Formal Approaches to Social Meaning, Variation and Identity Construction

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Limits of Variability in Language Summer School (Day 4)
Last two classes we focused on socially conditioned language variation.

▶ Many language changes are socially conditioned (since Labov, 1963) (see also Sali’s class!).
▶ Many language changes take place during times of significant social change.

**Today’s class**

Using game-theoretic models to analyze the relationship between language change and social change.
Labov (1963): Social motivation of sound change

Language change
Decentralization of /aw/, /ay/ before voiceless final consonants (about, right) in Martha’s Vineyard (and North Eastern US).

Social change
The main industries on the Vineyard were in the process of moving from whaling and fishing to tourism, creating significant hardships for islanders who had built their lives around the fishing industry.

Link between language and social change
Speakers committed to the old/outgoing way of life used more of the old/outgoing forms.
Weinreich et al. (1968)’s problems in the study of language change:

1. **Constraints** What are the constraints on change?
2. **Transition** How does language change?
3. **Embedding** How is a given language change embedded in social and linguistic systems?
4. **Evaluation** How do members of a speech community evaluate a given change and what is the effect of this evaluation on the change?
5. **Actuation** Why did a given linguistic change occur at a particular time and place that it did?

Understanding the link between language change and social change is crucial to solving the actuation problem.
Today’s class

How we can use game-theoretic models to understand the relation between language and social change, and make progress on the actuation problem.

- A case study: Variation and change in grammatical gender in French.
French grammar sorts all nouns into classes that determine patterns of agreement with other expressions.

Grammatical gender with inanimates

(1)  *lune* ‘moon’ has feminine g-gender.
    a.  *la belle* lune                      ‘the beautiful moon’

(2)  *soleil* ‘sun’ has masculine g-gender.
    a.  *le beau* soleil                   ‘the beautiful sun’
Animate nouns are more complicated...

Case 1: There is no relation between grammatical and social gender.

(3)  a. La personne qui est partie en premier...
     b. *Le personne qui est parti en premier...
       ‘The (male or female) person who left first...
Animate nouns are more complicated...

**Case 2:** Categorical masculine/feminine gender aligns with reference to male/female social gender.

(4) Different noun form
a. Le boulanger ‘The male baker’
b. La boulangère ‘The female baker’

(5) Common gender (Corbett, 1991)
a. Un journaliste ‘A male journalist’
b. Une journaliste ‘A female journalist’
Noms de métier et de fonction ‘professional nouns’

Non-arbitrary relation between grammatical and social gender

Variable masculine/feminine g-gender with female referents, categorical masculine gender with male referents.

(6) Different noun form
   a. Le président  ‘the (male or female) president’
   b. La présidente ‘the female president’

(7) Common gender
   a. Le ministre  ‘the (male or female) minister’
   b. La ministre  ‘the female minister’
Variation in the transcripts of the *Assemblée Nationale* (French house of representatives):

(8) Madame *le/la* ministre  ‘Madam Minister’

a. **M. Jean-Marc Ayrault.** Madame *le* ministre de l’environnement, plus de 6 000 personnes ont défilé, samedi dernier, dans les rues de Nantes, pour protester contre l’autorisation donnée par le Gouvernement à EDF de remblayer la zone humide du Carnet dans l’estuaire de la Loire. (29/01/1997)

b. **M. Jean-Marc Ayrault.** Monsieur le président, madame *la* ministre, mes chers collègues, tout à l’heure, le président Bayrou me reprochait d’avoir dit que nous étions venus pour voter le projet de loi de finances. (19/12/1997)
Gender fair language use

The use of grammatical gender in expressions referring to women has been the subject of enormous amounts of prescription and language planning in France and in the Francophonie (see Houdebine, 1987, 1998; Burr, 2003; Viennot, 2014, among others).
First wave of activism: 1984-1986

Yvette Roudy, women’s rights minister, headed a commission aimed at feminizing the *noms de métier et de fonction*.

- The commission recommends the use of feminine grammatical gender (eg. *la*) and (in some cases) nouns with feminine endings (eg. *présidente*).

March 11th, 1986

Prime minister Laurent Fabius (Socialist Party) legislated the use of the language recommended by the commission in the *Assemblée Nationale* (and similar government institutions).
Transcripts (‘compte rendus’) are available for all sessions since 1958 at http://archives.assemblee-nationale.fr.

- Automatically extracted all female titles: Madame la/le N.

Full dataset

85 422 occurrences of Madame le/la N.
Why titles?

Easy to automatically identify female referents of grammatically masculine expressions in terms of address.

(9)  
a. **To M. Strauss-Kahn**: Monsieur le ministre, vous avez tort.
b. **To Mme. Royal**: Madame le ministre, vous avez tort. ‘Mr./Madam minister, you are wrong.’

Not so easy to automatically identify female referents in the general case.

(10) **About M. Strauss-Kahn/Mme. Royal**: Le ministre a tort. ‘The minister is wrong.’
Variable gender in 1980s Assemblée Nationale

Proportion of feminine in the 1980s

Mar. 11, 1986
March 6th, 1998
Prime Minister Lionel Jospin (Socialist Party) recalls to the government that they are supposed to be using feminine gender and (if appropriate) feminized forms.

- Acknowledges that the Fabius’ policy was never obeyed/enforced.
- Commissions a new study from the Commission générale de terminologie et néologie (which makes essentially the same recommendations as the one in 1984-5) (Becquer et al., 1999).
Variable gender in 1990s-2000s

Proportion of feminine in the 1990s and 2000s

Mar. 6, 1998
Question
What changed from 1986 to 1998 which allowed the feminine form to take over, possibly aided by (the exact same) language policy?
Proposal

Changes in the use of feminine grammatical gender and differences in the effectiveness of Fabius/Jospin’s language policy are the result of changes in gender ideologies in France between the mid 1980s and mid 1990s.

- The mid 1990s saw the emergence of a new persona (identity/social type) for female politicians, which only feminine g-gender can construct.
- Jospin’s reinforcement of Fabius’ policy in 1998 was successful because it strengthened an existing association between feminine g-gender and a female political persona.
- Fabius’ policy was unsuccessful because it tried to build on ideological structure that was not shared by a large portion of the Assemblée Nationale.
Formal model of social and linguistic change

1. Use **Conceptual Spaces** (Gärdenfors, 2000, 2014) to formalize speaker ideologies.
2. Develop a **social meaning** analysis of the meaning of French grammatical gender (following McConnell-Ginet (2013)).
3. Use **epistemic game theory** (eg. Franke (2009); Frank and Goodman (2012); Burnett (2017)) to formalize the link between ideologies, social meanings and language use.
Variation and change in the Assemblée Nationale (1982-2017)

Parité and changing French gender ideologies

A formal model of the link between social change and language change

- Formalizing ideologies with Conceptual Spaces
- Linking ideological and linguistic changes with game theory

Conclusion
We know the change happened around 1996-1999, but when exactly?

A more fine-grained look. . .

At each day, we looked at the proportion of feminine uses on all the occurrences 30 days before and 30 days after.

- Restrict our attention to the period where there is variation in the statistical analyses.
Proportion of feminine uses over time (61 days window)

- Sep. 15, 1997
- Jul. 7, 1998
- Mar. 6, 1998

0.0
0.2
0.4
0.6
0.8
1.0
September 15th, 1997-July 7th, 1998

Beginning of the 11th legislature (after summer break) to the end of the 1998 spring session.

4,036 occurrences of Madame la/le N, 44% feminine overall.

M. Thierry Mariani. Madame la présidente de la commission, qu’en sera-t-il des catégories de délinquants étrangers qui ont de gros problèmes de santé, etc. ? (16/12/1997)

M. Gilbert Meyer. Madame la secrétaire d’Etat aux petites et moyennes entreprises, au commerce et à l’artisanat, la loi relative au développement et à la promotion du commerce et de l’artisanat… (7/10/1997)
M. Jean-Claude Gayssot. Madame le député, si j’ai bien compris, mon prédécesseur vous avait fait des promesses d’engagement au printemps dernier. (24/10/1997)

M. Jean-Claude Gayssot. Madame la députée, comme vous le savez, le schéma directeur national des liaisons ferroviaires à grande vitesse, approuvé par décret en 1992, a prévu, pour la desserte de l’ouest de la France, la réalisation du TGV Bretagne... (24/10/1997)
Garde des sceaux

M. Gérard Gouzes. Madame le garde des sceaux, alors que nous débattons du budget de la justice pour 1998, tout le monde commente le retard accumulé année après année... (21/10/1997)

M. Gérard Gouzes. Madame la garde des sceaux, combien de temps nous faudra-t-il encore pour définir de manière simple, de manière transparente, de manière cohérente, la place de chacun des acteurs de l’acte judiciaire dans notre vieux pays ?... (02/06/1998)
Rapporteur/euse

- M. Pierre Mazeaud. Madame le rapporteur, terminez, je vous en prie !... (29/10/1997)
- M. Yves Cochet. Vous gênez M. Cacheux, madame la rapporteuse. (02/06/1998)
M. le président. Vous gênez M. Cacheux, madame la rapporteuse.

Mme Véronique Neiertz, rapporteur pour le surendettement. Ah, non ! N'employez pas ce terme !

M. le président. Je dois pourtant vous informer que, ce matin, le bureau de l'Assemblée s'est prononcé en faveur de la féminisation des noms des fonctions parlementaires.

Mme Véronique Neiertz, rapporteur pour le surendettement. Continuez à m'appeler Mme le rapporteur !

M. Jean Le Garrec, rapporteur. Nous aurons donc eu deux grandes innovations aujourd'hui : l'Alliance et la rapporteuse !
<table>
<thead>
<tr>
<th>NOUN</th>
<th>F</th>
<th>M</th>
<th>TOTAL</th>
<th>PROP. F</th>
</tr>
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<tbody>
<tr>
<td>Deputé(e)</td>
<td>156</td>
<td>51</td>
<td>207</td>
<td>0.75</td>
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<tr>
<td>Président(e)</td>
<td>126</td>
<td>58</td>
<td>184</td>
<td>0.69</td>
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<tr>
<td>Secrétaire d’État</td>
<td>144</td>
<td>118</td>
<td>262</td>
<td>0.55</td>
</tr>
<tr>
<td>Ministre</td>
<td>1275</td>
<td>1657</td>
<td>2932</td>
<td>0.43</td>
</tr>
<tr>
<td>Garde des sceaux</td>
<td>77</td>
<td>335</td>
<td>412</td>
<td>0.19</td>
</tr>
<tr>
<td>Rapporteur(e)/euse</td>
<td>1</td>
<td>38</td>
<td>39</td>
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</tr>
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</table>

We eliminated *rapporteur/se* in the statistical analysis.
<table>
<thead>
<tr>
<th>Spectrum</th>
<th>Party</th>
<th>F</th>
<th>M</th>
<th>Total</th>
<th>Prop. F</th>
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<tbody>
<tr>
<td>Left</td>
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<td>183</td>
<td>108</td>
<td>291</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>Socialiste</td>
<td>722</td>
<td>406</td>
<td>1128</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Vert</td>
<td>81</td>
<td>48</td>
<td>129</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>MDC</td>
<td>42</td>
<td>17</td>
<td>59</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>DVG</td>
<td>23</td>
<td>14</td>
<td>37</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>PRS</td>
<td>33</td>
<td>36</td>
<td>69</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1084</td>
<td>629</td>
<td>1713</td>
<td>0.63</td>
</tr>
<tr>
<td>Right</td>
<td>UDF</td>
<td>302</td>
<td>650</td>
<td>952</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>RPR</td>
<td>368</td>
<td>941</td>
<td>1327</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>670</td>
<td>1591</td>
<td>2261</td>
<td>0.30</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
<td>25</td>
<td>37</td>
<td>62</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Focus only on the larger political parties in the statistical analysis.

<table>
<thead>
<tr>
<th>SPECT.</th>
<th>PARTY</th>
<th>F</th>
<th>M</th>
<th>PROP. F</th>
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</thead>
<tbody>
<tr>
<td>Left</td>
<td>Parti Communiste Français</td>
<td>183</td>
<td>108</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>Parti Socialiste</td>
<td>722</td>
<td>406</td>
<td>0.64</td>
</tr>
<tr>
<td>Right</td>
<td>Union pour la Démocratie Française</td>
<td>302</td>
<td>650</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>Rassemblement pour la République</td>
<td>368</td>
<td>941</td>
<td>0.29</td>
</tr>
</tbody>
</table>
Speaker gender

Statistics: 11ème legislature

- 10/35 members of the cabinet are female (29%).
- 63/577 deputees of the AN are female (10.9%).
- In our subcorpus: 55/404 speakers are women (13.6%).

<table>
<thead>
<tr>
<th>Speaker Gender</th>
<th>F</th>
<th>M</th>
<th>Total</th>
<th>Prop. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>397</td>
<td>318</td>
<td>715</td>
<td>0.55</td>
</tr>
<tr>
<td>Male</td>
<td>1382</td>
<td>1939</td>
<td>3321</td>
<td>0.42</td>
</tr>
</tbody>
</table>
Statistical analysis

Generalized linear mixed effects models in R using the lme4 package (Bates et al., 2014).

Fixed effects
1. Session date (continuous).
2. Speaker political party (PCF, PS, UDF, RPR).
3. Speaker gender (F, M).
4. Speaker age (continuous (birth date)).
5. Noun (président(e), député(e), ministre, secrétaire, garde)

Random effect
Speaker identity (363 speakers).
## Results: Fixed effects

|                          | Estimate | Std. Error | z value | Pr(>|z|) |
|--------------------------|----------|------------|---------|----------|
| (Intercept)              | -6.609679| 0.355040   | -18.62  | < 2e-16  *** |
| Session date             | -3.457020| 0.082100   | -42.11  | < 2e-16  *** |
| Garde des sceaux         | 1.692526 | 0.220880   | 7.66    | 1.82e-14 *** |
| Ministre                 | 0.767964 | 0.198284   | 3.87    | 0.000107 *** |
| Président(e)             | -0.075609| 0.262723   | -0.29   | 0.773507 |
| Secrétaire d’État        | 0.946869 | 0.232061   | 4.08    | 4.50e-05 *** |
| Socialist Party          | -0.007641| 0.248703   | -0.03   | 0.975490 |
| RPR                      | 1.292224 | 0.261221   | 4.95    | 7.54e-07 *** |
| UDF                      | 1.088865 | 0.259566   | 4.19    | 2.73e-05 *** |
| Speaker gender (M)       | 0.308782 | 0.193789   | 1.59    | 0.111073 |
| Speaker birth date       | -0.025583| 0.063722   | -0.40   | 0.688071 |

Intercept: Speaker gender: F; Party: PCF; Noun: Deputé(e)
Summary

1. Significant effect of date.
   ▶ Change in progress.
2. Significant lexical effect.
   ▶ Grammatical/cognitive factors at play?
3. No effect of speaker gender.
4. No effect of speaker age.
   ▶ Ideology is more important than demographics.
5. Significant effect of political party.
   ▶ Grammatical gender has social meaning. But which social meaning?
Hypothesis 1: Political conditioning

In the late 1990s, politicians in the AN are using grammatical gender in female terms of address to mark their political affiliation:

- *la* marks membership in a left wing party.
- *le* marks membership in a right wing party.
1. **Homogeneity within left wing parties:** The Socialists, Communists and Greens all behave identically with respect to g-gender variation.
   - If the feminine signalled the **degree** of political leftness of the speaker, we would expect to find a gradient pattern where the Communists to use significantly more feminine than the Socialists.

2. **Why is marking limited to the late 1990s?** Why do the politicians stop using g-gender to mark their political party in 1999?
3. The women of Rassemblement pour la République

<table>
<thead>
<tr>
<th>Speaker</th>
<th>F</th>
<th>M</th>
<th>Total</th>
<th>Prop. F</th>
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</thead>
<tbody>
<tr>
<td>Roselyne Bachelot</td>
<td>87</td>
<td>17</td>
<td>104</td>
<td>0.84</td>
</tr>
<tr>
<td>Nicole Catala</td>
<td>27</td>
<td>86</td>
<td>113</td>
<td>0.24</td>
</tr>
<tr>
<td>Michèle Alliot-Marie</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>0.25</td>
</tr>
</tbody>
</table>

What distinguishes Bachelot from MAM and Catala?
Roselyne Bachelot and parité

Member of Assemblée Nationale (1988-2012), held important party and governmental functions (3 ministerial portfolios).

1995-1998
Head of the Observatoire sur la parité entre les hommes et les femmes.

Parité
A philosophical position (Gaspard et al., 1992) and a political movement aimed at ensuring that men and women have equal access to electoral mandates and elected office.
Rise of the feminine linked to the *parité* movement

Spread of support for *parité* mirrors the spread of the feminine.

- Prior to 1995, pro-*parité* positions were almost exclusively held publicly by politicians on the radical left (Greens, Communists).
- In 1996-1997, support grew within the Socialist party.
- In 1997-1998, right wing politicians start to support *parité*.
- Summer 1999: Constitutional amendment allowing for gender-based electoral quotas passes with 94% support.

The *parité* movement was both accompanied and invigorated by enormous attention from the press.

- This coverage was characterized by the appearance of new discourses surrounding the nature, behavior and social position of female politicians (Freedman, 1997; Garréta, 2001; Scott, 2007; Julliard, 2012, among others).

**Proposal**

Discourses legitimizing the *parité* movement helped construct a new *persona* (identity/social type) for female politicians.
Main argument in favour of *parité*

More women in government would have a positive effect on France, since female politicians have different *stereotypically feminine* properties and view the world differently than male politicians (Agacinski, 1998, 1999; Kristeva, 1999; Freedman, 1997; Scott, 2007; Sintomer, 2007; Achin et al., 2007; Julliard, 2012, among others).
‘Feminine’ vs ‘masculine’ properties

Manifeste des dix

A pro-parité ‘manifesto’ published in L’express on June 6th, 1996 by 10 (former) female ministers (Barzach, Bredin, Cresson, Gisserot, Lalumière, Neiertz, Pelletier, Roudy, Tasca, and Veil).

The manifesto stated that the exclusion of women “by the Jacobins” at the founding of the republic had introduced an unfortunate but persistent opposition between virility (hierarchical, centralizing, arrogant, rationalist, abstract) and femininity (understanding others “as they are,” sensitive, concrete, and attentive to the cares of daily life).

Discursive construction of difference

(Auto)biographical studies of personal experiences of female politicians exploded in the mid/late 1990s, constituting a new literary genre (Freedman, 1998; Ramsay, 2003).

Some examples of this new genre in mid 90s by female politicians

Bachelot’s feminine persona (88% F) (see also Bard, 2012)

Je crois que la femme a un message de femme à apporter. Moi j’avoue que quand je vois quelque chose qui me fait pleurer, j’ose pleurer. Je suis quelqu’un de sensible; je ne veux pas devenir un homme manqué dans la politique. C’est ça que je veux apporter au monde politique.

‘I don’t want to be a tom-man in politics.’

En vérité, les avocates de la parité ne tentent pas seulement de nous faire croire qu'[e les femmes] sont essentiellement différentes des hommes, mais aussi qu’elles sont meilleures qu’eux. Avec elles, la politique si décriée deviendrait enfin plus humaine, plus chaleureuse et plus efficace. Pardon d’être sceptique, mais, à côtoyer les femmes de pouvoir, je les trouve très semblables à leurs collègues masculins : mêmes qualités, mêmes défauts.

‘Excuse me for being skeptical, but but, from spending time with powerful women, I find them very similar to their male colleagues: same qualities, same faults.’
Michèle Alliot-Marie’s universalist persona (25% F)

Voted against *parité* in 1999.

- “Ce que je dis est que les femmes ont les mêmes capacités que les hommes, qu’elles ont la même intelligence.” (*LeLab* (9/2/2017)).

- “Michèle Alliot-Marie incarne un type de féminité autoritaire, raide, évocatrice du masculin” (Bard, 2012, 10).
Martine Aubry vs Ségolène Royal (Ramsay, 2003; Montini, 2017)
Connection between persona construction and g-gender use

<table>
<thead>
<tr>
<th>PERSONA</th>
<th>SPEAKER</th>
<th>F</th>
<th>M</th>
<th>TOTAL</th>
<th>PROP. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feminine</td>
<td>Roselyne Bachelot (RPR)</td>
<td>87</td>
<td>17</td>
<td>104</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Ségolène Royal (PS)</td>
<td>14</td>
<td>2</td>
<td>16</td>
<td>0.88</td>
</tr>
<tr>
<td>Universalist</td>
<td>Michèle Alliot-Marie (RPR)</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Martine Aubry (PS)</td>
<td>43</td>
<td>39</td>
<td>82</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Table: G-gender use by Bachelot, Alliot-Marie, Royal and Aubry.
Social changes

In the 1980s (before 1995)...

▶ Few women in the AN (≈ 6%).
▶ Few public records of life as a female politician.
▶ No formal institutional divisions between men and women.

After 1995...

▶ More women in AN (11% in 1997, now 39%).
▶ Female politician writing becomes a new literary genre.
▶ The place of women in politics is a common topic in the press.
▶ Differences between men and women become formally encoded into the structure of governmental and educational institutions.
Change in the ideological landscape from 1986-1998
These social changes helped construct a new persona: the female politician.

- Speakers constructing this new persona use more feminine than speakers constructing the older universalist persona.
From social change to language change

1. Social changes and discourse about them construct and change speaker/listener ideologies (Foucault, 1976; Butler, 1993, 1997; Livia and Hall, 1997, among many others).

2. Speaker/listener ideologies constrain what truth-conditional and social meanings can be assigned to linguistic expressions (Silverstein, 1979, 2003; Irvine and Gal, 2000, among many others).

- Use Gärdenfors (2000, 2014)’s Conceptual Spaces to formalize the relationship between ideological structure and linguistic meaning.
Formalizing ideologies in conceptual spaces

Speaker/listener ideologies correspond to an $n$-dimensional vector space with the usual topology.

- **Personae** are distinguished sets of points in the conceptual space (Gärdenfors’ prototypes).

Which dimensions?

We take the relevant dimensions from the discourses on male and female politicians in the 1980s and 1990s.

(11) a. Institutional dominance (dominant $\leftrightarrow$ non-dominant)
    b. Abstraction (abstract $\leftrightarrow$ pragmatic)
    c. Toughness (tough $\leftrightarrow$ sensitive)
    ...

Speaker ideologies in 1984 and 1997 differ in their arrangement of personae.

**Personae in 1984 \( (\text{PERS}_{84}) \)**

There is a correlation between institutional dominance, abstraction and toughness in the minds of French politicians.

**Personae in 1997 \( (\text{PERS}_{97}) \)**

There are some personae that are both institutionally dominant and very sensitive/pragmatic.
Example PERS$_{84}$
Example \textsc{PERS}_97
Given an n-dimensional conceptual space and a distinguished set of points (eg. PERS), there is a natural way of partitioning this space into discrete regions: **voronoi polygons**.

- Let \( p_i \) be a persona, then the Voronoi polygon \( v(p_i) \) is the set of points that lie closer to \( p_i \) than to any other persona in the domain.

\[(12)\quad \text{The *Voronoi tessellation* generated by set of personae PERS is} \]

\[V(\text{PERS}) := \{v(p_i) | p_i \in \text{PERS}\}\]
2 dimensional tessellation of PERS$_{84}$
2 dimensional tesselation of PERS₈₄
Multi-factorial view of gender assignment

Grammatical gender marking takes into account a variety of linguistic, cognitive and, for animates, meaning-related factors (Tucker et al., 1977; Corbett, 1991; Dahl, 2000; Bonami and Boyé, 2017; Culbertson et al., 2017, and many others)

1. **Linguistic factors:** The shape of certain nominal endings may induce a strong preference for M/F (-eur vs -euse) (Tucker et al., 1977; Holmes and Segui, 2004, 2006; Matthews, 2010).

2. **Cognitive factors:** Highly frequency may induce a strong preference for M/F (eg. *le personne), see also Dye et al. (2017).

3. **Meaning factors**...
The puzzle of the meaning of g-gender

1. Social gender is not part of the semantics of g-gender.
   - *Madame le ministre* is not a contradiction.

2. There is clearly some link between French grammatical gender and social gender interpretation.
   - Masculine g-gender biases interpretation to socially male individuals (Brauer and Landry, 2008; Chatard et al., 2005; Gygax et al., 2008, 2012; Sato et al., 2013; Bonami and Boyé, 2017).
Gygax et al. (2008): Is (a/b) a sensible continuation?

(13) Les assistants sociaux marchaient dans la gare.
    a. Du beau temps étant prévu plusieurs femmes n’avaient pas de veste.
    b. Du beau temps étant prévu plusieurs hommes n’avaient pas de veste.

Participants were significantly more likely to say yes to (13-b) than to (13-a), independent of the noun, determiners etc.
Brauer and Landry (2008): In a politician naming task, participants named three times more female politicians in the gender inclusive condition (40% F) than in the ‘generic masculine’ condition (15% F).

(14) Sans tenir compte de vos opinions politiques, citez tous les {candidats, candidats/candidates} de droite/gauche que vous verriez au poste de Premier ministre. ‘Name all the right/left-wing candidates that you could see being Prime Minister.’

Where does this interpretative bias come from?
G-gender has social meaning

G-gender marking (on human nouns) indexes (Ochs, 1992) sets of properties, indexical fields (Eckert, 2008), which are stereotypically associated with men and women (McConnell-Ginet, 2013).

(15) Indexical fields for g-gender marking (human nouns)
    a. \([M] = \{\text{abstract, tough, dishonest, institutionally dominant} \ldots \}\)
    b. \([F] = \{\text{pragmatic, sensitive, honest, non-dominant} \ldots \}\)

Use of a gender-marked NP attributes at least one of the properties in the indexical field to the referent of the NP.

- Ideological structure licenses a social gender implicature.
Indexical field of masculine g-gender in 1984
Indexical field of feminine g-gender in 1984
Indexical field of masculine g-gender in 1997
Indexical field of feminine g-gender in 1997
Suppose the speaker needs to choose between *le ministre* and *la ministre* to describe a sensitive powerful minister.

- [ministre] is defined by the governmental institution.
- Membership in [ministre] implies a high value on the *institutional dominance* dimension (say, $> 0.7$).

(16) Fact: $[\text{ministre}] \cap [F] = \emptyset$ in 1984.

(17) Fact: $[\text{ministre}] \cap [F] \neq \emptyset$ in 1997.
RSA: A game-theoretic model of linguistic production

1. Listener prior beliefs \((Pr)\) are probability distributions over voronoi polygons associated with personae \(p\).
2. Listeners condition their priors on the indexical fields of the messages.

\[
L_1(p|m) = Pr(p|m]
\]

3. Speaker utility is informativity - costs.

\[
U_S(p, m) = \log(Pr(p|m]) - C(m)
\]

4. Speaker \((S_1)\) chooses non-deterministically based on utility.

\[
S_1(m|p) \propto \exp(\lambda \ast U_S(p, m))
\]

Soft-max choice (Sutton and Barto, 1998)

(Franke, 2009; Frank and Goodman, 2012; Burnett, 2017)
Proposal

Linguistic prescriptions add costs to the proscribed message (C(M)).

- Julien Aubert (right wing) had to pay 1378 euros for saying *Madame le président* in 2014.
Theorem 1 (1986)

For PERS\textsubscript{84}: For all points \( p \in \text{[ministre]} \), all cost functions \( C \), all values of \( \lambda \in \mathbb{R} \), and all prior belief functions \( Pr \), \( S_1(F|p) = 0 \).

Proof immediate from (16).

Theorem 2 (1998)

For PERS\textsubscript{97}: There are \( p \in \text{[ministre]} \) such that for all \( \lambda \in \mathbb{R} \), prior belief functions \( Pr \) and cost functions \( C \),

\[
(21) \quad \text{If } C' \text{ is cost function that is strictly monotonic with respect to } C, \quad S_1'(F|p) > S_1(F|p). \quad \text{Proof based on (17).}
\]

Predictions of the model

Fabius’ policy should have no effect, but Jospin’s policy should have an effect.
A new study of variation and change in French grammatical gender in the *Assemblée Nationale*.

- Change in g-gender linked to broader social changes associated with gender ideologies in 1996-1999.
- Social conditioning by political party is the result of a combination of the indexical meaning of g-gender and the belief states of speakers across the political spectrum.
- Linguistic prescription will only be successful if it builds on ideologies in the speech community.
- Conceptual spaces and game theoretic pragmatics are promising frameworks for formalizing ideologies and capturing their link with linguistic production.


