

# Croatia NooJ 2020

## TRANSFORMATIONS AND PARAPHRASES FOR QUECHUA SENTIMENT PREDICATES

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ELLIADD

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# PLAN

## TRANSFORMATIONS AND PARAPHRASES FOR QUECHUA SENTIMENT PREDICATES

**Introduction**

**Sentiment quechua predicates**

**Transformations**

**Paraphrasing of Sentiment predicates**

**Conclusion and perspectives**

# Introduction

**Quechua is an endangered language.**

**In order to save it :**

- 1. Since 1995 we have been constructing different kinds of linguistic resources (Dictionaries QU\_FR and FR\_QU)
- 2. Since 2011 we have been using NooJ to build electronic dictionaries (MWE, LVF\_QU of Verbs, N A and other PoS dictionaries, ... all of them in three languages QU\_FR\_SP\_QU)
- 3. Programming many Morphological and syntactic grammars
- 4. ... and recently **PARAPHRASE GRAMMARS**

# Generalities

1. Quechua is a SOV language

**Romilda Gervasiota riman/ Romilda talks to Gervasio**

S            O            V

3. The simple QU verb lexicon is small (<1400) **with 1325 trans.**)
4. QU is highly inflectional language (near 200 suffixes)

**Romilda<sup>m</sup> Gervasiota rima-yku-n Romilda talks to Gervasio**

5. It is highly derivative 1400 simple verbs> derive into 37 800 new verbs
6. Our dictionary LVF\_QU contains more than 200 sentiment verbs

# Sentiment quechua predicates

A Quechua sentiment verb maybe **transitive** or **intransitive**

**A transitive one accepts one or more objects**

1. *umpata Romilda munan/* Romilda loves the rose
2. *Sumaq sipasta Calisto asirin/* Calisto smiles at a beautiful girl

**Intransitive sentiment :**

3. *allin-musyaitam qatallinchik/* We keep good sentiments
4. *Calisto llakisqa-kachkan /* Calisto is depressed

# More than 200 sentiment quechua verbs

kamiy, V+Vq+tr+sent+FR="injurier"+SENS=insulter\_ inventiver+DOM=LAN+FLX=V\_TR\_CONJ  
kamiy, V+Vq+tr+sent+FR="insulter"+SENS=injurier\_ inventiver+DOM=LAN+FLX=V\_TR\_CONJ  
kamiy, V+Vq+tr+sent+FR="offenser"+SENS=blesser+DOM=PAT+FLX=V\_TR\_CONJO  
kamiykuy, V+Vq+tr+sent+FR="reprocher"+SENS=réprimander+DOM=AAA+FLX=V\_TR\_CONJO  
kirisja-kay, V+Vq+itr+sent+DOM=PSY+FR="être blessé"+FLX=V\_ITR\_CONJO  
kusikuy, V+sent+DOM=PSY+DOM=PSY+FR="devenir gai"+FLX=V\_ITR\_CONJO  
kusikuy, V+sent+DOM=PSY+DOM=PSY+FR="devenir heureux"+FLX=V\_ITR\_CONJO  
kusikuy, V+Vq+itr+sent+DOM=PSY+FR="devenir gai"+FLX=V\_ITR\_CONJO  
kusikuy, V+Vq+itr+sent+DOM=PSY+FR="être ravi"+FLX=V\_ITR\_CONJO  
kusinaj-kay, V+Vq+itr+sent+DOM=PSY+FR="être mécontent"+FLX=V\_ITR\_CONJO  
kusisjallaña-kay, V+Vq+itr+sent+DOM=PSY+FR="être excité"+FLX=V\_ITR\_CONJO  
kuyanakuy, V+sent+DOM=PSY+DOM=PSY+FR="être en empathie"+FLX=V\_ITR\_CONJO  
kuyay, V+Vq+tr+sent+FR="adorer"+SENS=idolâtrer+DOM=PSY+FLX=V\_TR\_CONJO  
kuyay, V+Vq+tr+sent+FR="aimer"+SENS=aimer\_ chérir+DOM=PSY+FLX=V\_TR\_CONJO  
kuyay, V+Vq+tr+sent+FR="chatouiller"+SENS=BBB+DOM=AAA+FLX=V\_TR\_CONJO  
lapsuyay, V+Vq+itr+sent+DOM=PSY+FR="se ramollir une personne"+SENS=se ramollir le .  
llakichiy, V+Vq+itr+sent+FR="assombrir"+SENS=attrister+DOM=PSY+FLX=V\_ITR\_CONJO  
llakikuy, V+Vq+itr+sent+FR="être triste"+SENS=BBB+DOM=AAA+FLX=V\_ITR\_CONJO  
llakikuy, V+Vq+itr+sent+FR="s'inquiéter"+SENS=BBB+DOM=AAA+FLX=V\_ITR\_CONJO  
llakilla-chisyay, V+Vq+itr+sent+DOM=PSY+FR="être déprimé"+FLX=V\_ITR\_CONJO  
llakillaña-kay, V+Vq+itr+sent+DOM=PSY+FR="être déprimé"+FLX=V\_ITR\_CONJO  
llakipa-atisjan\_kay, V+Vq+itr+sent+DOM=PSY+FR="être déprimé"+FLX=V\_ITR\_CONJO  
llakiy, V+Vq+itr+sent+DOM=PSY+FR="être triste"+FLX=V\_ITR\_CONJO  
llasayay, V+Vq+itr+sent+DOM=PSY+FR="devenir lourd"+FLX=V\_ITR\_CONJO  
llillisja-kay, V+Vq+itr+sent+DOM=PSY+FR="s'exaspérer"+FLX=V\_ITR\_CONJO  
lojlo-kay, V+Vq+itr+sent+DOM=PSY+FR="être idiot"+FLX=V\_ITR\_CONJO  
lulupay, V+Vq+tr+sent+FR="gâter"+SENS=amoureux+DOM=PSY+FLX=V\_TR\_CONJO  
luluy, V+Vq+tr+sent+FR="cajoler"+SENS=câliner\_ caresser+DOM=PSY+FLX=V\_TR\_CONJO  
luluy, V+Vq+tr+sent+FR="câliner"+SENS=cajoler\_ caresser+DOM=PSY+FLX=V\_TR\_CONJO  
luluy, V+Vq+tr+sent+FR="caresser"+SENS=amoureux+DOM=PSY+FLX=V\_TR\_CONJO  
luluy, V+Vq+tr+sent+FR="caresser"+SENS=bichonner\_ palucher+DOM=SOM+FLX=V\_TR\_CONJO  
luluy, V+Vq+tr+sent+FR="dorloter"+SENS=cajoler\_ choyer+DOM=PSY+FLX=V\_TR\_CONJO  
luluy, V+Vq+tr+sent+FR="flatter"+SENS=caresser+DOM=SOM+FLX=V\_TR\_CONJO

# Derivations of a transitive verb **rimay**/ to talk

The following NooJ grammar for transitive verbs generates 3 000 new derived verbs :

**V\_TR\_INF = :V\_SIP1\_INF | :V\_SIP2\_INF | :V\_SIP3\_INF;**

Which inbedded in a transformation grammar will give 3 000 transformations of the NV phrase:

**taytanta riman**/ il parle à son père (he talks to his father)

rimatamun taytanta,rimay,V+FR="il parle en passant à son père  
"+FLX=V\_TR\_INF+AEP+INF

rimarun taytanta,rimay,V+FR="il a parlé à son père  
"+FLX=V\_TR\_INF+PRES+INF

rimarqun taytanta,rimay,V+FR=" il a parlé vite à son père  
"+FLX=V\_TR\_INF+PAPT+INF

# Derivations of a transitive verb **rimay**/ to talk

**taytanta riman**/ il parle à son père (he talks to his father)

rimatamun taytanta,rimay,V+FR="il parle en passant à son père "+FLX=V\_TR\_INF+AEP+INF

rimarun taytanta,rimay,V+FR="il a parlé à son père "+FLX=V\_TR\_INF+PRES+INF

rimarqun taytanta,rimay,V+FR=" il a parlé vite à son père "+FLX=V\_TR\_INF+PAPT+INF

rimarin taytanta,rimay,V+FR="il commence à parler à son père "+FLX=V\_TR\_INF+DYN+INF

rimarayan taytanta,rimay,V+FR=" il continue à parler à son père "+FLX=V\_TR\_INF+DUR+INF

rimapun taytanta,rimay,V+FR=" il a parlé à son père pour lui "+FLX=V\_TR\_INF+APT+INF

rimapayan taytanta,rimay,V+FR=" il parle à son père à répetition "+FLX=V\_TR\_INF+FREQ+INF

rimapan taytanta,rimay,V+FR=" il insite à parler à son père "+FLX=V\_TR\_INF+PEAU+INF

rimanayan taytanta,rimay,V+FR=" il a envie de parler à son père "+FLX=V\_TR\_INF+ENV+INF

rimamun taytanta,rimay,V+FR=" il vient après avoir parler à son père

"+FLX=V\_TR\_INF+ACENT+INF

rimallan taytanta,rimay,V+FR=" il a du mal à parler à son père "+FLX=V\_TR\_INF+POL1+INF

rimakachan taytanta,rimay,V+FR=" il parle à son père en désordre "+FLX=V\_TR\_INF+ARO+INF

rimaysin taytanta,rimay,V+FR=" il aide à son père à parler "+FLX=V\_TR\_INF+COLL+INF

rimaykun taytanta,rimay,V+FR="il salue à son père"+FLX=V\_TR\_INF+COURT+INF

# Basic QU Verb Transformations

A simple QU verb can be derived into other verbs by using IPS suffixes and their combinations of 0, 1, 2, 3, 4 IPS. We obtain the basic transformations like: **asiy**/ to love gives: **asiriy**/ to smile; **asipayay**/ to make fun of; **asikachay**/ to flirt

*asirin/ he smiles*

So, basic transformations can be obtained by using IPS (27) suffixes :

*asiriykun/ he addresses a smile*

*asirillaykun/ he addresses a warm smile*

*asiriykachan/ he addresses a smile to each person*

# Basic QU V Transformations

The use of PPS (19) (post-position suffixes)  $SPP = \{ ch, chá, chik, chiki, chu(?), chu, chusina, má, man, m, mi, ña, pas, puni, qa, raq, s, si, taq, yá( ! ) \}$ . and their combinations generates supplementary transformations

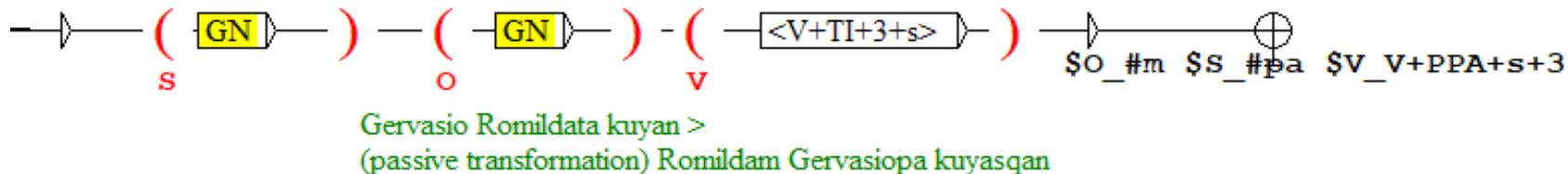
*asiriykunchá/ I suppose he addresses a smile*

*asirillayku<sup>n</sup>mi/ I confirm he addresses a warm smile*

*asiriykachanraj/ first he addresses a smile to each person*

# Elementary transformations of sentences

## The [Passive] QU transformation

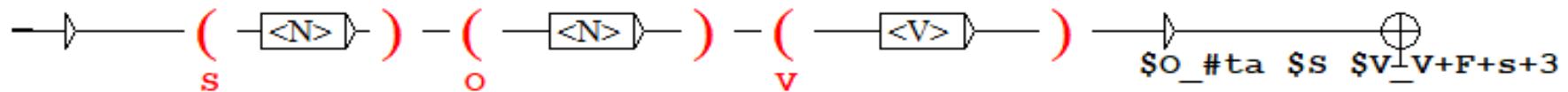


When parsing the sentence *Gervasio Romilda kuyan* the variable \$S stores the word Gervasio, \$O stores the word Romilda and \$V stores the word *kuyan /loves*.

The grammar's output “\$O\_m \$S\_#pa \$V\_V+PPA+s+3” produces the string *Romildam Gervasiopa kuyasqan / Romilda is loved by Gervasio*

# Elementary transformations

## The [Futur] QU transformation

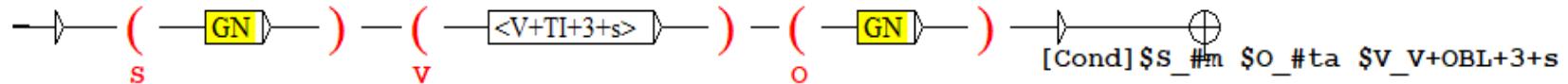


Gervasio Romilda kuyan >  
(futur transformation) Romilda Gervasio kuyanqa

Here, the grammar's output “\$O#ta \$S \$V\_{V+F+s+3}” produces the string « *Romilda Gervasio kuyanqa* »/ Gervasio will love Romilda.

# Elementary transformations

## The [Conditional] QU transformation

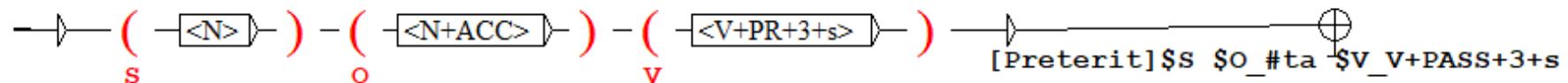


Gervasio Romilda kuyan= Gervasiom Romilda kuyanan  
Gervasio should love Romilda

The grammar's output “\$S\_m \$O\_ta \$V\_V+OBL+3+s” produces the string *Gervasiom Romilda kuyanan / Romilda should love Gervasio*

# Some more elementary transformations

[Preterit] Gervasio Romilda kuyan = Gervasio Romilda kuyara /  
Gervasio loved Romilda



Gervasio Romilda kuyan = Gervasio Romilda kuyara  
Gervasio loved Romilda

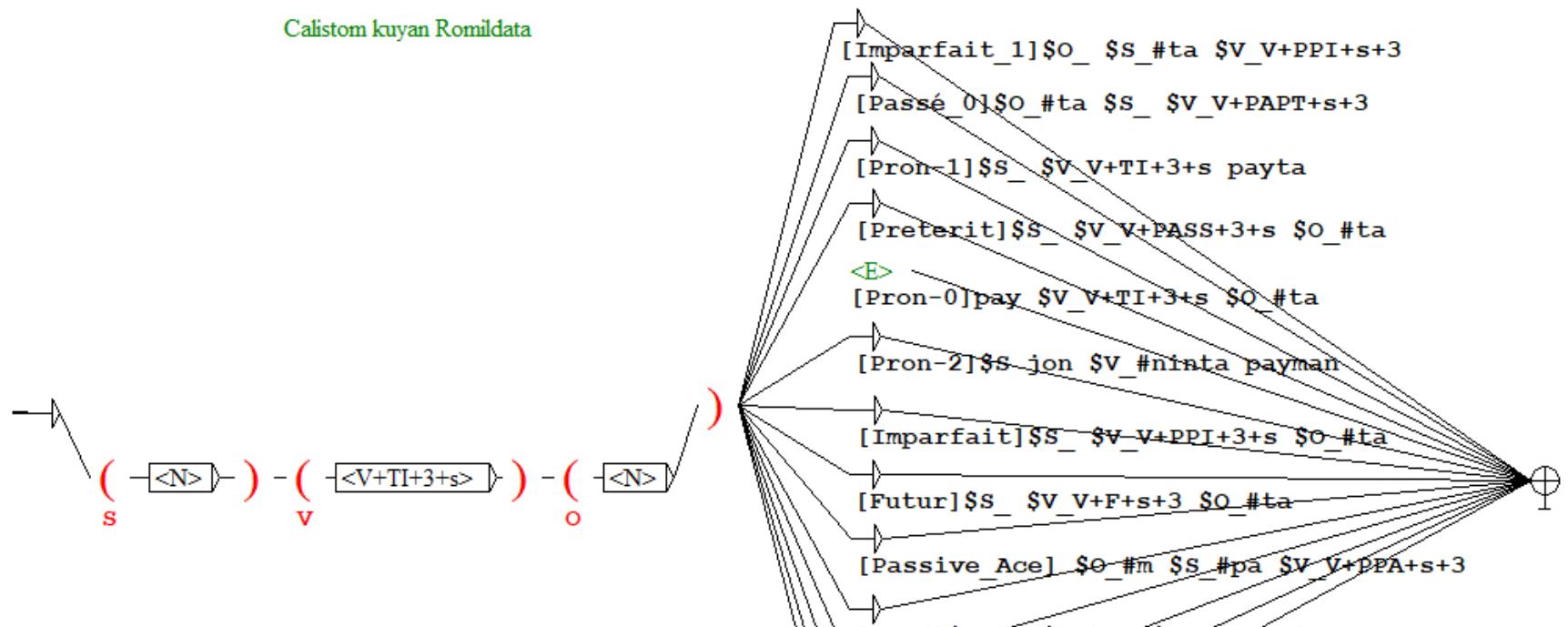
[Impfct] Gervasio Romilda kuyan = Gervasio Romilda kuyarqa /  
Gervasio has loved Romilda

[Futur\_I] Gervasio Romilda kuyan = Gervasio Romilda kuyarunqa /  
Gervasio will son love Romilda

# Transformation of sentences of the form

## <N0> <V> <N1>

Quechua/Quechua syntactic grammar.



Enter expression: Calistom kuyan Romildata

469836 analyses. Click a solution below to display the corresponding path:

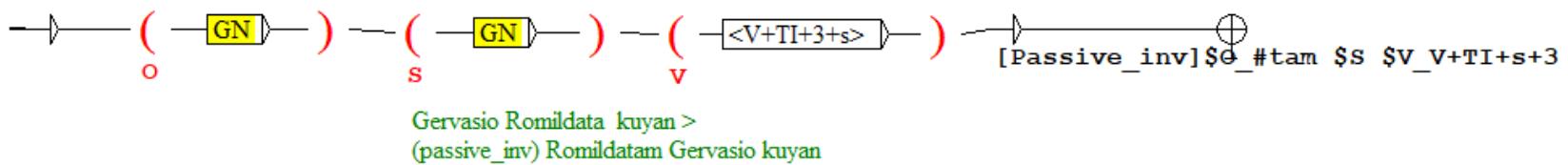
[Perfect Match](#) [Pa](#)

Paths	Outputs
("Main" Calistom kuyan Romildata )	[Negation] Calistoja manam Romildata kuyanchu
("Main" Calistom kuyan Romildata )	[Negation] Calistoja manam Romildata kuyanqachu
("Main" Calistom kuyan Romildata )	[Negation] Calistoja manam Romildata kuyachunchu
("Main" Calistom kuyan Romildata )	[Negation] Calistoja manam Romildata kuyarqanchu
("Main" Calistom kuyan Romildata )	[Negation] Calistoja manam Romildata kuyanmanchu
"/Main" Calistom kuyan Romildata )	[Negation] Calistoja manam Romildata kuyancinchu

# Reverse transformations

For many of these elementary transformations it is possible to construct grammars that perform the reverse operation

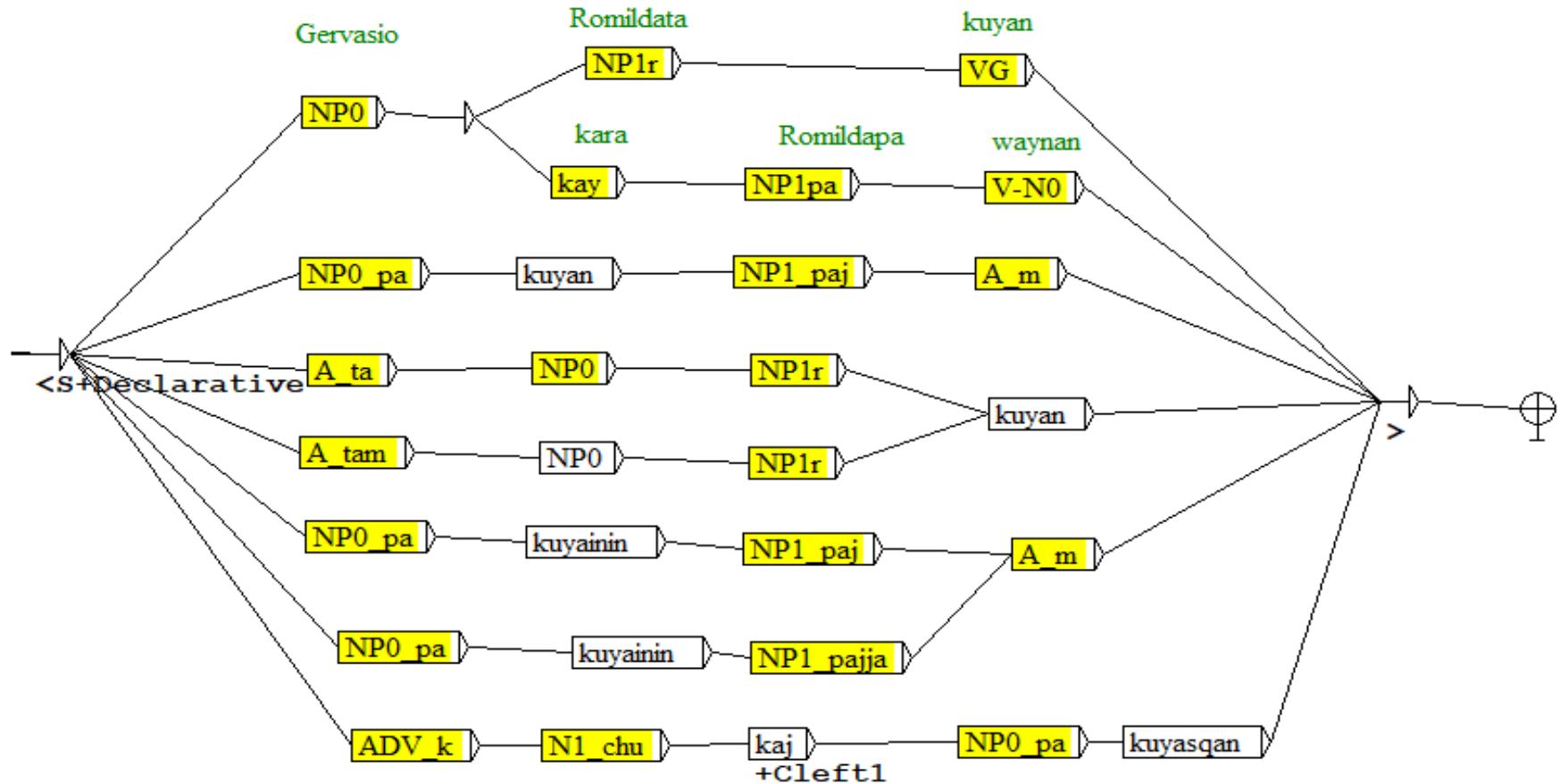
The [Passive\_inv] QU transformation



The grammar's output “\$O\_ #tam \$S\_ \$V\_V+PR+s+3” produces the string *Gervasio tam Romilda kuyan / Romilda is loved by Gervasio*

# The grammar for transformations of the declarative sentence: **Gervasio Romilda kuyan / Gervasio loves Romilda**

Quechua/Quechua syntactic grammar consists of 17 graphs.



# Transformations of the declarative sentence (around a million):

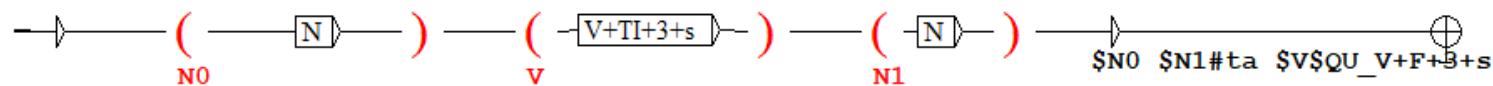
## Gervasio Romilda kuyan / Gervasio loves Romilda

```
# Dictionary generated automatically
wañuita pay kuyan,S+Declarative#+Intens1+Pro1
wañuita pay Romilda kuyan,S+Declarative#+Intens1
wañuita Gervasio payta kuyan,S+Declarative#+Intens1+Pro1
wañuita Gervasio Romilda kuyan,S+Declarative#+Intens1
qatunta pay payta kuyan,S+Declarative#+Intens1+Pro1
qatunta pay Romildata kuyan,S+Declarative#+Intens1
qatunta Gervasio pay kuyan,S+Declarative#+Intens1+Pro1
qatunta Gervasio Romildata kuyan,S+Declarative#+Intens1
sumaqta pay payta kuyan,S+Declarative#+Intens1+Pro1
sinchita Gervasio payta kuyan,S+Declarative#+Intens1+Pro1
sinchita pay Romilda kuyan,S+Declarative#+Intens1
sinchita Gervasio payta kuyan,S+Declarative#+Intens1+Pro1
miskita payta Romilda kuyan,S+Declarative#+Intens1
miskita Gervasio Romildata kuyan,S+Declarative#+Intens1
llullata pay Romildata kuyan,S+Declarative#+Intens1
llullata Gervasio Romildata kuyan,S+Declarative#+Intens1
llamputa payta pay kuyan,S+Declarative#+Intens1+Pro1
chikata Gervasio Romildata kuyan,S+Declarative#+Intens1
chuyata Gervasio payta kuyan,S+Declarative#+Intens1+Pro1
asta Gervasio Romildata kuyan,S+Declarative#+Intens1
achkata payta Romilda kuyan,S+Declarative#+Intens1
achkata Gervasio pay kuyan,S+Declarative#+Intens1+Pro1
paypa kuyainin Romildapaq qatunmi,S+Declarative+BEN+Intens3
paypa kuyainin Romildapaq asllatam,S+Declarative+BEN+Intens3
paypa kuyainin paypaqqa asllam,S+Declarative+BENTHE+Intens3
paypa kuyainin Romildapaqqa chuyam,S+Declarative+BENTHE+Intens3
Gervasiopa kuyainin paypaqqa wañuipagmi,S+Declarative+BEN+Intens3
Gervasiopa kuyainin paypaq asllam,S+Declarative+BEN+Intens3
Gervasiopa kuyainin Romildapaqqa chikachaqmi,S+Declarative+BEN+Intens3
Gervasiopa kuyainin Romildapaqqa asllam,S+Declarative+BENTHE+Intens3
manachus paychu kaj paypa kuyasqan,S+Declarative+Cleft1
manachus paychu kaj Gervasiopa kuyasqan,S+Declarative+Cleft1
manam paychu kaj paypa kuyasqan,S+Declarative+Cleft1
manam paychu kaj Gervasiopa kuyasqan,S+Declarative+Cleft1
```

# Transformation and translation from French to Quechua

## A transitive sentence: Gervasio Romilda kuyan

Quechua/Quechua syntactic grammar.



Translation FR>QU of a declarative phrase

**Input FR: Gervasio aimé Romilda**

**Output QU: Gervasio kuyara Romilda**

# Transformation and translation QU>FR

In QU: a conjugated form of a QU verb V for 3+s (pay) kuyan  
Output FR: all conjugated forms of the verb V in French

Quechua/Quechua syntactic grammar.

Traducteur 1 verbe en tous les temps Qu FR  
en Grammar>debug taper une forme conjugué en QU en tem T. En sortie on a toutes les formes conjuguées du verbe FR

Enter expression:  Debug

589 analyses. Click a solution below to display the corresponding path:

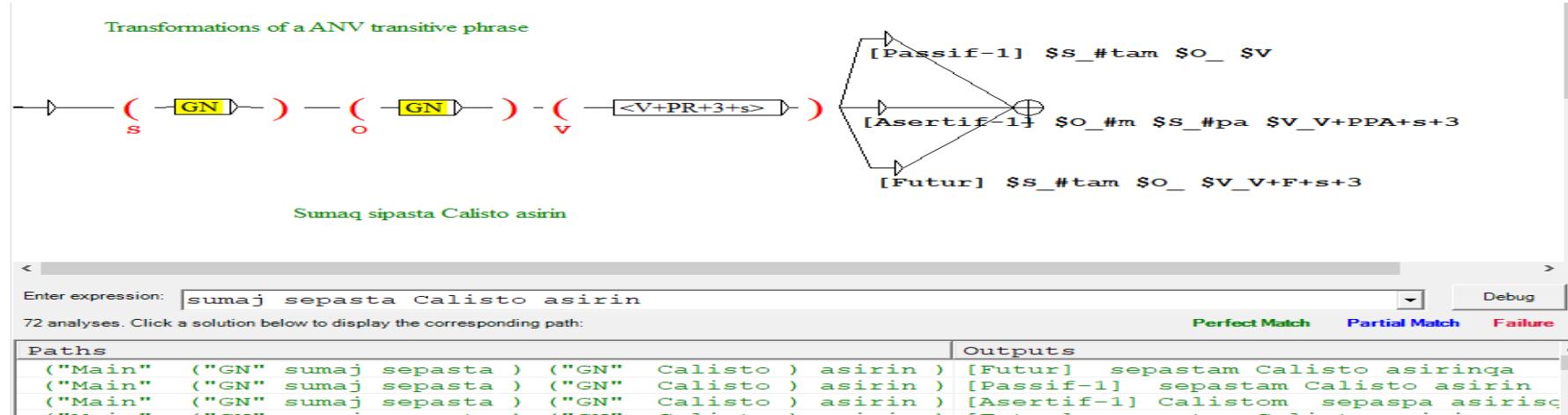
Paths	Outputs
("Main" kuyan )	aimions
("Main" kuyan )	aimiez
("Main" kuyan )	aimèrent
("Main" kuyan )	aimé
("Main" kuyan )	aimée
("Main" kuyan )	aimés

Perfect Match Partial Match Failure

# Transformations of elementary sentiment predicates

*Sumaq sipasta Calisto asirin/* Calisto smiles at a beautiful girl

# AN1 NOV



- *sumaq sipasta Calisto asirin* = Pay *sumaq sipasta asirin* / *He smiles* at a beautiful girl [Pron-0]
  - *sumaq sipasta Calisto asirin* = *Calisto payta asirin* / *Calisto smiles* at her [Pron-1]

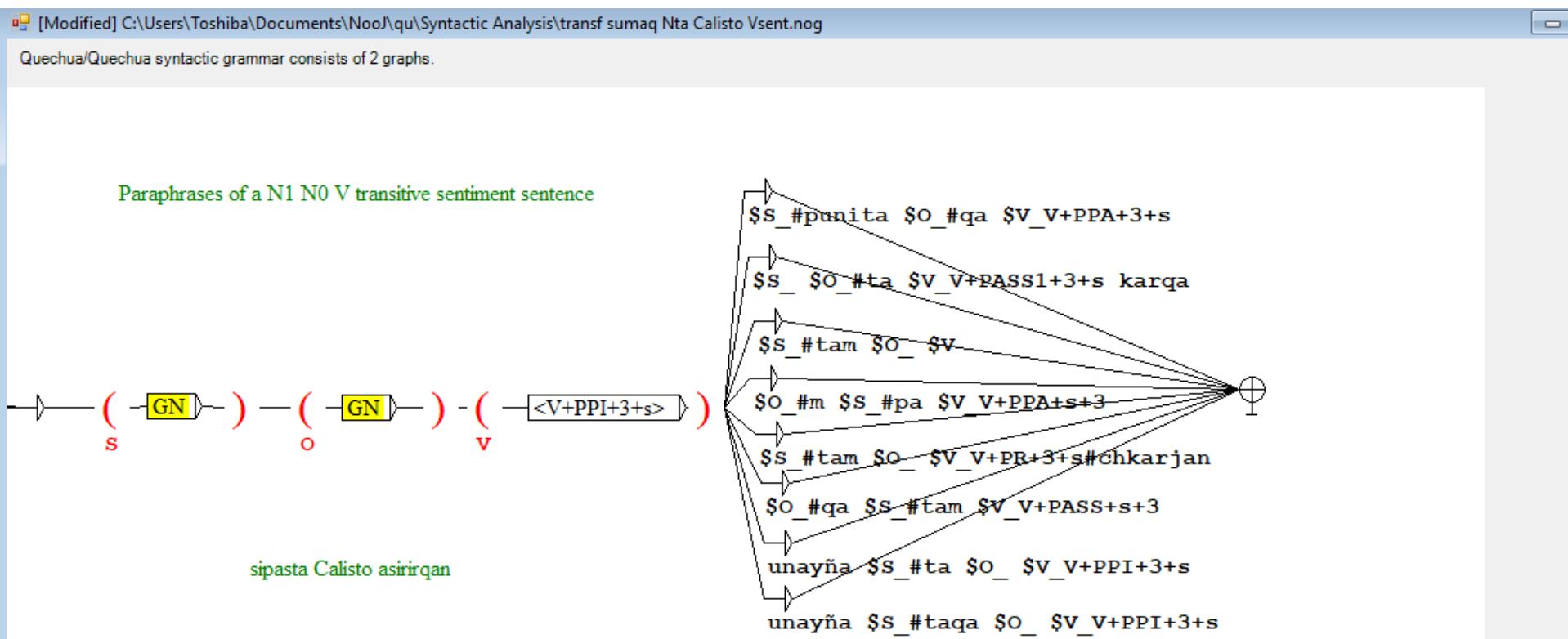
# **PARAPHRASES OF SENTIMENT PREDICATES**

- (Following Harris)

**PARAPHRASING GRAMMARS ARE TRANSFORMATIONS WHICH ALLOW TO OBTAIN EQUIVALENT SENTENCES BY MORPH-SYNTACTIC CHANGES WHILE PRESERVING THE MORPHEMES AND THEIR GRAMMATICAL RELATIONS BETWEEN THEM.**

**AMONG THE POSSIBLE TRANSFORMATIONS, WE WILL CHOOSE THE PASSIVATION, THE PERMUTATION, THE REDUCTION TO ZERO OR THE**

# A paraphraser grammar for: Sipasta Calisto asirirqan/Calisto smiled at a girl



Enter expression:

96 analyses. Click a solution below to display the corresponding path:

[Perfect Match](#) [Partial Match](#)

Paths	Outputs
("Main" ("GN" sipasta ) ("GN" Calisto ) asirirqan )	unayña sipastaqa Calisto asirirqan
("Main" ("GN" sipasta ) ("GN" Calisto ) asirirqan )	unayña sipasta Calisto asirirqan
("Main" ("GN" sipasta ) ("GN" Calisto ) asirirqan )	Calistoqa sipastam asiriran
("Main" ("GN" sipasta ) ("GN" Calisto ) asirirqan )	sipaspunita Calistoqa asirisqan
("Main" ("GN" sipasta ) ("GN" Calisto ) asirirqan )	sipas Calistota asirirunman karqa
("Main" ("GN" sipasta ) ("GN" Calisto ) asirirqan )	sipastam Calisto asirinchkarjan

**CONCLUSION AND PERSPECTIVES**  
IN THIS PAPER, I HAVE PRESENTED SOME GRAMMARS CAPABLE OF RECOGNIZING AND PRODUCING A LARGE NUMBER OF TRANSFORMATIONS OF A SENTENCE OF THE FORM NO N1 V, WHICH IS THE FORM ALSO OF A QU SENTIMENT SENTENCE LIKE GERVASIO ROMILDA KUYAN/ GERVASIO LOVES ROMILDA.

*I ALSO PRESENTED SOME SIMPLE GRAMMARS TO GENERATE PARAPHRASES FOR QUECHUA SENTIMENT PREDICATES*

*IN THE COMING WORKS I PLAN TO*

Maximiliano DURAN

**The end/ tukui**

**REJSI-KU-LLA-IKI-CHIK !**

**I THANK YOU VERY MUCH !**