Phrasal coordination is dependent on overt conjunctions: evidence from Khanty
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1. Main claims:

- 19th-century Khanty had no conjunctions and no phrasal coordination;
- the appearance of conjunctions in the 20th century paved the way for phrasal coordination;
- in traditional Khanty, phrasal coordination was blocked by processing economy;
- the appearance of conjunctions lifted the restrictions imposed by processing considerations.

2. Background

- **Khanty:** (Uralic; Finno-Ugric), spoken in Russia, <10,000 speakers (census 2010); considerable differences between dialects (but no significant dialectal variation with respect to coordination facts).
- **Syndetic coordination:** has been claimed to arise with literacy (Chafe 1985, Mithun 1988, Stassen 2003), based on evidence from African, American, Siberian languages (Yukaghir, Kamchadal).
- **Novel evidence from (earlier varieties of) Khanty**: lack of coordination on the phrase level (phrasal coordination).

Sources and methodology

1. Analysis of corpora representing 4 stages of Khanty:
   a. Paasonen tales (1901, Yugan area; 4000 words); additional data from Lewy (1911);
   b. Maremjanin's autobiographical notes (1936, Sherkaly; 6000 words);
   c. Rédei corpus (1964, Kazym; 3740 words);
   d. Texts collected by Márta Csepregi (1990s, Surgut; 4200 words)
2. Contemporary data obtained by elicitations from 3 Surgut Khanty speakers; additional data from a spoken corpus collected by Csepregi & Gugán (2017).

3. Coordination in Old Khanty (Paasonen tales, 1901)

3.1. Asyndetic clausal coordination

(1) [*mənn-əs*], [*pon   noq   tɐːɬ-s-i*],   [*quːɬ ɬɐːtʲ-s-i*],
     go-PST.3SG fish_basket up   pull-PST-PASS.3SG   fish catch-PST-PASS.3SG
     [*ɬɐːrəɣ   ɬɐːtʲ-s-i*],   [*sɒːrt ɬɐːtʲ-s-i*],   [*jɐːβ   ɬɐːtʲ-s-i*].
     ruff   catch-PST-PASS.3SG pike catch-PST-PASS.3SG   perch catch-PST-PASS.3SG
     'He left, the fish-basket was pulled up, fish was caught, ruff was caught, pike was caught, perch was caught.' (OUDB 1316)

Three-four occurrences of adverbs/particles used as connectives in the whole corpus; *pɐːnə: pa* 'other' + Locative:

(2) [*βɛɬi   βɛɬ*]   **_pɐːnə_**   [*nʲoβ   βɛɬ*].
     reindeer   kill-PST.3SG other.LOC elk   kill-PST.3SG
     'He killed reindeer, and he killed elk.' (OUBD 1316)

Clause linking via the subordination of one of the propositions:

(3) [*iːmi   βɐːn-ɣə   **joβt-əm**   **ɬɐːt-nə**]   *juːβ toj-ɐ   quːŋt-əs.*
     woman near-TRNS come-PTCP.PST   time-LOC   tree top-LAT climb-PST.3SG
     'The woman having come close, he climbed to the tree top.' (OUDB 1315)

3.2. Lack of phrasal coordination/conjunction reduction

No subject coordination:

(4) [*torrəm ji:r βɛr-tɐɣə mɒːst-ɬ*],   [*məɣ ji:r βɛr-tɐɣə*
     sky   animal_sacrifice do-INF need-PRS.3SG earth   animal_sacrifice do-INF
     mɒːst-ɬ].
     need-PRS.3SG
     'A sky animal sacrifice needs to be made, an earth animal sacrifice needs to be made.'
                                                                          (OUDB 1313)

No object coordination:

(5) [pro *puːpi toβə quːjsətəɣ*], [*por βɒːjəɣ toβə quːjsətəɣ*], [*βoqu toβə quːjsətəɣ*],
       bear there left   wolf   there left   fox   there left
     [*tʃeːβər toβə quːjsətəɣ*], [*t̪uːt puɯrnə kəmɬəɣ quːjsətəɣ*].
     hare   there left   that after   wolverine left
     'He left behind the bear, he left behind the wolf, he left behind the fox, he left behind the
     hare, he left behind the wolverine.' (OUDB 1315)

3.3. Co-compounding

- Co-compounding: two nouns that denote closely-related concepts combined into compound-like constructions (Wälchli 2005).
- Conditions: semantic and morphological parallelism.
- The two members of a co-compound share modifiers.

(6) a. ***iːmi-ɣən   iːki-ɣən** paɣ taj-s-əɣən.*
        woman-DU   man-DU son have-PST-DU
        'The woman [and] the man had a son.' (OUDB 1315)

     b. ***kur-a   uč-a   *kerŋentīdāi-ŋen*
        foot-LAT   clothes-LAT   fall-PST.DU
        'They fell on feet, on clothes' (Lewy 1911: 21)

     c. *Mɐː: ənəɬ sɒːrt-ɣən ɐːɣər-ɣən qɒːtɬ-əm.*
        1SG big pike-DU   ide-DU   catch-PST.1SG
        'I caught a big pike and a big ide.'

⇒ A co-compound is dominated by a single nominal functional projection.

When 3 referents that have the same function: one co-compound, two clauses:

(7) ***βoqu-ɣən tʃeːβər-ɣən** ɬɵβ jot-ɐɬ jə-s-ɣən,   kəmɬəɣ ɬɵβ jot-ɐɬ*
     fox-DU   rabbit-DU   he with-3SG come-PST-3DU wolverine he   with-3SG
     jə-s.
     come-PST.3SG
     'The fox [and] the rabbit came with him, the wolverine came with him.' (OUDB 1315)

4. The emergence of syndetic coordination

4.1. Maremjanin's autobiographical notes, 1936: the first conjunctions

- Still mostly juxtaposition of clauses:
- Occasionally, conjunctions borrowed from Russian (*i/ij* 'and' or *a* 'but'):

(8) [*Jaj-em   tɔw-ŋ-ət   kĭr-əs*]   ***ĭ*** [*manət teśat-s-ətte   wɔš-a*].
     brother-1SG horses-DU-3SG harness-PST.3SG and me   prepare-PST-SG<3SG city-LAT
     'My brother harnessed his two horses, **and** he prepared me for the city'
                                                                          (Steinitz 1989: 135)

No coordination of subjects:
(9) [*Tăm zawod-ət   fabrikaj-ət* roar-PRS-3PL and fiery-sledge-PL   roar-PRS-3PL
     this plant-PL   factory-PL roar-PRS-3PL and fiery-sledge-PL   roar-PRS-3PL
     ĭ   [*awtomobil-ət ŭw-t-ət*]
     and   car-PL   roar-PRS-3PL
     'These plants-factories roar, and railways roar, and cars roar.'   (Steinitz 1989: 145)

No coordination of objects:
(10) [*Jŏnttə tɔw-ət   wer-s-əm*],   [*jŏnttə uχt-ət   wer-s-əm*],
      playing horse-PL   make-PST-1SG, playing sledge-PL make-PST-1SG,
      [*jŏnttə sese-t   wer-s-əm*],   [*jŏnttə śɔrkan-ət   wer-s-əm*].
      playing looptrap-PL   make-PST-1SG, playing bowtrap-PL   make-PST-1SG
      'I made toy horses, I made toy sledges, I made toy looptraps, I made toy bowtraps.'
                                                                        (Steinitz 1989: 133)

4.2. Northern Khanty texts, 1964: spread of conjunctions, emergence of phrasal coordination
Juxtaposed clauses without an overt conjunction are still common.

(11) Grammaticalization of conjunctions:

corpus	conjunctions		disjunctions	
	type	**n**	**type**	**n**
Paasonen (1901) ≈ 4000 w.	*pɐːnə*	4	*məβə*	1
Maremjanin (1936) ≈ 6000 w.	*i*	28		
Rédei (1964) ≈ 3700 w.	*paː*	56	*muj*	5

Clausal coordination with *paː*:
(12) [*nʲɔː-ł   juβtəsəł*]   **paː** [*mɔːjpər   xɔːj-ł-a*].
      arrow   shoot-PRES.3SG   and bear   hit-PRS-PASS.3SG
      'The arrow shoots **and** the bear is hit.' (OUDB 1022)

Phrasal coordination of NPs/DPs:
(13) *łuβ   sorm-a   ji-te-ł   jupijən sʲar-łał   [**meːt   aːj**
      he   death-LAT become-PTCP-3SG   after   shaman-PL.3SG   most   small
      pox-łał-a**]   **paː** [mɛt aːj   eːβi-łał-a**]   *pit-ł-ət*.
      son-PL.3SG-LAT   and   most small   daugher-PL.3SG-LAT   pass-PRS-3PL
      'After he dies, his shamanic skills go to his youngest sons and to his youngest daughters.' (OUDB 878)

Paː still does not occur NP/DP-internally:
(14) *sʲi* [***βeːsʲəŋ nɛŋ-əł**],   [***xorasəŋ   nɛŋ-əł**]   *piła aŋk-eł   aːsʲe-ł*
      this pretty   woman-3SG beautiful   woman-3SG   with mother-3SG   father-3SG
      xosʲa   joxi   man-əs.
      to   home   go-PST.3SG
      'With this pretty woman, beautiful woman, he went home to his mother and father.' (OUDB 1117)

4.3. Eastern Khanty texts, 1990s: generalization of conjunctions, spreading of phrasal coordination

(15)   Continuous increase in the frequency of conjunction use:

corpus	conjunctions		disjunctions	
	type	n	type	n
Paasonen (1901) ≈ 4000 w.	*pɐːnə*	4	*məβə*	1
Maremjanin (1936) ≈ 6000 w.	*i*	28		
Rédei (1964) ≈ 3700 w.	*pa:*	56	*muj*	5
Csepregi (1998; 2002) ≈ 4200 w.	*pɐːn(ə)*	126		
	oːs	58		

Syndetic clausal coordination:

(16)   [*ətʲə   suːβəm-ɐt   məji*]   **pɐːnə**   [*pɛrt   puːl-ɐt*
       again   reel-of-thread-INS   give.PST.PASS.3SG   and   wood   piece-INS
       məji],   **pɐːnə**   [*mən*].
       give.PST.PASS.3SG   and   go-PST.3SG
       'Again he was provided with a reel of thread **and** he was provided with a piece of wood, **and** he set off.'   (OUDB 736)

NPs/DPs conjoined by *pɐːnə*:

(17)   *keːr-nə   βɐrɫ-i   kɐːt pəkət-ɣən nʲɐːnʲ: [ruːtʲ   nʲɐːnʲ]   **pɐːnə**
       oven-LOC   do-PRS-PASS.3SG   two kind-DU   bread   Russian   bread   and
       [*qantəɣ nʲɐːnʲ*].
       Khanty bread
       'In the oven, two kinds of bread are made: Russian bread and Khanty bread.'
                                                                        (OUDB 1076)

Pɐːnə has appeared as an alternative to the dual suffix:

(18)   a. *piːtʃiŋɣəli-ɣən   oːpi-sɐː-ɣən*   (1901)
          little.bird- DU   older.sister-ASC-DU'

       b. *piːtʲəŋkəli*   **pɐːnə**   *oːpi*   (1993)
          little-bird   and   older.sister

5. Coordinated constructions in 21st century Khanty

- Overt conjunctions are strongly preferred with both clausal and phrasal conjuncts.
- In most cases, phrasal coordination results from XP-coordination (coordination of individual phrases), as opposed to clausal coordination + conjunction reduction; ellipsis is quite restricted.

5.1. Syndetic clausal coordination

Examples without overt conjunctions, according to the speakers, sound incomplete (though not strictly ungrammatical). The choice of conjunction corresponds to the relative order of events: **pɐːnə** ('otherwise') is used for consecutive events, and **oːs** ('also') for contemporaneous ones.

(19)   *Iːt   iːttən. Mɐːʃɐ   nɐːj   ʉɫ-əɫ,   oːs   Miːʃɐ   jəŋk   tuː-ɫ.*
       now   evening Masha   fire   light-PRS.3SG   and   Misha   water   bring-PRS.3SG
       'It is evening now. Masha is making a fire, and Misha is bringing water.'

5.2. Phrasal coordination

Arguments are overtly coordinated:

(20) a. *Mɐːʃɐ pɐːnə Miːʃɐ iːrək-kən.*   subjects
    Masha and Misha sing-PST.3DU
    'Masha and Misha were singing.'

  b. *Mɐː sɒːrt pɐːnə jaβ qɒːɫəmt-əm.*   DOs
    1SG pike and perch catch/get-PST.1SG
    'I caught a pike and a perch.'

  c. *ɐːt'i Miːʃɐ-ɣɐ pɐːnə Peːt'ɐ-ɣɐ βat t'arɐs məj.* IOs
    father Misha-LAT and Petja-LAT five thousand give.PST.3SG
    'Father gave Misha and Petja 5000 rubles.'

Using clausal instead of phrasal coordination affects interpretation:

(21) *Mɐː [sɒːrt qɒːɫəmt-əm] pɐːnə [jaβ qɒːɫəmt-əm].*
  1SG pike catch-PST.1SG and perch catch/get-PST.1SG
  'I caught a pike and caught a perch.' (two distinct events, the first one is more important)

(22) *Qaβ juːɣ noβ ruːpɐk ajɐɣɫə-tɐɣə pɐːnə norəq juːɣ noβ ruːpɐk*
  long wood branch difficult find-INF and straight wood branch difficult
  ajɐɣɫətɐɣə.
  find-INF
  'It is difficult to find a long stick and it is difficult to find a straight stick.' (two different referents)

5.3. Conjunction reduction or XP-coordination?

5.3.1 Coordination of adjacent phrases

Possible ways of achieving phrasal coordination:

- XP-coordination (coordination of two individual phrasal constituents):
  - with the help of &P (Munn 1987; Kayne 1994; Johannessen 1996)
  - via adjunction of the second conjunct (Munn 1992; 1993)
- Clausal coordination, with parts of the clauses rendered unpronounced
  - coordination of two full clauses + ellipsis (Gleitman 1965; Wilder 1994; Schwarz 1999; Schein 2017).
  - parallel structures: the two clauses undergo Union, whereby the identical constituents (e.g., all other than the conjuncts) are fused and only spelled out once (Goodall 1987).

In today's Khanty, XP-coordination is readily attested, while ellipsis is restricted.

Collective/symmetrical predicates:

Availability of coordinated arguments of so-called collective/symmetrical predicates cannot result from ellipsis (Curme 1931; Peters 1966; Lakoff & Peters 1966; Wilder 2019):

(23) a. *John and Mary are alike.*
  b. **John* ~~is alike~~ *and Mary is/are alike.*

These constructions are available in today's Khanty:

(24) a. *[Mɐːʃɐ pɐːnə Peːt'ɐ] kiːtɣə mən-ɣən.*
    Masha and Petja in_two_halves go-PST.3DU
    'Masha and Petja got divorced.'

b. [*Mɐ:ʃɐ   pɐ:nə   Pe:t^jɐ*] *əj*   **qorɐsəp-ɣən.**
    Masha   and   Petja   one   alike-DU
    'Masha and Petja are alike.'

c. *Mɐ: (əj)   ɐ:nəɣ-ɐ   [qu:ɫ mɐ:rən pɐ:nə   qu:ɫ βoj] n^ju:ɫɐ   **ruβt-əm.***
    1SG one bowl-LAT fish caviar and   fish oil together mix-PST.1SG
    'I mixed caviar and fish oil together in a bowl.'

Postpositions like *between* work in a similar way:
(25) *Pu:ɣəɫ   qarə   [PP qɒ:t   pɐ:nə   jaβən   **ku:təp-nə**]   βaɫ-əɫ.*
    village   space   house   and   river   middle-LOC   lie-PRS.3SG
    'The yard lies between the house and the river.'

Focus particle *only*:
When a single focus particle *only* applies to coordinated nominals, an underlying structure with ellipsis would be infelicitous.

(26) a. *Only Masha and Katja saw a fox.*
    b. *Only Masha ~~saw a fox~~ and only Katja saw a fox.*
    c. *Only Masha ~~saw a fox~~ and Katja saw a fox.*

(27) *Tap Mɐ:ʃɐ   **pɐ:nə**   Kɐ:t^jɐ   βaqi βu:j-ɣən.*
    Only Masha   and   Katja   fox   see-PST.3DU
    'Only Masha and Katja saw a fox.'
                          ***

Possessive constructions:
Nominal possessors in Khanty elicit no overt marking on the possessor or possessum. Possessive constructions may be coordinated, (28a). If one of the possessums is omitted, (28b), the only available interpretation is that of joint possession. This speaks against ellipsis.

(28) a. [DP ***I:βɐn*** [NP *ruut*]]   *pɐ:nə*   [DP ***Mɐ:ʃɐ*** [NP *ruut*]]
       Ivan   boat   and   Masha   boat
    'Ivan's boat and Masha's boat (=two boats)'

    b. [DP ***I:βɐn***   *pɐ:nə*   *Mɐ:ʃɐ*   [NP *ruut*]]
       Ivan   and   Masha   boat
    'Ivan and Masha's boat' (= a single boat that belongs to both; NOT: two boats)'

To recap:

- In most cases, phrasal coordination in Khanty results from XP-coordination (e.g., PPs, DPs, and APs), which does not involve ellipsis.
- This aligns well with the fact that ellipsis within DPs (and PPs) is banned.

5.3.2 Other kinds of coordination
Gapping
- a kind of ellipsis in coordinated clauses that targets the iterated verb (Ross 1968);
- remaining lexical material is contrasted with its correlates in the preceding clause;
- one of the remaining constituents is typically the subject, while the other one may be an object or an adjunct (Johnson 1996; Winkler 2005).

Forward gapping: the 'gapped' verb is found in the second conjunct.

(29) *John likes ice-cream, and Mary ~~likes~~ chocolate cake.*

In Khanty, felicity of **forward gapping** varies by speaker age. Older speakers do not accept forward gapping, younger speakers do (though they prefer the non-gapped counterpart).

(30) % *Mi:ʃɐ   sɒ:rt qɒ:təɫ,   o:s   Pe:tʲɐ –   jaβ.*
              Misha   pike catch.PST.3SG   and   Petja   perch
              'Misha caught a pike, and Petja [caught] a perch.'
              'Misha caught a pike, and Petja [is] a perch.'

(31) % *Sɐ:ʃɐ   kənəkkə sɐ:p   ʉ:ɫti   ne:βrəm-əɣ, o:s Pe:tʲɐ   –   ru:pɐkkə.*
              Sasha   easily   creak   across   jump-PST.3SG and Petja   with_effort
              'Sasha easily jumped over the creak and Petja did so with effort.'

Many verb-final languages also allow for **backward gapping**, where the ellipsis site is in the first clause. In Khanty, backward gapping is marginally possible, but the non-gapped counterpart is preferred.

(32) ? *Mi:ʃɐ   sɒ:rt,   Sɐ:ʃɐ   jaβ   qɒ:təɫ.*
              Misha   pike,   Sasha   perch   catch.PST.3SG
              'Misha caught a pike, and Sasha caught a perch.'

Stripping
- all constituents in the second clause are deleted, under identity with those in the first clause, except for one, which may be accompanied by an adverb (*perhaps, as well, too*) or negation (Ross 1969; Hankamer & Sag 1976):

(33) a. *John left yesterday, and Mary too.*
      b. *John drank whisky last night, or maybe tequila.*
Stripping is not felicitous:
(34) a. ???*Mi:ʃɐ   sɒ:rt qɒ:təɫ,   Sɐ:ʃɐ   ətʲə.*
               Misha   pike catch.PST.3SG, Sasha   too
               'Misha caught a pike, Sasha too.'

      b. **Mi:ʃɐ sɒ:rt qɒ:təɫ   pɐ:nə   jaβ   ətʲə.*
             Misha   pike catch.PST.3SG and   perch   too
             'Misha caught a pike and a perch, too.'

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Overall conclusions:
- The oldest attested varieties of Khanty show no evidence of overt coordinators or of phrasal coordination. Clauses were juxtaposed instead of overtly coordinated.
- Coordination of smaller constituents was achieved via clausal coordination.
- Overt coordinators emerged in the 20th century.
- Today's Khanty uses overt coordinators with all constituent sizes.
- Restrictions on ellipsis ⇒ evidence against widespread conjunction reduction and in favor of XP-coordination as underlying phrasal coordination.

➢ **Emergence of phrasal coordination follows the emergence of overt coordinators**

6. Analysis

The attested data suggests an intrinsic correlation between overt conjunctions and phrasal coordination. What is the reason for the correlation?

Traditional Khanty: plenty of repeated material. This is a seeming violation of the Principle of Economy (Haiman 1983; 1985; Chomsky 1995; Hawkins 2004), unless repetitiveness pays off elsewhere.

> **Claim**: lack of asyndetic phrasal coordination facilitates processing.
>
> In the language type represented by oldest attested Khanty, phrasal coordination would result in shorter derivations but much more costly processing, with garden-path situations requiring (rounds of) backtracking.

General syntactic properties of Khanty:
- SOV;
- subject and object pro-drop;
- no NOM/ACC marking on subjects and objects
- no possessor/possessum morphology on nouns

$\Rightarrow$ an DP_1 DP_2 V string is <u>multiply</u> structurally ambiguous, until the verb and its suffixes are processed.

(35) DP_1 DP_2 V+AGR:

(i) DP_1 = subject, DP_2 = object;
(ii) DP_1 = possessor, DP_2 = subject;
(iii) DP_1 = possessor, DP_2 = object (subject = *pro*).

If traditional Khanty had asyndetic phrasal coordination, then further possibilities would arise:

(iv) DP_1 = subject$_1$, DP_2 = subject$_2$;
(v) DP_1 = object$_1$, DP_2 = object$_2$.

In the case of DP_1 DP_2 DP_3 V+AGR, possibilities multiply, resulting in garden-path situations: initial misinterpretations necessitating the backtracking and reanalysis of the string.

(36) DP_1 DP_2 DP_3 V+AGR:

(i)   [DP_1 = subject$_1$, DP_2 = subject$_2$, DP_3 = subject$_3$]
(ii)   *pro*   [DP_1 = object$_1$, DP_2 = object$_2$, DP_3 = object$_3$]
(iii)   [DP_1 = subject$_1$, DP_2 = subject$_2$], [DP_3 = object]
(iv)   [DP_1 = subject], [DP_2 = object$_1$, DP_3 = object$_2$]
(v)   [DP_1 = possessor, DP_2 = subject$_1$, DP_3 = subject$_2$]
(vi)   [DP_1 = possessor, DP_2 = subject], [DP_3 = object]
(vii)   [DP_1 = subject], [DP_2 = possessor, DP_3 = object]
(viii)   *pro*   [DP_1 = possessor, DP_2 = object$_1$, DP_3 = object$_2$]
(ix)   [DP_1 = possessor, DP_2 = subject$_1$, DP_3 = subject$_2$]
(x)   *pro*   [DP_1 = possessor$_1$, DP_2 = possessor$_2$, DP_3 = object]

$\Rightarrow$ In oldest attested Khanty, asyndetic phrasal coordination must have been blocked for the sake of **processing efficiency.**

This is consistent with the known principles of processing:

(37) *Maximize On-line Processing* (Hawkins 2004; paraphrased)
      The human processor prefers to maximize the set of properties (e.g., grammatical functions, theta-roles) that can be assigned to each word in real time, as the processing of an utterance progresses. Orders with all properties assigned upon encounter are preferred to orders with some properties misassigned or unassigned.

(38) *Principle of Economy* (building on Haiman 1983; 1985; Chomsky 1995; Hawkins 2004)
      A structure with higher processing cost is avoided in favor of a structure with lower processing cost.

⇒   Redundancy is preferred over linearly shorter and structurally simpler asyndetic phrasal coordination, which would lead to pervasive ambiguity.

Supporting evidence from processing and language acquisition:
- Ambiguity-avoidance as a general processing factor has been hard to establish, but ambiguity with respect to argument structure seems to be consistently avoided in natural language (Wasow 2015)
- Not all redundancy is bad: structural parallelism has been shown to facilitate both comprehension and production (Frazier et al. 2000).
- In language acquisition, clausal juxtaposition precedes conjunction use with clauses (Clancy et al. 1976).
- Clause-linking conjunctions are acquired before phrase-linking ones (though some results are open to interpretation; Chen et al. 2020).

Oldest attested Khanty: lack of phrasal coordination reduces the chance of garden-path situations.

20th-century Khanty: emergence of overt conjunctions; a conjunction linking two DPs indicates that the DPs share the same grammatical function and thereby facilitates processing. As a result, phrasal coordination became possible.

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