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Sentence comprehension in Heritage Icelandic

The effect of age-related decline

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- **Original goal:** Mapping sentence comprehension across different structures in Heritage Icelandic, focusing on argument position and case cues.
 - Other heritage languages: Argument reversal more difficult to process and produced less (Polinsky 2009 for processing and Andersen and Westergaard 2017 for corpus data).
 - Possible comparison to previous data from Icelandic monolingual acquisition (Þórðardóttir 2014, Sigurjónsdóttir 2015) and patients diagnosed with aphasia following left hemisphere stroke (Magnúsdóttir 2000).
- **Unusual population demographics → another approach/question:**

Are the documented sentence comprehension difficulties of heritage speakers partly due to age-related cognitive decline?

Overview

1. Heritage Icelandic in North-America
2. Sentence comprehension across groups of speakers
3. Interpreting aging effects: Variation or decline?

Study

4. Methods: Task, participants and test items
5. Results: Aging vs. attrition/incomplete acquisition
6. Analysis and implications: Disentangling effects

Heritage Icelandic in North-America

- Heritage Icelandic is mainly spoken **in Canada**, more precisely in the Interlake region north of Winnipeg in Manitoba and in Northern Saskatchewan, and **parts of North Dakota in the United States**.
 - Bulk of emigration from 1873-1914 → over 14,000 Icelanders (out of 75,000 inhabitants).
 - Few left after 1914: No renewal of speakers.
 - In the past 30 years: Dramatic decline in numbers of persons claiming to speak Icelandic in North America.

North-American Heritage Icelandic survives today in third and fourth generation Canadians and Americans of Icelandic descent and has **few speakers under the age of 70**.

Sentence comprehension across groups of speakers

- Language acquisition (Þórðardóttir 2014, Sigurjónsdóttir 2015):
 - Icelandic preschoolers show reduced comprehension in constructions with A- and A'-movement (see also Wexler and Hirsh 2006) and even more so if the movement includes argument reversal (patient-before-agent instead of agent-before patient), ignoring case cues. Might indicate that they only allow the movement of external arguments at first?
- People with aphasia (Magnúsdóttir 2000):
 - Also showed reduced comprehension in constructions with A- and A'-movement (also noted in Grodzinsky 2000 and Friedmann 2001) but argument reversal did not have as much of an overall effect. This, and further testing, indicates that some Icelandic speakers with aphasia make use of case cues when interpreting sentences.

Interpreting aging effects: Variation or decline?

- Different approaches across disciplines

- Within linguistics, correlation with age is traditionally associated with change in apparent time and/or age grading (e.g. Sankoff and Blondeau 2007).
- Other approaches, within speech-language pathology and psychology, show that different results might be due to the cognitive effects of healthy aging, and in particular the well-documented decline in language processing ability (Burke and Shafto 2008):
 - Comprehension typically considered to be relatively well-preserved in older adults, while widely recognized that production shows marked age-related decline (particularly word finding failures, increased slips of the tongue, pauses in speech – but also less left-branching embeddings (Kemper, 1987)).
 - Studies on the processing of complex sentences (increasing the working memory load and overall processing cost): Compensatory knowledge-based strategies where plausibility evaluation might play a role (e.g. Federmeier and Kutas 2005 and Wingfield and Grossman 2006).

Participants and task

Heritage speakers

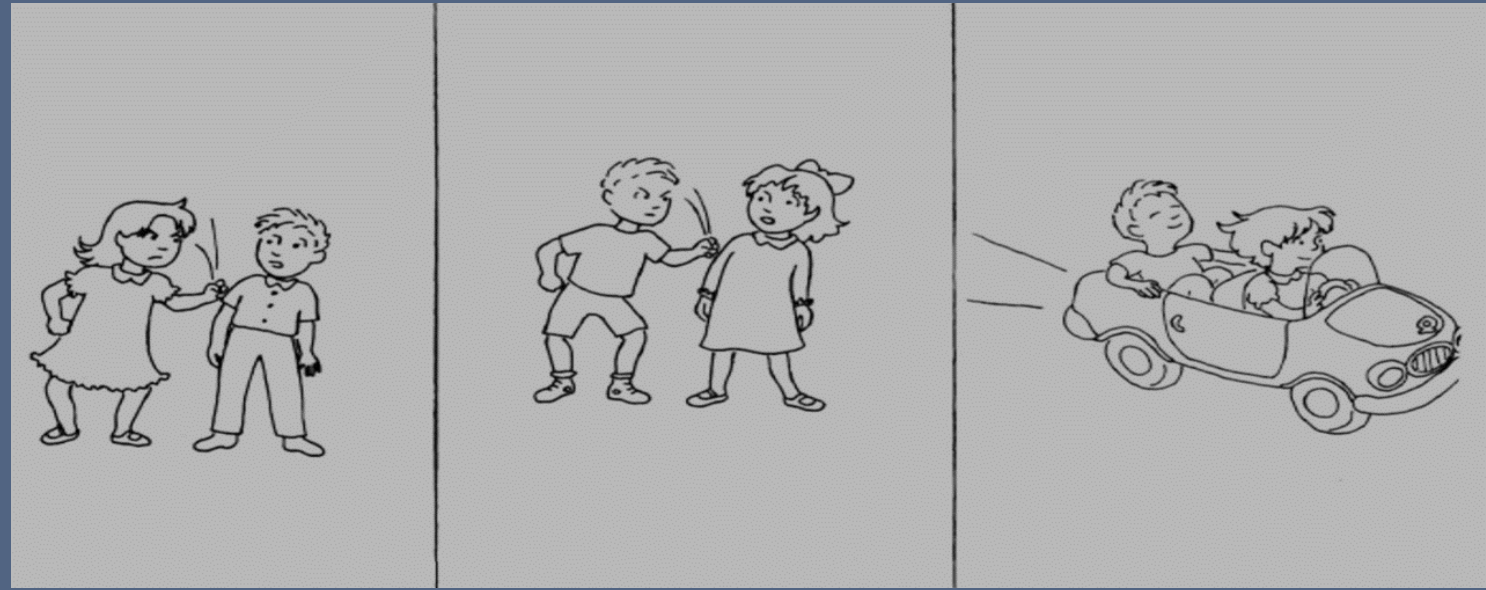
- 21 participants, two of them under 60. Mean age 70.5, sd = 14.7. All exposed to Icelandic from birth.

Control group I

- Older Icelandic speakers, 30 participants older than 70. Mean age 76.6, sd = 5.8.

Control group II

- Younger Icelandic speakers, 30 participants between 30 and 40 years old. Mean age 34.4, sd = 3.3.



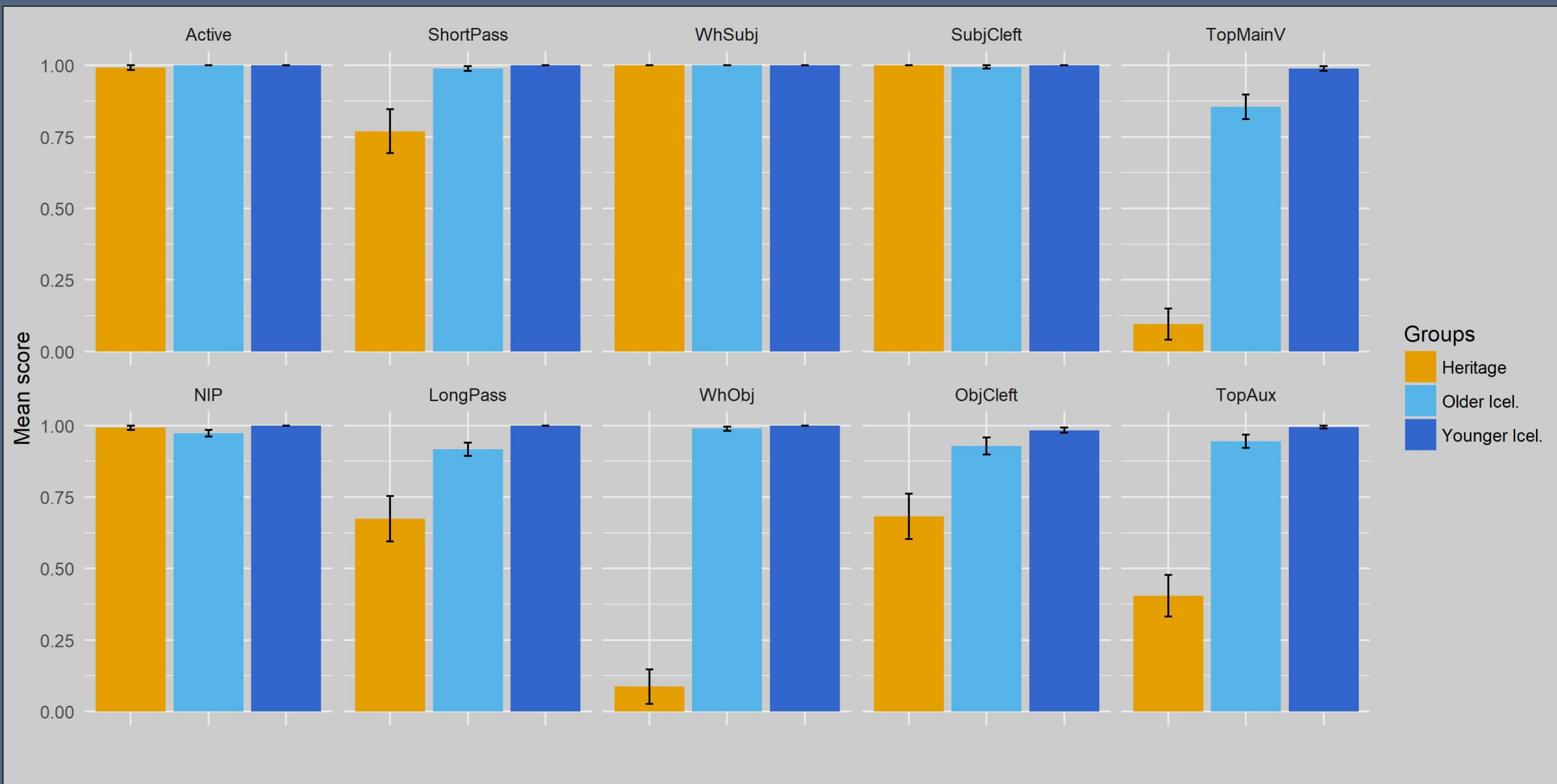
Sentence-picture matching with auditory sentence presentation (Magnúsdóttir 2000)

6 action verbs across 10 sentence types

- 3 accusative verbs (kitla – ‘tickle’, mála – ‘paint’, lemja – ‘hit’)
- 3 dative verbs (greiða – ‘comb’, ýta – ‘push’, klappa – ‘clap’)

Response: Accuracy (1 or 0), two pictures with inverse semantic roles and one unrelated control.

<p>Stelpan kitlar strákin.</p> <p>The.girl.NOM tickles the.boy.ACC</p> <p>‘The girl tickles the boy.’</p>	<p>active – canonical SVO</p> <p>+argument position</p> <p>+case</p>	<p>Það er kitlað strákin.</p> <p>It is tickled the.boy.ACC</p> <p>‘The boy is tickled.’</p>	<p>New Impersonal</p> <p>+argument position</p> <p>+case</p>
<p>Strákurinn er kitlaður.</p> <p>The.boy.NOM is tickled</p> <p>‘The boy is tickled.’</p>	<p>short passive</p> <p>-argument position</p> <p>-case (if ACC-verb)</p>	<p>Strákurinn er kitlaður af stelpunni.</p> <p>The.boy.NOM is tickled by the.girl.ACC</p> <p>‘The boy is tickled by the girl.’</p>	<p>long passive</p> <p>-argument position</p> <p>-case (if ACC-verb)</p> <p>+by-phrase</p>
<p>Hvaða stelpa kitlar strákin?</p> <p>Which girl.NOM tickles the.boy.ACC</p> <p>‘Which girl tickles the boy?’</p>	<p>wh-question • A focus</p> <p>+argument position</p> <p>+case</p>	<p>Hvaða strákur kitlar stelpa?</p> <p>Which boy.ACC tickles the.girl.NOM</p> <p>‘Which boy does the girl tickle?’</p>	<p>wh-question • P focus</p> <p>-argument position</p> <p>+case</p>
<p>Það er stelpa sem kitlar strákin.</p> <p>It is the.girl.NOM that tickles the.boy.ACC</p> <p>‘It is the girl who tickles the boy.’</p>	<p>cleft • A focus</p> <p>+argument position</p> <p>+case</p>	<p>Það er strákurinn sem stelpa kitlar</p> <p>It is the.boy.NOM that the.girl.NOM tickles</p> <p>‘It is the boy who the girl tickles.’</p>	<p>cleft • P focus</p> <p>-/+argument position</p> <p>-case</p>
<p>Strákin er stelpa að kitla.</p> <p>The.boy.ACC is the.girl.NOM to tickle</p> <p>‘The boy, the girl is tickling.’</p>	<p>topicalization +aux</p> <p>-/+argument position</p> <p>+case</p>	<p>Strákin kitlar stelpa.</p> <p>The.boy.ACC tickles the.girl.NOM</p> <p>‘The boy, the girl tickles.’</p>	<p>topicalization -aux</p> <p>-argument position</p> <p>+case</p>



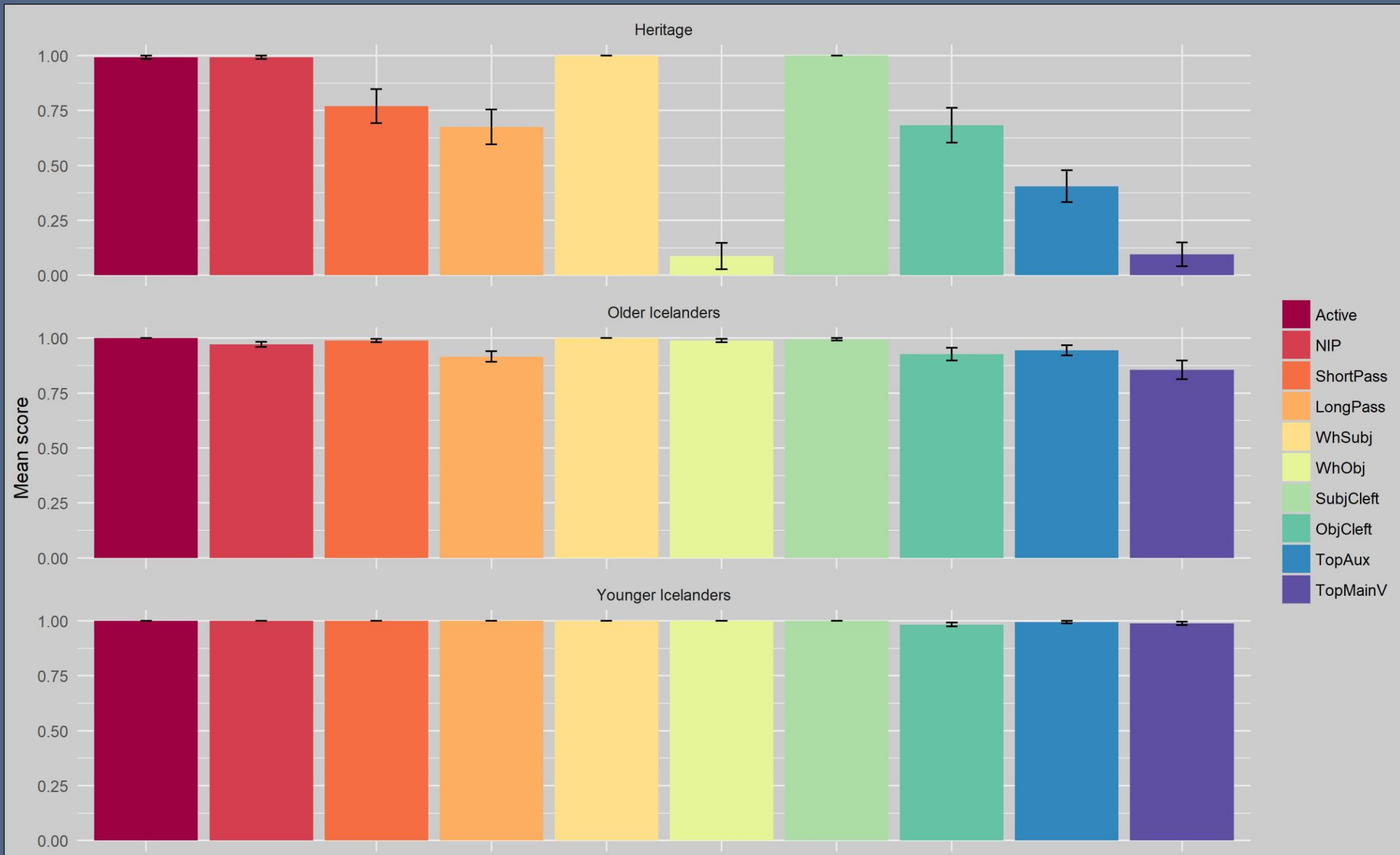
What is hard and why? Where is there a difference?

The different patterns across sentence types show that the difficulties heritage speakers encounter are **not general sentence comprehension difficulties**, but linked to specific constructions. This is also true of the older Icelandic speakers. The reported effects are only present in certain contexts.

Younger Icelanders > Older Icelanders > Heritage speakers for:

short and long passives, wh-questions with patient focus, clefts with patient focus and both topicalization environments.

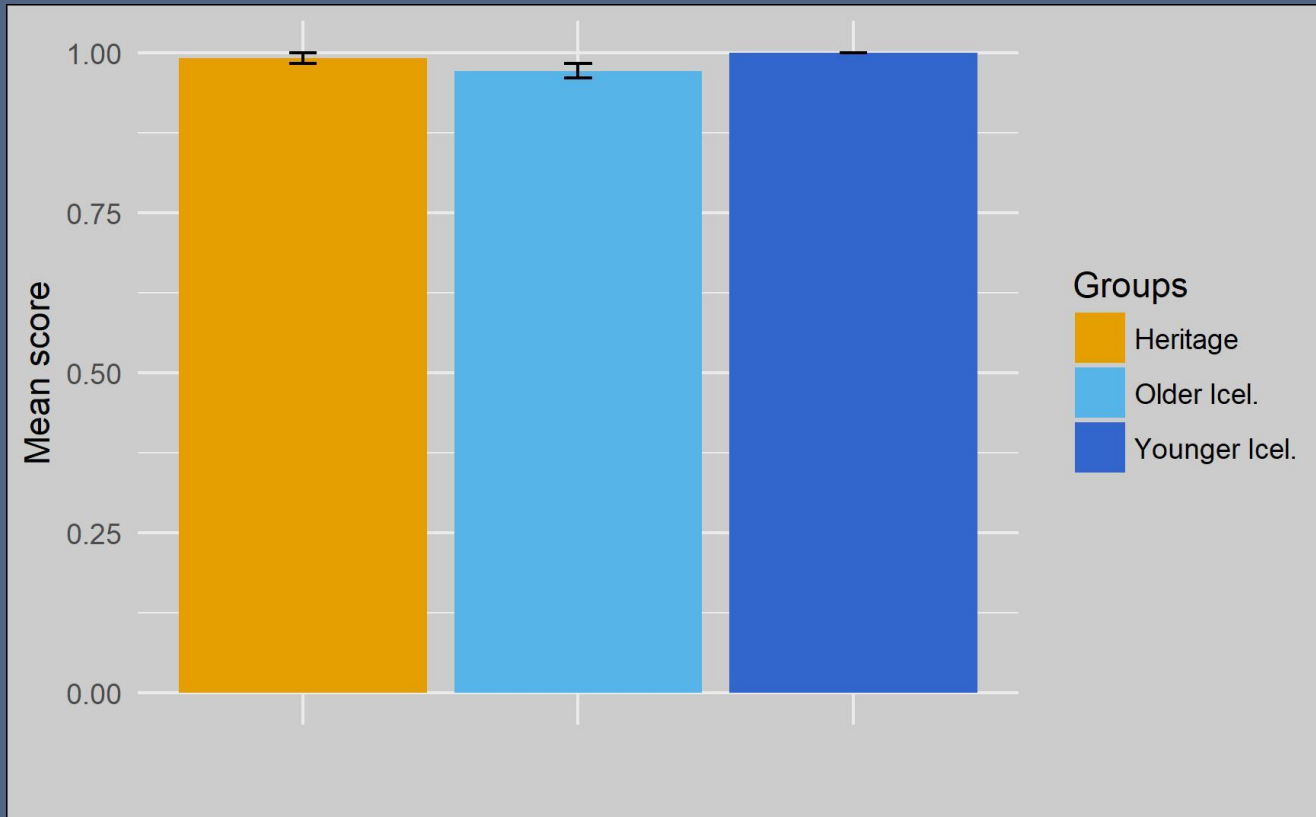
Movement is hard but argument reversal is harder – both combined are the hardest.



Group profiles: Which cues are useful for who?

- **Argument order helps everyone** – but heritage speakers depend on it.
- **Case helps non-heritage speakers** – but heritage speakers ignore it.
- **Frequency/naturalness is important for older non-heritage speakers** – but younger speakers don't need it as much.

Aging, variation and change



- The **New Impersonal Construction**, a change which seems to have spread in the late 20th century (Maling and Sigurjónsdóttir 2002), **long after the last emigrants left Iceland**, is the only context where heritage speakers do significantly better than the older Icelanders.
- Non-grammatical/non-natural/non-familiar = harder to interpret?
Sometimes being unsure is *easier*.
- *Easy to interpret* → *easy to add*?

Analysis and implications: Disentangling effects

Aging matters, but much less than being a heritage speaker of Icelandic, and not in the same way: Difficulties encountered by older Icelanders do not pattern in the same way as the heritage speakers' results, which allows us to **partly disentangle the aging effects from the much larger effects of being a heritage speaker**:

- **Heritage speakers: Argument order > case cues**
- The heritage speakers show patterns similar to the results found in language acquisition data: Rigid word order interpretation where the first DP is analyzed as the subject and morphological cues are ignored (contrary to some of the aphasia results) – this is consistent with previous findings from Russian heritage speakers (Polinsky, 2009).
- **Aging effects: Frequency, familiarity and plausibility?**
- On the other hand, the older speakers show a less consistent and clear pattern which might be compatible with the hypothesis of knowledge-based compensation strategies (Federmeier and Kutas 2005 and Wingfield and Grossman 2006).

Sentence comprehension across structures in Heritage Icelandic:

A case where a transdisciplinary approach is a necessary part of understanding and predicting variation.