I propose an approach within Lexical-Functional Grammar (LFG):

My implementation is based on two main components:

1) A detailed Finite-State Morphological Analyzer (FSMA) dealing with verbal morphology – listing both analytic and synthetic verb forms including morphosyntactic features
2) A computational LFG grammar effectively ruling out ungrammatical sentences and blocking analytic forms where inappropriate – using two short agreement templates

Implementation is faced with two tasks:

- Block redundant use of pronoun in conjunction with synthetic form
- Block analytic form when synthetic form is available

A Lexical-Functional Grammar Implementation

- I propose an approach within Lexical-Functional Grammar (LFG):
  - For both forms – synthetic and analytic – I assume the subject is pro.
  - Provided a detailed morphological analysis, agreement equations can be used efficiently to block analytic forms from occurring where synthetic forms would be available.

My implementation is based on two main components:

1) A detailed Finite-State Morphological Analyzer (FSMA) dealing with verbal morphology – listing both analytic and synthetic verb forms including morphosyntactic features
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Implementation situated within the context of the ParGram project (Butt et al., 2002): worldwide research effort for developing wide coverage LFG grammars

Implementation inspired by Mittendorf and Sadler (2006) for Welsh morphology

The Problem

- Irish verbs occur in two different forms: analytic and synthetic.

Analytic forms: person-number expressed by independent pronouns

Tuig^an m^e an fhadhb. understand.Pres 1P.Sg ART problem *‘I understand the problem.’*

Synthetic forms: person-number expressed by suffix on verb

Tuigim an fhadhb. understand.Pres.1P.Sg ART problem ‘I understand the problem.’

Finding: person-number suffixes identical in function to independent pronouns (McCloskey & Hale, 1984)

Evidence: (1) Independent pronoun is prohibited with a synthetic form:

*Tuig^an m^e an fhadhb. understand.Pres.1P.Sg 1P ART problem

(2) Use of ‘analytic form + pronoun’ is blocked if there is a synthetic form realizing the same features:

*Tuig^an m^e an fhadhb. understand.Pres 1P ART problem

Distribution of analytic and synthetic forms varies across paradigms:

<table>
<thead>
<tr>
<th>Features</th>
<th>Present</th>
<th>Imperfect</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P.Sg</td>
<td>tuigim</td>
<td>thuiugin</td>
<td>tuigfhd</td>
</tr>
<tr>
<td>2P.Sg</td>
<td>tuigean</td>
<td>thui^g^d</td>
<td>tuigfhd</td>
</tr>
<tr>
<td>3P.Sg,M</td>
<td>tuigean</td>
<td>thui^g^d</td>
<td>tuigfhd</td>
</tr>
<tr>
<td>3P.Sg,F</td>
<td>tuigean</td>
<td>thui^g^d</td>
<td>tuigfhd</td>
</tr>
<tr>
<td>1P.PI</td>
<td>tuigmid</td>
<td>thui^g^d</td>
<td>tuigfmid</td>
</tr>
<tr>
<td>2P.PI</td>
<td>tuigean</td>
<td>thui^g^d</td>
<td>tuigfhd</td>
</tr>
<tr>
<td>3P.PI</td>
<td>tuigean</td>
<td>thui^g^d</td>
<td>tuigfhd</td>
</tr>
</tbody>
</table>

The Finite-State Morphological Analyzer

- Implemented using FST toolset (Beesley & Karttunen, 2003)
- Both synthetic and analytic forms are listed – together with detailed morphosyntactic tags:

<table>
<thead>
<tr>
<th>Features</th>
<th>Verb Form</th>
<th>FSMA Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1P.Sg</td>
<td>tuigim</td>
<td>tuig+Verb+Pres+1P+Sg+PronIncl</td>
</tr>
<tr>
<td>2P.Sg</td>
<td>tuigean</td>
<td>tuig+Verb+Pres+2P+Sg</td>
</tr>
<tr>
<td>3P.Sg.M</td>
<td>tuigean</td>
<td>tuig+Verb+Pres+3P+Sg</td>
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</tr>
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<td>tuig+Verb+Pres+3P+Pl</td>
</tr>
</tbody>
</table>

Tag +PronIncl attached to synthetic forms: ensures pronominal analysis of subject

- Detailed person/number information – also for identical verb forms: agreement constraints can be enforced to realize morphological blocking

The Computational LFG Grammar

- Implemented using XLE platform (Crouch et al., 2008)
- Functional information associated with tag +PronIncl:

  PronSFX = { (↑ SUBJ PRED) = ‘pro’.}

- Tag itself provides information that the subject is pronominal
- Independent subject pronouns provide their own subject predicate
- Combination ‘synthetic verb form + independent subject pronoun’ is effectively ruled out: multiple PREDS not allowed in LFG (Bresnan 2001)

- Functional information associated with person-number tags:

  +1P V-PERS_SFX XLE @ (AGR-P 1).
  +Sg V-NUM_SFX XLE @ (AGR-N sg).

- Entries call up templates, which try to assign the respective value:

  AGR-P (P) = {↑ SUBJ PERS} = P.
  AGR-N (N) = {↑ SUBJ NUM} = N.

- Independent subject pronouns provide their own person-number information (for example: mé - first person singular)
- Analysis fails if values from analytic verb forms and subject pronouns do not match

  tuig^an { +2P | +3P } {↑ SUBJ PERS} = (2|3) {↑ SUBJ NUM} = (sg|pl)
  mé {↑ SUBJ PERS} = 1 {↑ SUBJ NUM} = sg

Summary

- Using a detailed morphosyntactic analysis and two efficient agreement templates, the Irish data can be accounted for in a straightforward way.
- The approach has been implemented for present tense and preterite verb forms, and can easily be extended to other tenses.
- The implementation obtains full coverage (parsing and generation) of a 30 sentence testsuite without any overgeneration.

References
