.

Keywords: formal semantics, dual number, (not-)at-issue, projective content, Khanty, Uralic languages.

1. Introduction

According to the Projection Principle (Beaver et al. 2017), semantic content projects if and only if it is not-at-issue with respect to the Question Under Discussion (QUD). The goal of this paper is to provide a counterexample to this claim. In particular, I will show that the duality implication of the dual number in Kazym Khanty (a Uralic language spoken in Siberia, Russia) is an example of not-at-issue content that does not project.

The structure of the paper is as follows. After the introductory Section 1, I will provide background information on the semantics of the dual number in Kazym Khanty (Section 2). In Section 3, I will discuss the notion of (not-)at-issueness proposed in (Simons et al. 2010) and show that the duality implication of the dual number is not-at-issue. Section 4 is dedicated to the projectivity and the "Family-of-Sentences" (Chierchia & McConnell-Ginet 1990) diagnostics which show that the duality implication of the dual number does not project. To resolve the tension between the not-at-issueness and the non-projectivity of the dual number's meaning, I will argue that the duality implication is unfocusable assertion (Section 5). In Section 6, I will discuss whether it should be surprising that not-at-issueness and projectivity do not always correlate. The paper will conclude in Section 7.

2. Dual Number in Kazym Khanty: background, assumptions, and methods

Kazym Khanty is a dialect of Northern Khanty, a Uralic language spoken in Western Siberia. It features a tripartite number system: singular, dual, and plural, and does not have articles (Kaksin 2010). The dual number is used when the NP refers to a set of exactly two individuals. For instance, the sentence in (1) entails that there are exactly two children walking on the street; (1) is infelicitous if the number of children is one or more than two.

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(1) kam-ən ńawrɛm-ŋən junt-λ-əŋən
street-LOC child-DU play-NPST3DU
'Children (exactly two/*at least two/*at most two) are playing on the street.'

This implication of the dual in (1) is the empirical focus of this paper. As I will show in the subsequent sections, it violates the Projection Principle (Beaver et al. 2017), being an instance of not-at-issue content that does not project.

Before moving to that part, however, it is important to establish precisely what is meant by the duality implication in question, so that the tests of (not)-at-issueness and projection can be applied more accurately. Typically the number is analyzed as a modifier: it applies to a predicate over individuals and restricts its extension (Spector 2007; Zweig 2009; Martí 2020; Scontras 2022, a.o.). In accord with this approach, I will informally define the duality implication as in (2). For the moment I will remain agnostic as to whether this inference follows from what the dual contributes to what is asserted, or instead to conditions on felicitous use. But we will see that the tests on projection lead us to favor the former.

(2) **Duality implication of the dual number**
Let f be the predicate over individuals provided by the dual-marked NP, w be the world of evaluation and c be the context, i.e. the relevant domain of interpretation.
The number of x such that f(x) is true in w and c equals two in w and c.

In what follows, I will assume that the duality implication is present in a target sentence if and only if it entails (2).

Another important methodological caveat that deserves mention has to do with the importance of the referential status of the bare dual NPs used in the projection/not-at-issueness stimuli. The NP in a definite phrase, like "dog" in "the dog", contributes to what its use presupposes (Frege 1892, Strawson 1950), while in a quantification phrase, like "every dog," it may not. Khanty does not have articles, but the common view suggests that in languages without audible articles, the meaning of the sentence nonetheless includes the *iota* operator contributed audibly in English by "the" (Partee 1987; Chierchia 1998; Dayal 2004; a.o.). Thus, if the dual NP in a sentence is used with definite meaning, we can expect the duality implication to project for the independent reason. That means that to test whether the duality inference projects on its own, one should put a dual NP in an indefinite context, since indefinite articles, and their covert analogues in articleless languages, are not presupposition triggers. For that reason, I constructed each stimulus in this study in such a way that the indefinite interpretation of the dual NP is forced.

The examples in this paper were collected during online elicitation sessions with 3 native speakers of Kazym Khanty living in the village Kazym (Khanty-Mansi Autonomous Okrug, Russian Federation), in August and September 2023. During the sessions, I asked consultants to translate Russian stimuli into Kazym Khanty and then, if needed, provided an alternative potential translation into Khanty, and asked for their judgements. For each sentence, a context was introduced to make the translation more natural and, in some cases, to control for the target semantic variables.

In the next two sections, I will introduce the notions of (not-)at-issueness and projectivity and show that the dual number is diagnosed as both not-at-issue and non-projective content, which contradicts the assumption that not-at-issueness and projectivity correlate (Simons et al. 2010; Beaver et al. 2017).

3. (Not)-at-issueness

The rubric of *(not-)at-issueness* was first introduced in Potts 2005 to cover the special semantic behavior of conventional implicatures, appositives and non-restrictive relative clauses. The basic intuition is that meanings differ in whether they contribute to the main point of the utterance. This difference is illustrated in (3):

(3) a. Who is your new roommate?
b. John, my friend from college, is my new roommate.
c. #John, my new roommate, is a friend from college.

Although both (3b) and (3c) convey the same information (John is the speaker's roommate and their friend from college), only (3b) is a natural response to (3a), while (3c) is an incoherent answer to the same question. This contrast arises due to the asymmetry in terms of relevance between the appositive NP and the main clause: main clauses convey the relevant information, while appositives provide a side comment.

Simons, Tonhauser, Beaver and Roberts (2010) define at-issueness the following way:

(4) **Definition of at-issueness** (Simons et al. 2010: 323)
a. A proposition *p* is **at-issue** iff the speaker intends to address the QUD via *?p*.[2]
b. An intention to address the QUD via *?p* is felicitous only if:
i. *?p* is relevant to the QUD, and
ii. the speaker can reasonably expect the addressee to recognize this intention.

Applying (4) to sentence (3b), we can see that the proposition 'John is my new roommate' is at-issue since it addresses the question under discussion, that is, directly answers (3a). In contrast, the proposition 'John is my friend from college', (3c), implied by the appositive is not-at-issue since it does not constitute a relevant answer to (3a). In addition, the contrast in (3) shows that appositives are dedicated to not-at-issue content: the reversed syntactic marking of the very same propositions results in the infelicity of (3c).

Thus, according to the definition in (4), at-issue content should address the question under discussion. As we saw in (3), appositive NPs convey *not*-at-issue content, and accordingly, they cannot be used to address the QUD. This is also true for the dual number in Kazym Khanty (5c); in contrast to the numeral *kăt* 'two' (5b), it cannot be used to answer the question in (5a), which interrogates the number of children.

[2] The notation *?p* introduced in Simons et al. 2010 denotes "the question whether *p*, i.e. the partition on the set of worlds with members *p* and ¬*p*" (ibid.: 317).

(5) a. **muj-arat** ńawrɛm kam-ən junt-λ?
what-QUANT child street-LOC play-NPST[3SG]
'**How many** children are playing on the street?'

b. kam-ən **kăt ńawrɛm** junt-λ
street-LOC two child-DU play-NPST[3SG]
'**Two** children are playing on the street.'

c. #kam-ən ńawrɛm-**ŋən** junt-λ-əŋən
street-LOC child-DU play-NPST-3DU
'Children, **of which there are two,** are playing on the street.'

The dual number can be a part of the answer if the cardinality of referents is not relevant for the question. For instance, sentence (6b) can be an answer to the question in (6a): what matters for the QUD is who the players are, while their cardinality is not-at-issue.

(6) a. **χuj** kam-ən junt-λ?
who street-LOC play-NPST[3SG]
'**Who** is playing on the street?'

b. kam-ən **ńawrɛm-ŋən** junt-λ-əŋən
street-LOC child-DU play-NPST-3DU
'**Children (two)** are playing outside.'

In sum, the duality implication of the dual number is a clear instance of not-at-issue content since it cannot address the QUD. The Projection Principle therefore predicts that the duality implication should also be projective. However, as I will show in the next section, it does not project.

4. Projectivity

4.1. Setting the stage

Projectivity is a property of certain implications that they avoid falling within the scope of certain semantic operators (Stalnaker 1970 et seq; Karttunen 1974 et seq.; Heim 1983 et seq; Chierchia&McConnell-Ginet 1990, among others). Simons, Tonhauser, Roberts and Beaver, the authors of the Projection Principle, define projection the following way:

(7) **Definition of projection** (Simons et al. 2010: 309)
An implication *projects* if and only if it survives as an utterance implication when the expression that triggers the implication occurs under the syntactic scope of an entailment-canceling operator.

To illustrate how projection works, let us consider the two sentences in (8). (8a) implies two propositions: 'Mary does not smoke' and 'Mary used to smoke'. Crucially, under negation

(8b), the first entailment gets canceled, and only the second one remains intact. Thus, according to the definition in (7), this last inference projects through negation, since it survives as an implication even though the expression that contains it is embedded under an entailment-canceling operator.

(8) a. Mary stopped smoking.
⇒ *1. Mary does not smoke.*
⇒ *2. Mary used to smoke.*
b. Mary did not stop smoking.
⇏ *1. Mary does not smoke.*
⇒ ***2. Mary used to smoke.***

Projectivity is well-known as one of the properties of presuppositions (Stalnaker 1970, Karttunen 1974, Heim 1983). The duality implication of the Kazym Khanty dual number, however, is not a presupposition: the duality of the referents of a dual NP does not have to be in the common ground, as demonstrated in (9).

(9) Context: The speaker and their friend go for a walk. The speaker sees two unknown children playing on the street, and tells their friend:

kam-ən	ńawrɛm-ŋən	junt-λ-əŋən
street-LOC	child-DU	play-NPST-3DU

'A couple of children are playing on the street.'

The context suggests that the mentioned children are not familiar to the speaker or the addressee. Neither is it the case that the speaker expects to meet exactly two children, or believes that children usually come in twos. Still one can naturally use the dual NP in (9) to inform the addressee that the number of these new children was two.

However, the fact that the duality implication is not a presupposition does not mean it is not projective; there are other types of meaning that survive embedding under an entailment-canceling operator (consider their detailed taxonomy in Tonhauser et al. 2013). In the following subsections, I will apply the so-called "Family-of-Sentences" diagnostics (Chierchia & McConnell-Ginet 1990) to the duality implication of the dual number, and show that it does not project through negation, questions, conditional antecedents or possibility modals.

4.2. Dual number under negation

The duality implication does not project through negation. Sentence (10) can be uttered if someone mistakenly thought that what is lying on the table was a couple of apples, when in fact it was a single pear. Use of the sentence does not imply that there are two apples or any other duality of referents somewhere else. Instead, the speaker claims that the object in question was incorrectly identified, and it is neither dual nor an apple: it is a single pear.

(10)

păsan-ən	japlokaj-ŋən	χɵn,	kruša	uλ
table-LOC	apple-DU	NEG	pear	lie.NPST[3SG]

'Not two apples, but one pear is lying on the table.'

4.3. Dual number in questions

The duality implication does not project in questions either: it can be a part of what is questioned, as shown in (11). Given the context provided, there is no specific duo of children that Grandma has in mind: she might just think that the noise resembles the typical voices of children. The context in (11) also suggests that Grandma is not even sure that it is a couple of children (or any other couple) that causes the noise, it is just her best hypothesis, and needs her grandson's confirmation. In other words, the duality implication is a part of what is asked about, not what is taken to be true. Thus, the duality does not project in (11). If it did, we would expect the question to mean something like 'I am sure there is something in the quantity of two that produces the sound from outside, is this a couple of children playing?'.

(11) Context. Grandma is sitting inside her room and hears some noise from outside. She thinks that maybe there are children playing outside, but she is not sure – it could also be dogs barking or even the wind blowing. Her grandson comes from the school, and she asks him:

kam-ən ɲawrɛm-ŋən junt-λ-əŋən?
street-LOC child-DU play-NPST-3DU
'Are there two children playing on the street?'

4.4. Dual number in conditionals

The duality implication likewise does not project in conditional antecedents. It can be part of the hypothetical condition, and need not hold at the world of evaluation, as is shown in (12). The context implies that the existence of a pair of gloves that should be on the table is not guaranteed; it could be an unlucky day when the hospital managers forgot to provide any gloves. The doctor knows it, and yet that does not prevent him from using the bare dual *perčatkajŋən* 'gloves' in (12). This means that the inference that there is a duality of gloves – or any other entities – is not entailed.

(12) Context. Every day, the hospital buys a pair of gloves that surgeons can take if they are preparing for surgery. Sometimes, however, the hospital forgets to provide such an extra pair. A surgeon realized he needs gloves and asks his assistant:

păsan ɵχtij-n perčatkaj-ŋən uλ-λ-əŋən ki,
table on-LOC glove-DU lie-NPST-3DU if
măn-ɛm tʉw-a-λi
I-DAT bring-IMP-SG>NSG
'If a pair of gloves is lying on the table, bring them.'

4.5. Dual number in possibility modals

Finally, the duality implication of the dual number does not project through possibility modals. It shares the same level of uncertainty as the other implications in the scope of a modal operator. This is demonstrated in (13). As the context suggests, the speaker is not sure that there is a

duality of children (or anyone/anything else) outside that may produce this noise; it could be a single child, or more than two children, or just the wind blowing.

(13) Context. Someone asks the speaker about the noise in the street. The speaker thinks they hear two children's voices, but they are not sure, it could be just the wind blowing.

iśipa	ńawrɛm-ŋən	kam-ən	junt-λ-əŋən
probably	child-DU	street-LOC	play-NPST-3DU

'Probably, children are playing on the street.'

4.6. Projectivity: results

In summary, the duality implication of the dual number does not project through any of the semantic operators from the Family-of-Sentences diagnostics (negation, questions, conditional antecedents, and possibility modals). This contradicts the Projection Principle: given that the duality implication is clearly not-at-issue content, it should also be projective. In the next two sections, I propose an analysis that will resolve this tension and will discuss possible disconnects between not-at-issueness and projectivity.

5. Duality implication as Unfocusable Assertion

To account for the behavior of the Kazym Khanty dual, I argue that the duality implication of the dual number contributes to what is asserted, as in (14), and yet cannot be focused, with the result that its content is always not-at-issue.[3]

(14) $[[DU]] = \lambda f_{<e,\,t>}.\ \lambda x_e.\ f(x)\ \&\ \#_f(x) = 2$

The hypothesis that not-at-issueness of the duality implication of the dual number in Khanty follows from its unfocusability is motivated by previous research. According to Sidorova 2016 and Golosov & Pisarenko 2021, the dual number cannot get narrow focus, unlike the numeral *kăt* 'two'.[4] My own data from contrastive focus and the scope of the particle *təp* 'only' confirm this generalization: dual NPs can bear focus only if the dual number does not contribute to the focus alternatives.

Under contrastive focus, dual NPs are felicitous if the semantic focus is on the property denoted by the nominal predicate (15a), but not on the number of individuals (15b). In the latter case, a numeral phrase with *kăt* 'two' should be used instead (15c).

(15) a. păsan-ən japlokaj-**ŋən** χən, krušaj-ŋən uλ
table-LOC apple-DU NEG pear-DU lie.NPST[3SG]
'Not a couple of apples, (but) a couple of pears is lying on the table.'

[3] $\#_f(x) = 2$ is true if and only if the number of *x* atomic with respect to *f* equals two.

[4] The link between at-issueness and focus is also pointed out in (Tonhauser 2012), where she proposes that one property of at-issue content is that it "determines the relevant set of focus alternatives" (ibid.: 245). However, what Tonhauser means is that the at-issue content of a question determines how it should be addressed, and she does not discuss other focus-sensitive environments.

b. #păsan-ən japlokaj-**ŋən** χən, **(i)** japloka uλ
table-LOC apple-DU NEG one apple lie.NPST[3SG]
Expected: 'Not a couple of apples, but one apple is lying on the table.'

c. păsan-ən **kăt** japloka χən, **i** japloka uλ
table-LOC two apple NEG one apple lie.NPST[3SG]
'Not **two** apples, (but) **one** apple is lying on the table.'

In the scope of *təp* 'only', the dual NPs are felicitous only if the salient alternatives do not differ in terms of number. For instance, in (16), the intention of the speaker is to emphasize that only girls came, but not boys. Hence, there is only one salient alternative, 'The boys are sitting in my class', which is negated. The cardinality of individuals does not matter for these two focus alternatives, and the dual NP is felicitous.

(16) Context. Students, two girls and eight boys, have their first day at school, so teachers keep track of them. All of them were in the first class, but in the second class, only the girls came. The person teaching the second class calls the other teacher and says:
ma χuś-am-a ɛwɛ-ŋən təp oməs-λ
I place-POSS.1SG-DAT girl-DU only sit-PST[3SG]
'Only **girls** are sitting in my class.'

In contrast, the dual NP is infelicitous in (17b). In this case, what speaker emphasizes is that among the whole set of students, only two people came, and both were girls. Hence, the alternatives negated by *təp* differ not only in whether girls and/or boys came, but also in how many students of each group were present. Accordingly, cardinality is a parameter that is involved in deriving the alternatives and that blocks the use of the dual NP in (17b). Instead, again, a sentence with the numeral *kăt* 'two' must be used, as shown in (17a).

(17) Context. Students, eight girls and eight boys, have their first day at school, so teachers keep track of them. All of them were in the first class, but in the second class, only two girls came. The person teaching the second class calls the other teacher and says:
a. ma χuś-am-a **kăt** **ɛwi** təp oməs-λ
I at-POSS.1SG-DAT two girl only sit-PST[3SG]
b. #ma χuś-am-a **ɛwɛ-ŋən** təp oməs-λ
I at-POSS.1SG-DAT girl-DU only sit-PST[3SG]
'Only **two girls** are sitting in my class.'

Thus, the dual number cannot be under narrow focus, which explains why the duality implication is not-at-issue. Focus establishes the set of alternatives relevant for the QUD, and the dual number, which is not focused, fails to contribute to the formation of this set. However, that does not prevent it from being in the scope of entailment-canceling operators (given that it does not help to resolve the QUD). In other words, the duality implication can be canceled by semantic operators if it is not the main implication targeted by those operators.

6. Discussion

In this section, I will argue that the existence of not-at-issue content that does not project should not be surprising: the definitions of the projectivity and (not-)at-issueness do not logically lead us to the same type of phenomenon.

The definition of at-issueness relies on relevance to the Question Under Discussion: if content addresses it, it is at-issue, and if not, it is not-at-issue. However, this definition does not entail that not-at-issue content must project, i.e., avoid falling within the scope of entailment-canceling operators. One imaginable counterexample would be an informative implication that is not relevant for the current QUD and yet stops being entailed in the scope of semantic operators, together with the main, at-issue content.

That is exactly what the duality implication of the Kazym Khanty dual number does. When an indefinite dual NP is used in a sentence where it does not fall within the scope of an entailment-canceling operator, the dual number provides the implication that there are two individuals. This implication is secondary to the main point of the discussion but is nevertheless an entailment; if the number of individuals does not equal two, the sentence is not true. Crucially, when a dual NP is embedded under an entailment-canceling operator, the duality implication remains not-at-issue, but is no longer entailed: it can be a part of what is questioned, negated, etc., as long as the cardinality of the individuals does not matter to the QUD. In other words, the duality implication cannot be the main target of negation, question, conditional, or possibility modal, but at the same time, it does not have to be something the speaker commits to either.

Thus, the Kazym Khanty data simply show that two aspects of meaning (or use) that are distinct conceptually are furthermore distinct in fact, contrary to the hypothesis of Beaver et al. 2017.

7. Conclusions

The duality implication of the dual number in Kazym Khanty poses a challenge to the Projection Principle (Beaver et al. 2017), according to which a semantic inference is not-at-issue if and only if it projects. Contrary to expectations, the inference of two individuals provided by the dual number is not-at-issue and at the same time does not project. I argue that this duality implication can be analyzed as a type of unfocusable assertion. It is part of the dual number's content, but it cannot receive narrow focus (the reasons for that are still to be explored). This result, in turn, indicates that projectivity and not-at-issueness (as defined by Simons et al. 2010) are independent parameters; a not-at-issue implication can get canceled when it is in the scope of an entailing-canceling operator.

Abbreviations

1,2,3 – persons, DAT – dative case, DU – dual number, IMP – imperative mood, LOC – locative case, NPST – non-past tense, POSS – possessive marker, PST – past tense, QUANT – quantity question word, SG – singular number, X>Y – multiple agreement (X – features of the subject, Y – features of the object).

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