Field-appropriate Experimental Methods

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Psycholinguistic Experiments are normally WEIRD

- Participants come from particular societies:
  - Western
  - Educated
  - Industrialised
  - Rich
  - Democratic
- Undergraduate students from Stanford, Cambridge, etc.
- See Henrichs et al. (2010) in *Behavioural and Brain Sciences* and commentaries
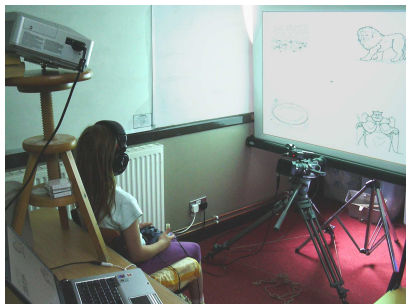- http://lessweird.org/

WEIRD Experimental Linguistics

- a well-equipped **lab** with specialist **equipment**, such as (proprietary) specialised **software** and hardware for reaction-time (RT), eye-movement or brain-imaging measurements,
- a well-described **language** for which **resources** like grammars, dictionaries, lexical databases or pre-tested stimuli with naming accuracy and response-time information are available,
- a comparatively homogeneous pool of **(computer)literate participants from the same culture** as the researcher who have either taken part in experiments themselves before or are at least familiar with the concept of experiments.

Equipment & Software: RT-Studies

- a standard PC or laptop
- a lightweight headset with a microphone
- a high-quality mouse or USB-game pad
- For recording equipment, see http://experimentalfieldlinguistics.wordpress.com/links/recording-equipment-websites/ and links there.
- Free RT-measurement software:
  - DMDX (Windows only, but flexible, great support)
  - Linger (easier, Windows/Mac/Unix, but limited)
  - PsychoPy (Psychology Software in Python, Windows/Mac/Unix)
- http://experimentalfieldlinguistics.wordpress.com/links/software/

Cheap Eye-Tracking

Poor (Wo)Men's Eye Tracker

- http://gameswithwords.fieldofscience.com/2010/02/lab-notebook-building-better-eyetracker.html .
- Three types are common:
  - a laptop to display pictures, with a built-in video camera to record eye-movements and potentially also a USB-game pad to record push-button responses and a headset.
  - a "box" with positions for pictures or objects in the four corners and a built-in-camera for eye-movement recordings in the middle (with the box potentially created in the fieldwork location to avoid logistic problems), potentially combined with digital voice-recorder or a laptop with a headset for audio-stimuli
  - a laptop, a camcorder, and a data projector to project pictures on a white wall or screen, potentially with a USB-game pad to record push-button responses.
- Online, using webcam: https://lookit.mit.edu/

Resources for WEIRD Studies

- Corpora and associated search tools
- Lexical databases with combinations of orthographic, phonological, morphological, syntactic and frequency information, some of them even with RT-data for words.
- Databases with information about semantic relationships between words (e.g. WordNet http://globalwordnet.org/)

See:
http://experimentalfieldlinguistics.wordpress.com/experimental-materials/

Substitutes

- use internet chat rooms and other online texts in the respective language as the basis for corpus creation
- create initial word lists based on fieldwork checklists (http://experimentalfieldlinguistics.wordpress.com/experimental-materials/wordlists/) , native speaker interviews or existing corpora, …. Based on these lists, you can then obtain
  - subjective frequency rating from a set of at least 20 native participants, which tend to correlate well with corpus-based frequencies and RTs for lexical decision experiments (Schreuder & Baayen, 1997 in *Journal of Memory and Language*)
  - semantic relatedness ratings for pairs of words

Stimuli and Inter-Cultural Issues

- Taboos (animals, foods, etc.)
- Clothing and looks (unfamiliarity effects, gender stereotypes, norms, etc.)
- conventions for picture, comics, and line drawings (thought bubbles, wriggly "motion" lines, etc.)
- Differences in outfits for professions (e.g. uniforms) and attitudes towards professions (e.g. police, army)
- Combinations of items (e.g. tigers, lions, polar bears in zoo, not nature)
- Cross-cultural evaluation of stimuli (http://experimentalfieldlinguistics.wordpress.com/experimental-materials/stimulusdatabases/)

(Computer) Illiteracy

- Additional initial training sessions for the use of keyboards, USB game pads, drawings, etc.
- Introduction of equipment in social situations (projector for video showing)
- Conducting naturalistic sampling before semi-structured tasks and then experiments (also helps with stimulus creation)
- Tasks developed for participants who cannot read (e.g. aphasics, children, etc.)

Tasks

- lexical representations and access
  - Auditory lexical decision
  - Visual lexical decision
- representations for linguistic units and their relationships
  - (masked) visual priming
  - Cross-modal priming
  - Production priming :
- syntactic representations and processing:
  - Self-Paced Reading
  - Sentence-Picture-Matching
  - Visual World

Lexical Decision

- Participants have to decide as fast as possible whether the stimulus that is presented to them is a word like *car* (YES) or a non-word/pseudo-word like *fonkel* (NO)
  - visual lexical decision: a string of letters
  - auditory lexical decision: a segment of spoken speech
- If a particular linguistic unit (e.g. a stem or an inflected form) is stored, then the frequency of this unit should determine response times, in interaction with other factors such as length. Thus, a growing number of studies has used this task to explore whether morphologically complex forms like *walked* are stored as whole units (word form frequency effects) or decomposed into stems and affixes (*walk, -ed*; only stem/affix frequency effects).

Priming

- Participants respond to a stimulus (=target) after the presentation of another stimulus (=prime). The prior exposure to the prime can facilitate the response to the target by pre-activating the target or a unit that is associated with it.
  1. Identity: Walk – walk   sing - sing
  2. Related: Walked – walk   sang - sing   RT: 1 ≤2 < 3
  3. Unrelated: Sang – walk   walk - sing
- Priming effects suggest that pre-activation of a unit (e.g. a stem).
  - cross-modal priming: auditory prime, lexical decision for visual target
  - masked priming: very briefly presented visual prime, mask "########", lexical decision for visual target.
  - production priming: spoken or written prime, participant has to produce an utterance using the same construction (e.g. a passive) or a different one (e.g. an active)

Self-Paced Reading

- Participants read through a text on the PC-screen in their own pace, by pressing buttons to consecutively display individual words or phrases on the screen.
- Display times for words/phrases are measured
- Long reading times indicated increased processing difficulty for the respective words/phrases.
- Reading experiments are obviously only appropriate for literate participants. Variants with audio-stimuli are possible in principle, but require even more control for the length of the individual segments and potential competitors for the words that are presented (similar to issues arising for auditory lexical decision experiments).

Sentence-picture-matching

- Participants see two pictures on computer screen, followed by a sound file with a sentence.
- They have to press a button to indicate which sentence matches the picture.
- This task allows you to investigate both (i) the choice of picture, which provides information about participants' interpretation of the sentence, and (ii) the RT, which gives you information about processing difficulties.
- However, as you only measure RTs for the entire sentence, you cannot tell at which point these processing difficulties occurred (vs. self-paced reading).
- This task has been employed in studies with adults and children and can be used for illiterate participants.

Visual World

- Participants' eye-movements are measured while they listen to stimuli and look at objects or pictures.
- When participants are asked to manipulate real objects, their actions can be analysed as well. For instance, when they have a frog sitting on a napkin and another frog and a napkin, one can see which of the two frogs they first pick up when they are asked to "put the frog on the napkin in the basket".
- When pictures are displayed on a screen, one can also measure RTs for button-press responses to questions about the stimuli.
- Both versions have been used for adults and children and are appropriate for illiterate participants.

Lexical Decision (LD): DMDX Script

```
<ep> <cr> <fd 30 <d 59> <t 1500> <id keyboard> <mnr
  "+Left Arrow"> <mpr "+Right Arrow"><dbc
  210210210> <dfs 36> <dwc 0> <vm
  1024,768,768,16,60> <nfb> <eop>
! Item number AB;
! A=condition (1=word, 2=non-word);
! B=Trial number;
0 "Press SPACEBAR to start";
+11 * "rabies" /;
-22 * "brantly" /;
-23 * "skelve" /;
+14 * "jump" /;
0 "The END! Thank you for your participation";
```

LD DMDX Script: Fixation Cross

```
<ep> <cr> <fd 30 <d 59> <t 1500> <id keyboard> <mnr
  "+Left Arrow"> <mpr "+Right Arrow"><dbc
  210210210> <dfs 36> <dwc 0> <vm
  1024,768,768,16,60> <nfb> <eop>
! Item number AB;
! A=condition (1=word, 2=non-word);
! B=Trial number;
0 "Press SPACEBAR to start";
+11 * "+" / "rabies" /;
-22 * "+" / "brantly" /;
-23 * "+" / "skelve" /;
+14 * "+" / "jump" /;
0 "The END! Thank you for your participation";
```

Masked Priming DMDX: Short SOA

```
<ep> <cr> <fd 30> <d 29> <t 1000> <id keyboard>
  <MapPositiveResponse "+Right Arrow">
  <MapNegativeResponse "+Left Arrow"> <dbc
  210210210> <dfs 36> <dwc 0 ><vm
  1024,768,768,16,60> <nfb> <eop>
! A=condition (1=word, 2=non-word);
! B=Trial number;
0 "Press SPACEBAR to start";
+11 "+" / "##########"  / <fd 2> "DOCTOR" /
  "##########" / *  "NURSE" /;
-22 "+" / "##########" / <fd 2> "TREE" / "##########" / *
  "FLORE" /;
+13 "+" / "##########" / <% 2> "MOTHER" /
  "##########" / *  "SON" /;
0 "The END! Thank you for your participation";
```

Masked Priming DMDX: Long SOA

```
<ep> <cr> <fd 30> <d 29> <t 1000> <id keyboard>
  <MapPositiveResponse "+Right Arrow">
  <MapNegativeResponse "+Left Arrow"> <dbc
  210210210> <dfs 36> <dwc 0 ><vm
  1024,768,768,16,60> <nfb> <eop>
! A=condition (1=word, 2=non-word);
! B=Trial number;
0 "Press SPACEBAR to start";
+11 "+" / "##########"  / <fd 5> "DOCTOR" /
  "##########" / *  "NURSE" /;
-22 "+" / "##########" / <fd 5> "TREE" / "##########" / *
  "FLORE" /;
+13 "+" / "##########" / <% 5> "MOTHER" /
  "##########" / *  "SON" /;
0 "The END! Thank you for your participation";
```