The grammar of relative measurement

Dorothy Ahn (Harvard) · Uli Sauerland (ZAS)
dorothyahn@fas.harvard.edu uli@alum.mit.edu
SALT 25, Stanford University, May 15–17, 2015

• Many languages allow non-conservative uses of relative measures
  (German, Georgian, Korean, French, Italian, Mandarin, ...)

• (Pseudo-)partitives can be generally structurally ambiguous

• Support for a copy-theory based account of conservativity

1 Non-Conservativity

Conservativity Universal: All natural language determiners are interpreted as conservative quantifiers. (originally Keenan and Stavi 1986, recently reaffirmed by e.g. Romoli 2014; Szabolcsi 2010; Westerståhl 2014)

Relative measures (fractions, percent, ...) often allow non-conservative interpretations:

Non-Bavarian German (Sauerland, 2014)

(1) In subject position:
   a. 30 Prozent Studierender arbeiten.
      30 percent-NOM students-GEN work
      ‘30 percent of students work.’ (conservative)
   b. 30 Prozent STUDierende arbeiten hier.
      30 Percent-NOM studierende-NOM work here
      ‘30 percent of workers here are students.’ (non-conservative)

(2) In dative object position:
   a. Ein-em Drittel der Männer gefiel Conchita.
      one-DAT third the-GEN men pleased Conchita
      ‘One-third of the men liked Conchita.’ (conservative)
   b. Ein-em Drittel MÄNner-n gefiel Conchita.
      one-DAT third men-DAT pleased Conchita
      ‘One-third of those who liked Conchita were men.’ (non-conservative)

Morphological marking in German: focus, case (genitive vs. matching), (and definiteness)
Georgian (Ahn’s informant work, in progress)

(3) In subject position:
   a. Profesorebi-s erti-mesamed-i movida.
      professor-GEN one-third-NOM came
      ‘One-third of the professors came.’  
      (conservative)
      one-third=NOM professor.PL-NOM came
      ‘One-third professors came.’  
      (non-conservative)

(4) In object position:
   a. Harvard-ma kalebi-s ormutzda.at-i prochet-i daasakma.
      Harvard-ERG women-GEN fifty-NOM percent-NOM hired.
      ‘Harvard hired 50% of the women.’  
      (conservative)
   b. Harvard-ma ormutzda.at-i prochet-i kal(eb)-i daasakma.
      Harvard-ERG fifty-NOM percent-NOM woman(PL)-NOM hired
      ‘Harvard hired 50% women.’  
      (non-conservative)

Morphological marking in Georgian: focus, case (genitive vs. matching), and number.

Korean (Ahn, 2012)

(5) In subject position:
   a. [Kyosu-(uy) isip-phulo]-ka wassta.
      professor-GEN twenty-percent-NOM came
      ‘20 percent of the professors came.’  
      (conservative)
   b. KYOSU_f-ka isip-phulo wassta.
      professor-NOM twenty-percent came
      ‘20 percent of those who came were professors.’  
      (non-conservative)

(6) In object position:
      company-NOM woman-GEN fifty-percent-ACC hired
      ‘The company hired fifty percent of the women.’  
      (conservative)
      company-NOM woman-ACC fifty-percent hired
      ‘The company hired fifty percent women.’  
      (non-conservative)

Morphological marking in Korean: focus, word-order (quantifier float), and case
French (Benjamin Spector, p.c.)

(7)  a. Ce film a été vu par deux tiers des journalistes.  
this movie has been seen by two thirds of-the journalists  
'Two thirds of the journalists have seen this movie.'  
(conservative)

   b. Ce film a été vu par deux tiers de journalistes.  
this movie has been seen by two thirds of journalists  
'Two thirds of the people who have seen this movie are journalists.' (non-conservative)

Italian (Silvia Darteni, p.c.)

(8)  a. Gianni ha parlato a un terzo delle donne  
Gianni has talked to a third of the women  
'Gianni talked to a third of the women.'  
(conservative)

   b. Gianni ha parlato a un terzo di donne  
Gianni has talked to a third of women  
'A third of those Gianni talked to were women.'  
(non-conservative)

Morphological marking in French and Italian: focus and definiteness

Mandarin (Hongyuan Sun, p.c.)

(9)  Tāmen lìyòng le 5% de běndì-rén  
3pl. hire perf. 5% DE local-person  
   a. 'They hired 5% of the locals.'
   b. '5% of the persons they hired are locals.'

Morphological marking in Mandarin: only focus

Summary

(10) Morphological markings across languages:

<table>
<thead>
<tr>
<th>language</th>
<th>morphological marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>German</td>
<td>focus &amp; case</td>
</tr>
<tr>
<td>Georgian</td>
<td>focus, case &amp; number</td>
</tr>
<tr>
<td>Korean</td>
<td>focus, case &amp; word order</td>
</tr>
<tr>
<td>French</td>
<td>focus &amp; definiteness</td>
</tr>
<tr>
<td>Italian</td>
<td>focus &amp; definiteness</td>
</tr>
<tr>
<td>Mandarin</td>
<td>focus</td>
</tr>
</tbody>
</table>
2 Narrow Focus

If the NP construed with the measure is complex, narrow focus gives rise to a third construal.

**German**

(11) 60 Prozent [Frauen aus DEUTschland] sitzen im Publikum.

60 percent women from Germany sit in the audience

‘60 percent of the women in the audience are German.’

**Georgian**


one-NOM third-NOM woman-NOM professor-NOM came

‘One-third of the professors who came were female professors.’

The non-focussed parts of the NP are composed with the VP:

- non-conservative construals are especially dependent on focus
- syntax alone doesn’t determine the restrictor

3 Conservative Construals with Relative Measures

Previous work mostly on absolute measures:
Champollion (2010); Krifka (1989); Schwarzchild (2006); Scontras (2014)

(13) $x$ is 5 ounces of (the) gold

a. Krifka 1989: $\text{ounces}(x) = 5 \& \text{gold}(x) \& \text{Monotonicity}$

b. Schwarzchild 2006: $\exists \text{Dim}: \text{gold}(x) \& 5\text{-ounces}(\text{Dim}(x)) \& \text{MON(Dim,gold)}$

Relative measures require functional application (Ionin et al., 2006).

(14) Our lexical entry for percent:

$[	ext{percent}] = x \in D_e n \in D_a y \in D_e . \frac{\mu(x \oplus y)}{\mu(x)} = \frac{n}{100}$

- Measure $\mu$ is usually provided by context (e.g. % by volume, % by weight)
Maximization, Definiteness, and the Partitive Constraint

If the substance DP isn’t overtly definite (i.e. type e), maximization must apply.

$$\sup(c) = \bigoplus_{c(x)=1} x$$

*Account of the Partitive Constraint (Ladusaw, 1982):* Languages that have an overt definite determiner, prefer using it instead of maximization. (cf. Chierchia 1998)

(15) John ate sixty percent of *(the) apples.

Bare plural kinds and mass singulars are possible when the total quantity is graspable: Ionin et al. (2006)

(16) Sixty percent of Americans smoke Marlboro.
(17) Ninety percent of water is undrinkable.

4 Non-Conservative Structure of Measures

Proposal: A contextual, focus-sensitive restrictor $C$ fills the argument position of *percent*:

(18) **Non-Conservative**

$$\begin{array}{c}
\text{DP} \\
\text{DP} \\
\text{NP} \\
\text{percent} \\
C \\
\text{[substance]-F}
\end{array}$$

(19) **Conservative**

$$\begin{array}{c}
\text{DP} \\
\text{D/NP} \\
\text{percent} \\
\text{(the) [substance]}
\end{array}$$

- The *percent* DP and the NP form an appositive unit (Ott, 2012).

**Basic Syntactic Properties**

- Genitive case is assigned to $C$, so the substance noun cannot be Genitive-marked.
  → Data from German, Georgian, and Korean

- NP must match in case with the *percent* DP.
  → Data from German and Georgian

- The *percent* DP blocks the D-position of the NP, so the NP can’t be definite.
  → Data from French, Italian, and German
Semantic Account

(20) 55% women$^F$ are presenting.

(Actually in German)

$C$ is a set of properties, so sup must be generalized to sup$'$:

$$\text{sup}'(C) = \bigoplus_{c \in C} x_{c(x) = 1}$$

The boxed DP causes a type mismatch, so it moves, leaving behind an index and a definite as occurs in the copy theory of movement (Fox 1999; Sauerland 2004, and others):

(21) $[55 \text{ percent sup}' C] \sim C[\lambda_1 \text{ the}_1 (\text{women } F) \text{ are presenting}]$

(22) $[\text{the}_n]^g = P . P(g(n)) : g(n)$

Movement also provides a site for the focus licensor $\sim$, determining $C$ (Rooth, 1992):

$$C = \{x . x \text{ a female presenter}, x . x \text{ is a male presenter}\}$$

Account of Narrow Focus

(23) 60 percent women from Germany$^F$ sit in the audience ($= \text{German (11)}$)

(24) $[60 \text{ percent max'} C] \sim C[\lambda_1 \text{ the}_1 (\text{women from Germany } F) \text{ sit in the audience}]$

(25) $C = \{x . x \text{ a female audience member from France}, x . x \text{ a female audience member from Italy,}$

$x . x \text{ a female audience member from Germany, ...}\}$

Syntactic Account of Korean

(26) KYOSU$^F$-ka isip-phulo wassta.

professor-NOM twenty-percent came

‘20 percent of those who came were professors.’

The remnant DP containing the substance noun moves for case, but reconstructs:

(27) $[\text{professor \ the}_x] \text{-NOM 20\% } x \text{ [professor}_F \text{ the}_x \text{ came}$
5 Further Consequences

Ambiguity of (Pseudo-)Partitives

(Pseudo-)partitives can allow two structures more generally:

\[
\text{zwei Glas Wasser} \quad \text{('two glasses of water', German)}
\]

Absolute measures in German also allow a genitive or a case-matching structure:

(28) a. \textit{Sie hat zwei voll-e Glas frisch-en Wasser-s getrunken.}
    she has two full-ACC.PL glas fresh-GEN.SG water-GEN,.SG drunk
    \text{‘She drank two full glasses of fresh water.’}

b. \textit{Sie hat zwei voll-e Glas frisches Wasser getrunken.}
    she has two full-ACC.PL glas fresh-ACC.SG drunk-ACC.SG drunk
    \text{‘She drank two full glasses of fresh water.’}

Because absolute measures are intersective, no semantic difference is expected.

Conservativity

Two theoretical directions to understand conservativity:

- cognitive accounts (Keenan and Stavi 1986, and others)
- copy-theoretic account (Chierchia 1995; Romoli 2014, and others)

If cognitive accounts refer to processing of the surface form, our data falsify them. A copy-theoretic account of the conservativity of 55% + partitive:

(29) a. 55\% of the women are presenting.
    b. [55\% of the women] [l₁ the₁ woman is presenting]

But, the NP isn’t moved in the non-conservative structure:

(30) a. 55\% women are presenting.
    b. 55\% C [l₁ the₁ woman is presenting]
6 Conclusions

- Many languages allow non-conservative uses of relative measures (French, Georgian, German, Korean, French, Italian, Mandarin, . . . )
- Morphological markings include case, definiteness, word order, and crucially focus
- (Pseudo-)partitives can be generally structurally ambiguous
- Support for a copy-theory based account of conservativity

Selected References

Ott, Dennis: 2012, Local Instability: Split Topicalization and Quantifier Float in German, Linguistische Arbeiten. De Gruyter.