The mental lexicon across the lifespan

Word associations from L1 and L2 speakers of Norwegian with and without dementia

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Word association tests

Word association data differ from other types of linguistic data. No restrictions are imposed on the participants, and no contexts for the cue words are given. Thus, word association tests may give "rise to distinct mental properties that go beyond the information captured in written or spoken text" (De Deyne and Storms 2015: 470).

Patterns in associations may shed light on how the mental lexicon is organised. Taking a usage-based view, we expect associations based on perceived similarities in form or meaning, as well as associations based in patterns of use.

Influence of age, language background and cognitive decline

While **the lexicon expands throughout the lifespan** (Jarema and Libben 2007), lexical processing slows down with age (Kempler & Zelinski 1994).

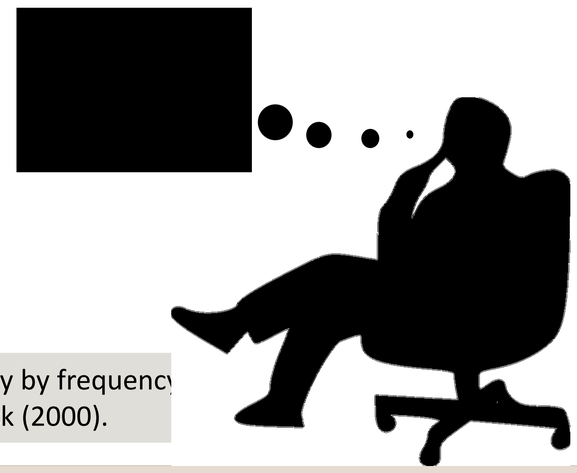
For **L2 learners**, barely known cues elicit phonological associations, partially cues known may elicit syntactic associations, and well-known words elicit semantic associations (Namei 2004).

Persons with Alzheimer's disease (AD) show a marked increase in multi-word responses and a decrease in semantic associations (Santo Pietro & Goldfarb, 1985).

Procedure

I will now read you a list of words, one by one. Then I want you to tell me the first word that pops into your head after I have said my word. There are no right or wrong answers, all you have to do is to say the first thing you think of after I have said a word. Please try to answer with one word if possible. Are you ready?

Stupid	Obey
Fruit	Pot
Hold	Window
Dirty	Furniture
Disease	Science



Test items often selected randomly by frequency
Examples from Meara & Fitzpatrick (2000).

Methods

Stage 1

Participants: 122 **younger** (aged 20-30) and 51 **older** (>60 years) L1 Norwegian speakers, all neurologically healthy.

Norwegian **100-word test** based on Fitzpatrick et al. (2015):

- Nouns, verbs and adjectives randomly selected from the 2k and 3k lemma frequency bands of NoWaC (Guevara 2010). No homographs or proper names.
- Administered in written form, with cue words in alphabetical order.
- Responses divided into four broad categories (**meaning-based**, **position-based**, **form-based**, **seemingly unrelated**) and 14 subcategories (cf. Fitzpatrick et al. 2015).

Stage 2

Participants: **Healthy L1 or L2 speakers** of Norwegian, and **L1 or L2 speakers with AD** (see table).

30-word version (nouns and verbs), based on stage 1:

- 20 cues primarily evoking semantic associations, 10 cues balanced between syntactic and semantic.
- Administered orally, with a written list for support.
- Two frequent words added as warm-up.
- Revised scoring system: added a meaning-based subcategory (*description)*.

Group	Age	n
Younger L1	20-30	16
Older L1	>55	28
Older L2	>55	10
Older L1 AD	>60	4
Older L2 AD	>60	3

Results

Stage 1

Significant differences between the groups were found within:

- meaning-based
- position-based
- form-based

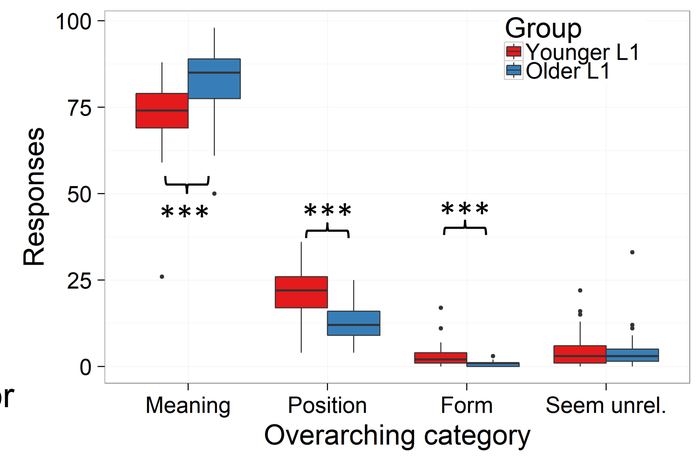
The majority of responses were meaning-based.

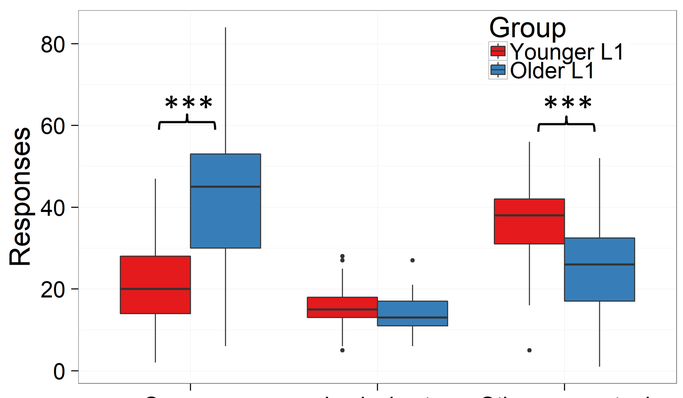
- Synonyms were common for the **older participants**

  servere → *gi*
  'serve' 'give'
  tempo → *fart*
  'pace' 'speed'

- The **younger participants** primarily provided other conceptual associations

  planlegge → *kalender*
  '(to) plan' 'calendar'
  kjærlighet → *hjerte*
  'love' 'heart'





Stage 2

Older L2 were more similar to younger than to older L1

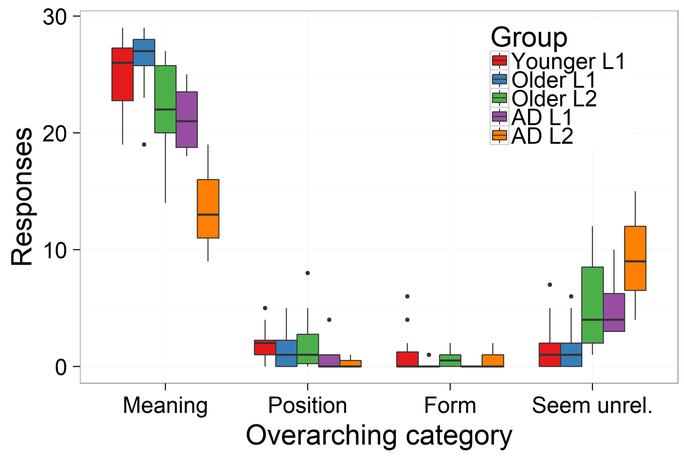
Between older healthy L1 and L2 speakers, significant differences were found within

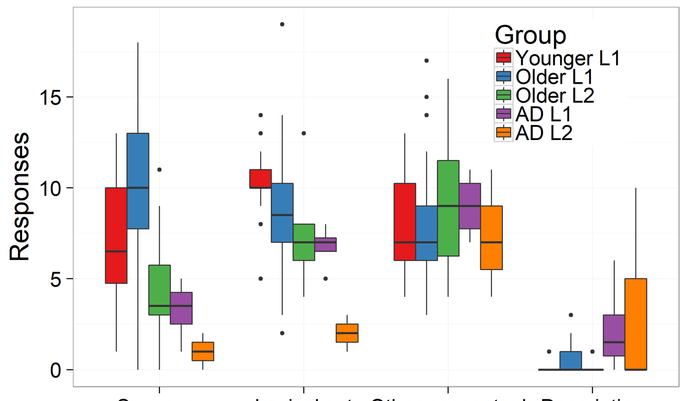
- more meaning-based
- seemingly unrelated

The majority of responses were meaning-based (but not in the AD L2 group).

- Many multi-word utterances among **speakers with AD**

  drømme → *tanken du får når du sovner*
  '(to) dream' 'the thought you get when you fall asleep'
  virksomhet → *gjerne prøve, men orker ikke*
  'enterprise' 'like to try, but can't bear it'





Conclusions

Similar response patterns among healthy L1 speakers in the two stages.

- Older L1 provided almost exclusively meaning-based associations. Predominantly these were synonyms.
- Younger L1 gave fewer synonyms than the older L1.
- Older L2 also leaned towards meaning-related associations, but gave more seemingly unrelated responses than the other healthy participants.
- Similar to the healthy older L2 speakers, L1 speakers with AD gave fewer meaning-related and more seemingly unrelated responses than the healthy L1 speakers
- L2 speakers with AD gave markedly fewer meaning-related and more seemingly unrelated responses than any other group.
- Both AD groups gave many multi-word responses, in spite of instructions.

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Scoring system

Category	Subcategory	Example
Meaning	Synonym	*quickly*→fast
	Lexical set	*mom*→dad
	Other conceptual	*love*→marriage
Position	Cue-response	*weather*→God
	Response-cue	*spring*→hot
	Both	*hard*→rock
Form	Affix manipulation	*baker*→bake
	Similar in form only	*sit*→pit
	Two-step	*fit*→feet→nails
Seemingly unrelated	Single- or multi-word response with no clear connection	*enterprise*→ would like to try, but can't

Note: Responses that might be related to the cue in both meaning and position were rated as members of both categories (and the relevant subcategories).

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