

On the Dimensions of Discourse Salience

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Dimensions of Salience

- Background
 - Models of salience-based information packaging
referential choice, grammatical roles and word order
- Corpus study 1
 - One or multiple dimensions of salience ?
- Corpus study 2
 - Forward-looking vs. backward-looking salience ?
- Discussion

Background: Linguistic Variability

- `[E]s darf nicht verkannt werden, dass man denselben Sinn, **denselben Gedanken auch verschieden ausdrücken** kann, wobei denn also die Verschiedenheit ... nur eine der ... Färbung des[selben] Sinnes ist und für die Logik nicht in Betracht kommt.'

(Frege 1892)

`[W]e must not fail to recognize that the same sense, **the same thought, may be variously expressed**; thus the difference does ... concern ... only the ... colouring of the [same] thought, and is irrelevant for logic.'

(Geach and Black 1980)

- ⇒ Linguistic variability cannot be (completely) accounted for on grounds of (Fregean) semantics
 - ⇒ "Information Packaging"

Information Packaging

- `the kind of phenomena ... that ... have to do primarily with **how the message is sent** and secondarily with the message itself'

(Chafe 1976)

- `the linguistic dimension that allows speakers to make **structural choices in accordance with** their assumptions about the hearer's **communicative state**, and that allows hearers to **decode** the import of those structural choices **appropriately.**'

(Vallduví 1994)

Information Packaging

- (a) the noun may be either **given** or **new**;
- (b) it may be a **focus of contrast**;
- (c) it may be **definite** or **indefinite**;
- (d) it may be the **subject** of the sentence;
- (e) it may be the **topic** of the sentence;
- (f) it may represent the individual whose **point of view** the speaker takes, or with whom the speaker **empathizes**

(Chafe 1976)

Information Packaging

„salience“; „givenness_S[aliency]“ **er given or new;** (Sgall et al. 1986; Prince 1981)

„discourse salience“ **a focus of contrast;** (Langacker 1997)

„salience“ **e definite or indefinite;** (Lewis 1979)

„salience“ **e subject of the sentence;** (Fillmore 1977)

„salience“ **e topic of the sentence;** (Sgall et al. 1986; Grosz et al. 1995)

- (f) it may represent the individual whose **point of view** the speaker **empathizes**

Many aspects of information packaging have been explained on grounds of „salience“

(Chafe 1976)

Information Packaging

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Many aspects of information packaging have been explained on grounds of „salience“

(Chafe 1976)

... but **what exactly is it, and what effects does it have ?**

Effects of salience ?

- Well, different people have different ideas
 - **Personal pronouns** are more salient than **demonstratives**
(Gundel et al. 1993)
 - **Demonstratives** are more salient than **personal pronouns**
(Sgall et al. 1986)
 - salient (**given**) precedes non-salient (**new**)
(Sgall et al. 1986)
 - **new**(**sworthy**) precedes **given**
(Mithun 1993)
 - the grammatical subject designates **salient referents** (Fillmore 1977)
 - the grammatical subject designates **non-salient referents** that are to be promoted in their saliency (Mulkern 2007)

What is salience ?

- Well, different people have different ideas

- salient = given ?

(Sgall et al. 1986, Prince 1981)

- salient = new(sworthy) ?

(Davis & Hirschberg 1988, Steedman 2000)

relevant/important ?

(Langacker 1997)

- multiple dimensions of salience ?

- backward-looking vs. forward-looking

(Givón 1982, 2001, Arnold 2005)

What is salience ?

- Well, different people have different ideas

‘As we have just seen, a number of **different factors** have been claimed to contribute to salience. Researchers are also **divided on the effects** of salience to sentences. ... [S]alience is (...) characterized by a number of superficially **dissimilar properties.**’

(Sridhar 1988)

What is salience ?

- Well, different people have different ideas

As we have just seen, a number of **different factors** have

been discussed

also discussed

[S]alience

dissimilarity

... but it is generally accepted that

- salience has to do with attention and memory
- salience plays a crucial role in selection tasks
- this includes the information packaging of discourse referents
 - referential choice: pronominal > nominal
 - grammatical roles: subject > object > oblique
 - word order: salient precedes non-salient

ly

38)

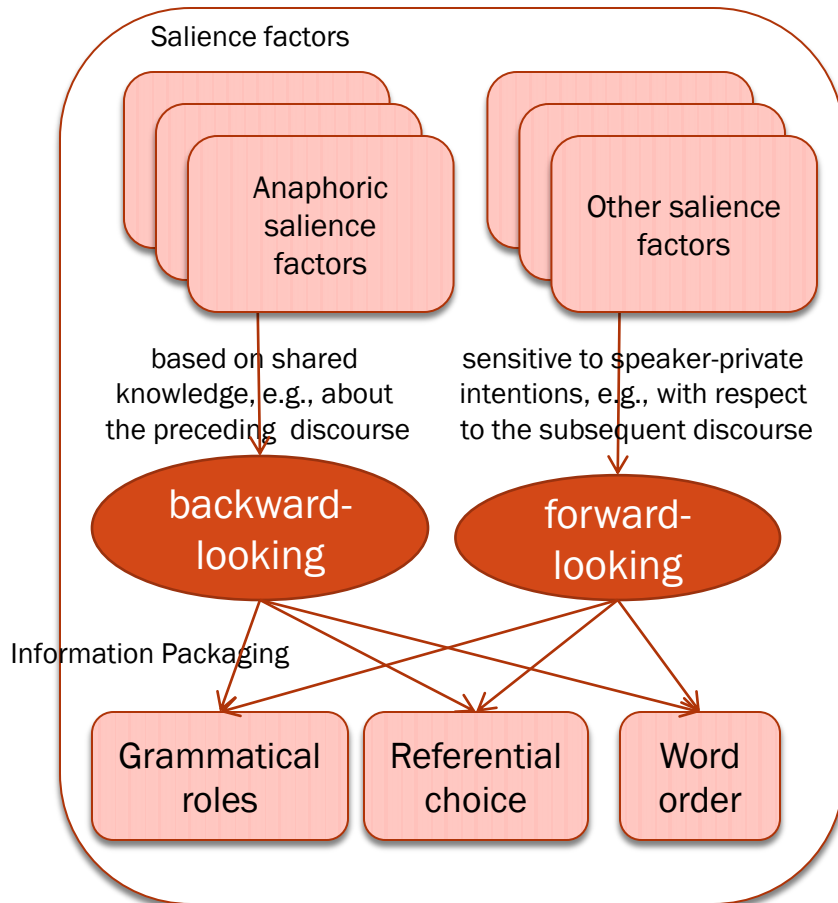
What is salience ?

Salience of discourse referents

- Monodimensional
 - Discourse referents are characterized by a single cognitive dimension of salience that governs referential choice, grammatical roles and word order preferences
- Multidimensional
 - At least two logically independent dimensions of salience are to be distinguished. Both interact in the derivation of packaging preferences for referential choice, grammatical roles and word order preferences

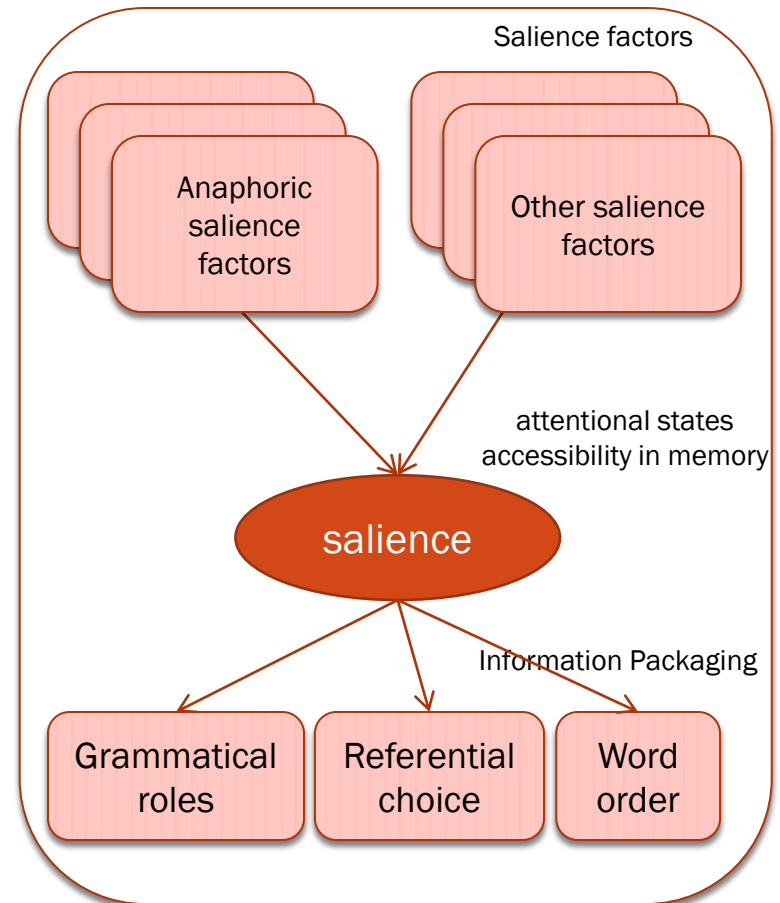
Two views on salience of discourse referents

Multidimensional



(Givón 1983, 2001, Clamons et al. 1993, Mulhern 2007)

Monodimensional



(Sgall et al. 1986, Tomlin 1995, 1997)

Saliency in discourse

- Saliency of discourse referents
 - is related to the focus of attention and accessibility in memory of hearer and/or speaker
 - is manifested by the choice of referring expressions, grammatical roles and word order
 - is the most important cognitive determinant of information packaging
- Monodimensional vs. Multidimensional
 - No agreement as to whether saliency is a unified cognitive concept

Saliency in discourse

- Two corpus studies
 - Test predictions of both models for the correlation between saliency-marking grammatical devices
 - Pronominalization
 - Sentence-initial word order
 - Subject role
 - Test whether the dimensions of saliency correlate with forward-looking and backward-looking saliency factors

One or two dimensions of salience ?

- Background

⇒ Salience influences information packaging
pronominalization, subject role, sentence-initial position

- **Corpus study 1**

One or two dimensions of salience ?

- Corpus study 2

Forward-looking vs. Backward-looking salience ?

- Discussion

Saliency in discourse

- Corpus study
- German
 - Grammatical roles and word order less dependent on each other than in English
- TüBa-D/Z (Telljohann et al. 2009, Naumann 2007)
 - 2,213 newspaper articles
 - Syntax + coreference annotation
 - Features
 - perspron (personal pronoun)
 - sbj (subject role)
 - vf (*vorfeld*, sentence-initial topological field)

Saliency in discourse

- Feature extraction

- SWI Prolog conversion of TüBa-D/Z
- non-coordinated, non-embedded main clauses
40,713 clauses
- all nominal and pronominal arguments and adjuncts
79,222 (potential) referring expressions
- packaging phenomena
 - perspron ⇔ pos=„PPER“
 - sbj ⇔ func=/on|onk/
 - vf ⇔ cat=„VF“
- discourse features
 - given ⇔ link* to preceding discourse
 - important ⇔ link* to subsequent discourse

(Bouma 2010)

One or two dimensions ?

- Monodimensional prediction
 - Salience understood as a latent variable
 - Can be extrapolated from information packaging
 - Extrapolation is imprecise
 - other (semantic, socio-cultural, etc.) factors have an influence on the realization of the referent
 - Reliability of the extrapolation increases, if multiple dimensions of information are taken into consideration that indicate the same salience status

One or two dimensions ?

- Monodimensional prediction

- Salience-marking grammatical devices

X^{sal}

- Pronominalization (perspron)
- Subject role (sbj)
- Sentence-initial position (vf)



indicate high
degrees of salience

- Prediction 1

$$P(X^{sal} | Y^{sal}) > P(X^{sal})$$

- salience has an effect on information packaging
 - sbj => salient => perspron
- ⇒ sbj => perspron preference

$$P(\text{perspron}|\text{sbj}) > P(\text{perspron})$$

One or two dimensions ?

- Monodimensional prediction

- Prediction 2

$$P(X^{\text{sal}} | Y^{\text{sal}}, Z^{\text{sal}}) \geq P(X^{\text{sal}} | Y^{\text{sal}})$$

- salience extrapolation from Y and Z* is more reliable than extrapolation from Y alone

- sbj => salient (low confidence) => perspron
- sbj and vf => salient (high confidence) => perspron

⇒

- sbj => perspron (low confidence)
- sbj and vf => perspron (high confidence)

$$P(\text{perspron} | \text{sbj}, \text{vf}) \geq P(\text{perspron} | \text{sbj})$$

* Given that Y^{sal} and Z^{sal} point to the *same* degree of salience

One or two dimensions ?

- Multidimensional prediction

- Prediction 1 may hold

$$P(X^{\text{sal}} | Y^{\text{sal}}) > P(X^{\text{sal}})$$

- But only if X^{sal} and Y^{sal} are affected by the same dimension of salience

- Prediction 2 does not hold $P(X^{\text{sal}} | Y^{\text{sal}}, Z^{\text{sal}}) \geq P(X^{\text{sal}} | Z^{\text{sal}})$

- If X^{sal} is determined by **one** dimension of salience and Y^{sal} by **another** dimension of salience

One or two dimensions ?

Prediction 1

$$P(X^{sal} | Y^{sal}) > P(X^{sal})$$

Probability increase confirmed

- if there are multiple dimensions of salience, they are interrelated

realization $X^{sal\uparrow}$	condition $Y^{sal\uparrow}$	(conditioned) probability $P(X^{sal\uparrow} Y^{sal\uparrow})$	probability increase (vs. unconditioned)
perspron	(none)	10.80% (8,557/79,222)	
	vf	11.43%	+0.63%
	sbj	20.06%	+9.26%
sbj	(none)	42.50% (33,667/79,222)	
	perspron	78.94%	+36.44%
	vf	63.91%	+21.41%
vf	(none)	33.16% (16,789/79,222)	
	perspron	35.08%	+1.92%
	sbj	49.87%	+16.71%

Significant positive correlation between perspron, sbj, vf

realization		χ^2	ϕ
\pm perspron	\pm vf	$p < .0001$.014
\pm perspron	\pm sbj	$p < .0001$.257
\pm sbj	\pm vf	$p < .0001$.305

One or two dimensions ?

Prediction 2

$$P(X^{sal} | Y^{sal}, Z^{sal}) \geq P(X^{sal} | Z^{sal})$$

realization $X^{sal\uparrow}$	conditions		probability $P(X^{sal\uparrow} Y^{sal\uparrow}, Z^{sal\uparrow})$	probability increase vs. $P(X^{sal\uparrow} Z^{sal\uparrow})$	
	$Y^{sal\uparrow}$	$Z^{sal\uparrow}$		$P(X^{sal\uparrow} Y^{sal\uparrow})$	$P(X^{sal\uparrow} Z^{sal\uparrow})$
perspron	vf	sbj	15.51% (2,604/16,789)	+4.08%	-4.55%
vf	perspron	sbj	38.55% (2,604/6,755)	+3.47%	-11.32%
sbj	vf	perspron	86.74% (2,604/3,002)	+22.84%	+7.80%

- $P(\text{perspron} | \text{vf}, \text{sbj}) < P(\text{perspron} | \text{sbj})$
- $P(\text{vf} | \text{perspron}, \text{sbj}) < P(\text{vf} | \text{sbj})$
- **Direct counterevidence** for monodimensional models of salience
 - perspron is primarily determined by one dimension of salience
 - vf is primarily determined by another dimension of salience
 - sbj is sensitive to both dimensions

Forward-looking/backward-looking ?

- Background
 - ⇒ Salience influences information packaging
pronominalization, subject role, sentence-initial position
- Corpus study 1
 - ⇒ (at least) two dimensions of salience
- **Corpus study 2**
Forward-looking vs. Backward-looking salience ?
- Discussion

Forward-looking/backward-looking ?

Multidimensional models of salience

„anaphoric“
(backward-looking)

„cataphoric“
(forward-looking)

(Givón 1983, 2001)

„givenness“

„emphasis“
„foregrounding“

(Clamons et al. 1993,
Mulkern 2007)

„anaphora“

„anadeixis“
(attention guidance)

(Ehlich 1982,
Cornish 2007)

Forward-looking/backward-looking ?

Multidimensional models of salience

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(attention guidance)

(Ehlich 1982,
Cornish 2007)

Defined with respect to the
preceding discourse /
common ground

Attention-shifting operations /
preparation for subsequent
discourse

Forward-looking/backward-looking ?

→ „backward-looking“

Covers most salience factors that are accessible to the hearer

Salience ~ attention:
Approximates attentional states of the hearer

Realization and distribution of the referent in previous discourse

Defined with respect to the preceding discourse / common ground

Attention-shifting operations / preparation for subsequent discourse

Generic labels

General characterization

Heuristic measurements

Functions

Forward-looking/backward-looking ?

→ „backward-looking“

„forward-looking“ ←

Covers most salience factors that are accessible to the hearer

Salience ~ attention:
Approximates attentional states of the hearer

Includes sources of information that are available to the speaker only

For example, his/her intentions for the development of subsequent discourse

Can be partially reconstructed from

Realization and distribution of the referent in previous discourse

Realization and distribution of the referent in subsequent discourse

Defined with respect to the preceding discourse / common ground

Attention-shifting operations / preparation for subsequent discourse

Generic labels

General characterization

Heuristic measurements

Functions

Forward-looking/backward-looking ?

→ „backward-looking“

← „forward-looking“

±given
previous mention

±important
subsequent mention

Robust, coarse-grained
heuristic measurements



Abstract from
theory-specific
details

Realization and distribution of
the referent in previous
discourse

Realization and distribution of
the referent in subsequent
discourse

Different measurements with a
variety of factors have been
proposed
(cf. Chiarcos 2010 for an overview)

Defined with respect to the
preceding discourse /
common ground

Attention-shifting operations /
preparation for subsequent
discourse

Forward-looking/backward-looking ?

„backward-looking“

„forward-looking“

±given
previous mention

±important
subsequent mention

Robust, coarse-grained
heuristic measurements

Extrapolated from coreference annotation in TüBa-D/Z

realization	±given		±important	
	χ^2	ϕ	χ^2	ϕ
±perspron	p < .0001	.342	p < .0001	.174
±sbj	p < .0001	.288	p < .0001	.279
±vf	p < .0001	.065	p < .0001	.073

Significant and positive
correlation between heuristic
measurements and packaging
phenomena

But how do ±given and
±important interact ?

Forward-looking/backward-looking ?

- How do \pm given and \pm important interact ?
 - Experiment with C4.5 decision trees to predict packaging preferences from only \pm given and \pm important

(a) referring expressions

correctness: 34.6%
(baseline: defNP, 33.6%)

```
+given
| +important: perspron
| -important: defNP
-given: defNP
```

(b) grammatical roles

correctness: 53.1%
(baseline: sbj, 42.5%)

```
+given: sbj
-given
| +important: sbj
| -important: other
```

(c) word order

correctness: 38.7%
(baseline: mf_initial, 33.6%)

```
+given: mf_initial
-given
| +important: vf
| -important: mf_noninitial
```

- Important here is not the quality of the classification, but the predicted effects of \pm given and \pm important on information packaging

Packaging predictions

	+important	-important
+given	Personal pronoun Subject Mittelfeld initial	Definite NP Subject Mittelfeld initial
-given	Definite NP Subject Vorfeld	Definite NP Oblique Mittelfeld non-initial

This distribution explains the observations of first corpus study

- correlation between pronominalization and subject (+important, +given)
- correlation between vorfeld and subject (+important, -given)
- dispreference for subject pronouns (+given) in vorfeld (-given)

\pm given and \pm important account for the observed distribution of grammatical devices

Discussion

- Background
 - ⇒ salience influences information packaging
- Corpus study 1
 - ⇒ (at least) two dimensions of salience
- Corpus study 2
 - ⇒ these dimensions may be forward-looking and backward-looking salience
 - ±given and ±important account for the observed distribution

- **Discussion**

Results

- If a salience-based approach on information packaging is adopted to account for
 - the choice of referring expressions,
 - the assignment of grammatical roles, and
 - word order preferences in German,
- it is
 - necessary to distinguish (at least) two dimensions of salience in discourse, and
 - plausible to model these dimensions as backward-looking/hearer-oriented salience and forward-looking/speaker-oriented salience

Thank you

Additional slides

- Related research
 - Antecedent selection preferences of Finnish pronouns
 - Experimental support for a two- (or higher-) dimensional model of salience
 - German *vorfeld*
 - Empirical evidence and theoretical claims that the positioning in the *vorfeld* cannot be explained solely on the basis of backward-looking salience/givenness

Related research: Pronouns

- Kaiser & Trueswell (2004, to appear 2011)
 - antecedent selection preferences for personal pronouns and demonstrative pronouns in Finnish
 - Personal pronoun more sensitive to grammatical role
 - Demonstrative pronoun more sensitive to word order
 - ⇒ A unified notion of salience cannot be the sole determinant of the choice of referring expressions
- **But**
 - constraints on the surface realization of antecedent-anaphor pairs are insufficient to disprove the existence of a unified *cognitive* dimension of salience
 - see next slides for an alternative explanation

Related research: Pronouns

- An alternative explanation
 - **one cognitive dimension of salience**
 - salience-based **grammaticalization**
 - ⇒ conventional associations between the linguistic realization of the antecedent and the referring expression of the anaphor
 - Pronominal anaphors with subject antecedent may evolve into syntactically bound pronouns
 - Cf. German (bound) relative pronoun *das* `that' from original (free) demonstrative pronoun

Related research: Pronouns

- An alternative explanation
 - **one cognitive dimension of salience**
 - salience-based **grammaticalization**
 - form-sensitive antecedent selection preferences for different types of pronouns may reflect different degrees of grammaticalization
 - conventional associations may apply independently from the actual degree of salience a referent has

Related research: Pronouns

- An alternative explanation
 - **one cognitive dimension of salience**
 - salience-based **grammaticalization**
 - form-sensitive antecedent selection preferences for different types of pronouns may reflect different degrees of grammaticalization
- ⇒ Dimensionality of salience needs to be confirmed independently from the surface realization of the antecedent
 - motivation for this study

Related research: *Vorfeld*

- Word order in German
 - „standard view“
 - *Vorfeld* marks topical (given) referents
 - Weber & Müller (2004)
 - Indefinite object tend to precede definite subjects in German OVS sentences
 - Speyer (2007)
 - 51% of *Vorfeld* constituents could neither semantically nor anaphorically linked to the preceding discourse
 - Dipper & Zinsmeister (2009)
 - 55% of *Vorfeld* constituents stand in no obvious relationship to the preceding discourse

Related research: *Vorfeld*

- Word order in German

- Frey (2004)

- Canonical topic position in German is the Wackernagel position (*Mittelfeld* initial)
- Pragmatically-driven *Vorfeld* positioning (A' movement) requires an additional pragmatic motivation
 - kontrast (Vallduví & Vilkuna 1998)
 - If the *Vorfeld* is not occupied by A' movement, the highest-ranking *Mittelfeld* constituent is moved in the *Vorfeld* (formal movement)
 - this may be the topic

⇒ Association between (givenness-)topic and *Vorfeld* is secondary

The primary function of the *vorfeld* is not to mark *givenness*

Related research: *Vorfeld*

- Alternative determinants of *Vorfeld* positioning in German

- „discourse aboutness“

(Filippova & Strube 2007)

Vorfeld constituents refer to the global discourse topic
(= headline of a biographical article)

- contrast & frame-setting topics

(Speyer 2007)

primary determinants of *Vorfeld* positioning

backward-looking salience (Grosz et al. 1995) is secondary

Related research: *Vorfeld*

- Aboutness, contrast and frame-setting are speaker-oriented salience factors
 - speaker-private information (prior to utterance)
 - may belong to the same group of factors as \pm important

⇒ Replace backward-looking /forward-looking dichotomy by hearer-oriented vs. speaker-oriented

(Chiarcos 2010)

forward-looking factors do, however, represent only a fraction of possible speaker-oriented salience factors

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