Typology of spatial representation

Lecture 6: The Levinson-Li Debate

Jürgen Bohnemeyer

2017 LSA Linguistics Institute

University of Kentucky, July 5-August 1st, 2017

jb77@buffalo.edu

http://www.acsu.buffalo.edu/~jb77/
SYNOPSIS

- Situating today’s lecture
- What Whorf wrought
- Opening salvo: Pederson et al 1998
- Counter attack: Li & Gleitman 2002
- The 2011 papers
- Enter MesoSpace
- Summary
SITUATING TODAY’S LECTURE

- the course: overview

Figure 1.1. A classification of spatial concepts
SYNOPSIS

- Situating today’s lecture
- What Whorf wrought
  - Opening salvo: Pederson et al 1998
  - Counter attack: Li & Gleitman 2002
  - The 2011 papers
  - Enter MesoSpace
- Summary
what whorf wrought

the linguist relativity hypothesis (lrh): strong vs. weak interpretations

the strong (deterministic) orthodox interpretation of the lrh:
"the structure of anyone’s native language strongly influences or fully determines the world-view he will acquire as he learns the language."

the weak (non-deterministic) neo-whorfian interpretation of the lrh:
"structural differences between language systems will, in general, be paralleled by nonlinguistic cognitive differences, of an unspecified sort, in the native speakers of the two languages." (brown 1976: 128)

the strong (deterministic) orthodox interpretation of the lrh, narrowed to semantic/pragmatic effects:
the semantic/pragmatic system of anyone’s native language strongly influences or fully determines the worldview they will acquire as they learn the language.

the weak (non-deterministic) neo-whorfian interpretation of the lrh, narrowed to semantic/pragmatic effects:
language-specificity in the semantic/pragmatic system may cause differences in nonlinguistic cognition in speakers of different languages.
language-on-thought (LoT) effects

Figure 2.1. A classification of hypothetical LoT effect
factors fueling skepticism/reservations/rejection

- strong interpretations of the LRH are difficult to reconcile with the contemporary mainstream view of cognition
- strong emphasis on innate knowledge in the dominant paradigm in the cognitive sciences since the 1960s
- the search for culture-specificity in cognition may be seen as clashing with the ‘Psychic Unity of Mankind’ postulate
  - Bastian (1860)
- the existence of any cognitive biases undermines ‘naive realism’ (Ross & Ward 1996)
CogSci 2.0 - a paradigm shift/maturation process that has created a more favorable environment for interest in the LRH

- computer science moving away from symbolic representations/systems and toward statistical learning;
- growing interest in item-based learning as opposed to appeals to innate knowledge in language acquisition research;
- increasing emphasis on constructions and usage-based patterns in theories of grammar;
- embrace of statistical modeling in various fields of the language sciences
  - and of the kind of large ("big") data sets such techniques can handle;
- more attention to variation;
- growing interest in brain plasticity
effects from what on what?

First language acquisition:
Habituation to cognitive practices associated with the use of $L_A$; linguistic scaffolding effects

Speech community of $L_A$

(Contact-induced) language change:
Through sustained transfer, linguistic practices of the $L_B$ community spread in the $L_A$ community, causing spread of habituation to the associated cognitive practices

Child
L1 learner of $L_A$

Transfer:
Cognitive habituation during L2 acquisition

Adult
L1 speaker of $L_A$
L2 speaker/learner of $L_B$; cf. next Figure

Speech community of $L_B$

Figure 2.2. Some hypothetical LoT effects I: External perspective
Figure 2.3. Some hypothetical LoT effects II: Internal perspective (green boxes and black arrows - computational components of the speech processing system; ochre boxes and red arrows - proposed LoT effects)
semantic categorization and conceptual transfer

Figure 2.4. Language learning and concept induction
SYNOPSIS

- Situating today’s lecture
- What Whorf wrought
- Opening salvo: Pederson et al 1998
- Counter attack: Li & Gleitman 2002
- The 2011 papers
- Enter MesoSpace
- Summary


### OPENING SALVO: PEDERSON ET AL 1998

> language sample and researchers

**Table 3.1.** Language sample and researchers (Pederson et al 1998: 560; blue dots: Men-and-Tree data included in the analysis; red dots: Animals In A Row (AIAR) data included; green dots: Transitive inference task data included)

<table>
<thead>
<tr>
<th>LANGUAGE</th>
<th>FAMILY (COUNTRY)</th>
<th>RESEARCHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mopan</td>
<td>Mayan (Belize)</td>
<td>E. Danziger</td>
</tr>
<tr>
<td>Tzeltal</td>
<td>Mayan (Mexico)</td>
<td>P. Brown, S. Levinson</td>
</tr>
<tr>
<td>Yucatec</td>
<td>Mayan (Mexico)</td>
<td>C. Stolz</td>
</tr>
<tr>
<td>Totonac</td>
<td>Totonacan (Mexico)</td>
<td>P. Levy</td>
</tr>
<tr>
<td>Kilivila</td>
<td>Austronesian (Papua New Guinea)</td>
<td>G. Senft</td>
</tr>
<tr>
<td>Longgu</td>
<td>Austronesian (Solomon Islands)</td>
<td>D. Hill</td>
</tr>
<tr>
<td>Kgalagadi</td>
<td>Bantu (Botswana)</td>
<td>S. Neumann</td>
</tr>
<tr>
<td>Hailom</td>
<td>Khoisan (Namibia)</td>
<td>T. Widlok</td>
</tr>
<tr>
<td>Arandic</td>
<td>Pama-Nyungan (Australia)</td>
<td>D. Wilkins</td>
</tr>
<tr>
<td>Tamil</td>
<td>Dravidian (India)</td>
<td>E. Pederson</td>
</tr>
<tr>
<td>Belhare</td>
<td>Tibeto-Burman (Nepal)</td>
<td>B. Bickel</td>
</tr>
<tr>
<td>Dutch</td>
<td>Indo-European (Netherlands)</td>
<td>Staff</td>
</tr>
<tr>
<td>Japanese</td>
<td>Uncertain (Japan)</td>
<td>K. Inoue, S, Kita</td>
</tr>
</tbody>
</table>
Table 3.2. Referential communication tasks drawn on by Pederson et al (1998: 561); highlighted: Men-and-tree is the study quantitative results are presented from

<table>
<thead>
<tr>
<th>LANGUAGE GAME</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men-and-tree</td>
<td>Photograph matching; horizontal plane relations</td>
</tr>
<tr>
<td>Farm animals</td>
<td>Matching object arrays; horizontal plane relations</td>
</tr>
<tr>
<td>Wooden man</td>
<td>Matching posture configurations with human model</td>
</tr>
<tr>
<td>Route descriptions</td>
<td>Motion on horizontal plane</td>
</tr>
<tr>
<td>Tinker Toy™</td>
<td>Complex figure construction; caused motion elicitation</td>
</tr>
</tbody>
</table>

Table 3.3. Nonverbal cognition tasks drawn on by Pederson et al (1998: 581); highlighted: Men-and-tree is the study quantitative results are presented from

<table>
<thead>
<tr>
<th>EXPERIMENT</th>
<th>COGNITION TESTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animals-in-a-row</td>
<td>Visual recall memory of objects</td>
</tr>
<tr>
<td>Red and blue chips</td>
<td>Visual recognition memory of 2-D shapes</td>
</tr>
<tr>
<td>Completed path task</td>
<td>Recognition memory, inference</td>
</tr>
<tr>
<td>Motion maze task</td>
<td>Recognition memory, cross-modal interpretation</td>
</tr>
<tr>
<td>Transitive inference</td>
<td>Memory, inference</td>
</tr>
</tbody>
</table>
frame use in discourse

**referential communication** tasks (Clark & Wilkes-Gibbs 1990) with screened off ‘Describer’ and ‘Matcher’

- picture matching (Men & Tree)
- object-to-picture matching (Farm-Animals)
- model-to-object matching (Tinker Toys)
- route description through model landscape

![Diagram](image)

**Figure 3.1.** Matching tasks
frame use in discourse (cont.)

- coding of responses for reference frame types
  - Step 1: break down descriptions into propositions
    - every proposition should express a single locative relation or orientation interpreted in a single frame
  - Step 2: code the locative/orientation proposition for every reference frame type
    - under which the proposition is true of the described stimulus
      - if a proposition is true of a stimulus in multiple frames, it must be coded as ambiguous
    - whether a particular frame type is actually available for a given proposition may need to be established w/ L1 speakers
frame use in discourse (cont.)

results

Table 3.4. Typing of the sample languages based on responses to Men and Tree Set 2 (Pederson et al 1998: 572)

<table>
<thead>
<tr>
<th>INFORMATION TYPE (FRAME OF REFERENCE)</th>
<th>LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic alone</td>
<td>Kilivila (Austronesian)</td>
</tr>
<tr>
<td></td>
<td>Mopan (Mayan)</td>
</tr>
<tr>
<td>Relative</td>
<td>Japanese (Uncertain)</td>
</tr>
<tr>
<td>Participant derived (and intrinsic)</td>
<td>Dutch (Indo-European)</td>
</tr>
<tr>
<td>Absolute</td>
<td>Arandic (Pama-Nyungan)</td>
</tr>
<tr>
<td>Geo-cardinal derived (and intrinsic)</td>
<td>Tzeltal (Mayan)</td>
</tr>
<tr>
<td>Mixed cases</td>
<td>Longgu (Austronesian)</td>
</tr>
<tr>
<td>(relative plus absolute)</td>
<td></td>
</tr>
<tr>
<td>Participant and geo-cardinal (and</td>
<td>Belhare (Tibeto-Burman)</td>
</tr>
<tr>
<td>intrinsic information</td>
<td>Hai</td>
</tr>
<tr>
<td></td>
<td>Kgalagadi (Bantu)</td>
</tr>
<tr>
<td></td>
<td>Tamil (Dravidian)</td>
</tr>
<tr>
<td></td>
<td>Totonac (Totonacan)</td>
</tr>
<tr>
<td></td>
<td>Yucatec (Mayan)</td>
</tr>
</tbody>
</table>
frame use in recall memory: Animals in a Row (AIAR)

- design
  - open number of practice trials
  - followed by 5 test trials
  - each array involves 3 animals out of a total set of 4
  - participants memorize the array on the stimulus table
  - researcher then takes away the array, waits 30 seconds, then walks participants over to the recall table
  - handing them all four animals and asking them to ‘Make it again, just the same!’

*Figure 3.2. Setup of the Animals in a Row study (Pederson et al 1998: 576)*
frame use in recall memory: Animals in a Row (AIAR) (cont.)

coding

- facing direction and order were coded as ‘relative’, ‘absolute’, ‘untypable’, ‘invariant’, or ‘inconsistent’

- ‘relative’ and ‘absolute’ really means egocentric and geocentric, respectively, in this case

- responses cannot be discriminated for relative vs. direct or absolute vs. geomorphic/landmark-based

- and there is no detectable intrinsic response pattern

- ‘untypable’: array reconstructed along a rotated axis

- ‘invariant’: response did not encode the animals’ facing direction

- inconsistent: inconsistent facing direction or wrong order
frame use in recall memory: Animals in a Row (AIAR) (cont.)

- exclusions
  - inconsistent trials were excluded from the analysis
  - so were participants who produced invariant trials
  - Pederson et al do not report participant exclusions due to frequent inconsistent responses
  - in the New Animals study of MesoSpace, we excluded participants with 2+ errors of 6 test trials
frame use in recall memory: Animals in a Row (AIAR) (cont.)

results

- the ratio of geocentric responses over trials is significantly different b/w the two groups
  - Mann-Whitney U = 241.5, p < 0.001

---

**Figure 3.3.** Number of geocentric (‘absolute’) responses by number of participants: the linguistically geocentric populations (Pederson et al 1998: 579)

**Figure 3.4.** Number of geocentric (‘absolute’) responses by number of participants: the linguistically relative populations (Pederson et al 1998: 580)
AIAR did not produce interpretable results with some of the other populations due to the great number of unidirectional responses, for example: Tamil.

The case of Tamil is particularly interesting due to variation b/w urban and rural speakers.

The former tend to be linguistically egocentric/relative, the latter geocentric/absolute (Pederson 1995).

So Pederson et al included results obtained just with Tamil speakers using a second design: the Transitive Inference task.
frame use in inferences: Transitive Inferences

design

open number of practice trials on Table 1

followed by 10 test trials

stimuli: three objects of distinct shape and color

participants memorize the location of B with respect to A on Table 1

then that of C with respect to B on Table 2

then are returned to Table 1 and asked to locate C wrt. A

**Figure 3.5.** Setup of the Transitive Inference study (Levinson 2003: 166)
frame use in inferences: Transitive Inferences (cont.)

results: the Tamil participants

Figure 3.5. Number of geocentric (‘absolute’) responses by number of participants: linguistically relative vs. geocentric Tamil speakers (Pederson et al 1998: 584)

“(…) there is a highly reliable contrast between relative and absolute speaking Tamil subjects in their choice of a solution to the nonlinguistic task (p < 0.001 for comparison between samples; p < 0.01 for linguistically relative vs. chance; p < 0.05 for linguistically absolute vs. chance” (Pederson et al. 1998: 584)

I assume they again applied the Mann-Whitney to the population means
four interpretations of Pederson et al’s findings

the “hardcore” neo-Whorfians

Haun et al (2011); Levinson (2003); Levinson et al (2002); Majid et al (2004); Pederson et al (1998); *inter alia*

language as the “driving force” (Levinson et al 2002: 162)

concept learning and habituation as mechanisms

no explicit commitment re. weak vs. strong interpretation

“We surmise that language structure - as instantiated in the social patterns of language use - provides the individual with a system of representation, some isomorphic version of which becomes highly available for incorporation as a default conceptual representation. Far more than developing simple habituation, use of the linguistic system, we suggest, actually forces the speaker to make computations he or she might otherwise not make.” (Pederson et al 586)
four interpretations (cont.)

- the “moderate” neo-Whorfians: Le Guen (2011); Mishra et al (2003); Wassmann & Dasen (1998); *inter alia*

- language as one causal factor among others

- explicit rejection of strong interpretations

- and of the hardcore neo-Whorfians, who are seen as defending a strong interpretation

- arguably incorrect (but understandable!):

  “(...) no one, not even Whorf, ever held that our thought was in the infernal grip of our language. Whorf’s own idea was that certain grammatical patterns, through making obligatory semantic distinctions, might induce corresponding categories in habitual or non-reflective thought in just the relevant domains (...)”

  (Levinson 2003a: 33; emphasis JB).
four interpretations (cont.)

the Linguistic Transmission Hypothesis

Linguistic Transmission Hypothesis (LTH) - abstract formulation:
“Using a language or linguistic variety may facilitate the acquisition of cultural practices of nonlinguistic
cognition shared among the speakers of the language.”

Linguistic Transmission Hypothesis (LTH) - concrete formulation:
“The comprehension of utterances may provide clues to the cognitive practices involved in their
production, and both the comprehension and the production of utterances may afford habituation to
these cognitive practices. The cognitive practices so acquired may or may not subsequently be
extended beyond the domain of speech production.”

Bohnemeyer et al (2015, in press)

cf. Lecture 7
four interpretations (cont.)

- the epiphenomenal hypothesis
  (Li & Gleitman 2002; Li et al 2011)

- culture-specific biases in both language use and nonverbal cognition reflect nonlinguistic influences of

  - literacy, education, and the environment
    (population geography and topography)

“(…) it is possible that some third variable that differed for the subject populations is responsible both for the linguistic difference between them and for their approaches to spatial tasks. Just because linguistic and cultural practice are so often and usefully intermeshed, it is difficult to tell cause from effect.” (Li & Gleitman 2002: 272)
SYNOPSIS

- Situating today’s lecture
- What Whorf wrought
- Opening salvo: Pederson et al 1998
- Counter attack: Li & Gleitman 2002
- The 2011 papers
- Enter MesoSpace
- Summary
COUNTER ATTACK: LI & GLEITMAN 2002

- two replications of AIAR with American college students designed to test the hypothesis
  - that American college students can be induced to perform just like Pederson et al’s geocentric populations
    - by tweaking contextual factors
      - Experiment 1: conducting the task indoors vs. outdoors
      - Experiment 2: adding a supposed landmark cue to the AIAR configurations
Experiment 1: indoors vs. outdoors

- 3 conditions: indoors blinds up vs. indoors blinds down vs. outdoors
  - reliable difference b/w blinds-down and outdoors
  - Mann-Whitney U-test; $P = 0.035$

Figure 4.1. Number of geocentric ('absolute') responses by number of participants and environmental condition (Li & Gleitman 2002: 279)
Experiment 1: indoors vs. outdoors (cont.)

part of the rationale for this experiment was a conjecture on Li & Gleitman’s part
to the effect that Pederson et al had tested members of indigenous communities mostly outdoors
however, as Levinson et al (2002) point out in response, this was not so
Experiment 1: indoors vs. outdoors (cont.)

- a replication of Li & Gleitman’s indoors/outdoors condition effect with Dutch participants failed

- no significant difference; Mann-Whitney U; $P = .4$

**Figure 4.2.** AIAR with environmental conditions replication: *Number of geocentric (‘absolute’) responses by proportion of participants and environmental condition* (Levinson et al 2002: 169)
Experiment 1: indoors vs. outdoors (cont.)

Levinson et al also ran a motion maze recall memory task under the indoors-outdoors conditions

again no effect emerged

Figure 4.3. Setup of the Motion Maze study (Levinson et al 2002: 165)

Figure 4.4. Motion Maze study: number of geocentric (‘absolute’) responses by proportion of participants and environmental condition (Levinson et al 2002: 171)
Experiment 1: indoors vs. outdoors (cont.)

- why did L&G’s indoors-outdoors condition effect fail to replicate with Dutch participants?

  - Hypothesis 1: some American college students adjust the frame type they use for small-scale space to whether they are indoors or outdoors in a way Dutch students do not

    => carry out linguistic elicitation in both conditions!

  - Hypothesis 2: something in the way L&G carried out the outdoors condition raised attention to environmental cues
Experiment 2: duck pond

- blinds-up version of AIAR with identical copies of an ad-hoc landmark placed on each table
- a pair of “kissing” styrofoam ducks on a paper pond
- placed to the left of the participant on the stimulus table and on the left or the right on the test table
- 20 participants saw it always on the right of the test table
- supposedly biasing toward egocentric coding
- another 20 saw it always on the left for geocentric bias
Experiment 2: duck pond (cont.)

- results

- the two duck pond placements produced a highly significant difference in performance

- Mann-Whitney $U$-test; $P = 0.003$

**Figure 4.6.** Duck pond study: number of geocentric (‘absolute’) responses by percentage of participants and environmental condition (Li & Gleitman 2002: 281)
Experiment 2: duck pond (cont.)

- response: 3 vs. 4 animals

  Levinson et al (2002) hypothesized that the duck pond was conceptualized as part of the array to test this hypothesis, they replicated the experiment twice with new manipulations.

  In the first, 10 participants were given three animals as in L&G’s replication.

  While the other 10 had to choose the correct 3 animals from the total set of 4 as in Pederson et al.
Experiment 2: duck pond (cont.)

response: 3 animals vs. 4 (cont.)

results: in the 3-animals condition, participants behaved as in L&G’s study

but with 4 animals they just ignored the “pond” and coded relatively

Figure 4.7. Levinson et al’s duck pond replication: number of intrinsic (corresponding to L&G’s ‘absolute’) responses by proportion of participants and condition (Levinson et al 2002: 176)
Experiment 2: duck pond (cont.)

response: 90° vs. 180° rotation conditions; 3 animals

Figure 4.8. Setup of the duck pond study replication with 90° vs. 180° rotation conditions (Levinson 2002: 178)

Figure 4.9. Levinson et al’s duck pond replication with 90° vs. 180° rotation conditions: number of intrinsic (corresponding to L&G’s ‘absolute’) responses by proportion of participants and condition (Levinson et al 2002: 176)
L&G were able to show that some American college students can be made to pay more attention to environmental cues just by taking them outdoors. However, Levinson et al were unable to replicate this effect with Dutch speakers, thus more data from other populations is needed to determine what happened in L&G’s outdoors condition.
Levinson et al showed convincingly that L&G’s participants were treating the duck pond toy as part of the array rather than as a geocentric cue so we cannot conclude from L&G’s results successfully inducing geocentrism in American college students bottom line: the evidence that it is possible to induce cognitive geocentrism by tweaking conditions remains at best equivocal
there also remains something of a gap between L&G’s experiments and their discussion of Pederson et al’s view
the experiments seem to have been designed to show that the observed community biases are shallow
and easily mutable in response to tweaking of experimental conditions
this suggests that L&G question how robust these cultural practices of cognition really are
i.o.w., a “CogSci 1.0” view minimizing or dismissing the role of culture in cognition
SYNOPSIS

- Situating today’s lecture
- What Whorf wrought
- Opening salvo: Pederson et al 1998
- Counter attack: Li & Gleitman 2002
- The 2011 papers
- Enter MesoSpace
- Summary
THE 2011 PAPERS

- Li et al (2011)
  - claim: Tenejapan Tseltal speakers when given an appropriate task can be induced to memorize stuff in a relative frame
  - problem from the get-go: nobody said any population can’t be made to learn to use a particular frame type
    - no reason not to assume that the possibility of learning to use the basic frame types is innate
  - the neo-Whorfians’ claims merely concern preferences for using particular FoRs in particular domains
    - and the cognitive consequences of these usage patterns
Li et al (2011) (cont.)

- method (experiment I)
- a variation of Brown & Levinson 1993: picture-to-picture matching
  - view a card with two dots on the stimulus table
  - then turn, walk to the test table
  - and select an identical copy from out of a set of four differing in their orientation
Li et al (2011) (cont.)

method (experiment I) (cont.)

the participants hold the original card covered in a box as they rotate

two conditions

“egocentric”: the box rotates w/ the participants

“geocentric”: the participants maintain the orientation of the box in the room

Figure 5.1. Stimuli, experiment 1 of Li et al 2011, based on Brown & Levinson 1993
Li et al (2011) (cont.)

results (experiment I)

74% “correct” responses in the geocentric condition, 84.6% in the egocentric one - difference not significant

LA&P’s interpretation

correct responses in the egocentric condition require use of relative frames

therefore, the outcome shows that Tseltal speakers can be induced to reason in relative frames

and will then apply them just as successfully as geocentric frames
Li et al (2011) (cont.)

- critique: two problems
  - the use of a left-right distinction with respect to the participants’ own body is intrinsic, not relative
  - experimental bias: the task was easier to solve in the egocentric condition
    - since the participants could keep track of the ground - their own body - proprioceptively

Figure 5.2. Anchor points for spatial memory in Experiment 1 of Li et al 2011 (Bohnemeyer & Levinson ms.)
Haun et al (2011)

- goal: test how easy it is to train children growing up in an egocentric community to use geocentric frames
  - in small-scale space
  - and vice versa

- participants: 12 children each growing up learning Dutch and ≠Ahkoe Hai||om (Khoisan, Namibia)
  - ages 8-9 (Dutch) and 7-11 (Hai||om)
Haun et al (2011) (cont.)

- Experiment 1: array reconstruction without training
  - results: the Dutch kids perform egocentrically; the Namibian kids geocentrically

- Experiment 2: as E1, but more complex arrays (six objects instead of three)
  - results: the Dutch children perform even more strongly egocentrically
  - and the Namibians more strongly geocentrically
Haun et al (2011) (cont.)

Experiment 3: the children are trained to use the non-native strategy

first with a video narrated in their L1

followed by several practice trials

results: only 50% were able to diverge from their habitual strategy

and only 20% managed to apply the instructed strategy successfully

in the sense that they now produced trials in the non-habitual strategy
Haun et al (2011) (cont.)

results (cont.)

at the same time, both populations showed dramatically increased error rates

neither group got more than 50% of trials right

whereas prior to instruction, the media success rate had been 90.91% (Dutch) and 81.82% (Hai||om)
discussion

impressive

but

how much can we conclude from the fact that one method of instruction failed?

maybe it was a particularly poorly done instruction?

maybe the length of instruction was just a wee bit too short?
and finally, the other Haun et al (2011) paper

Figure 5.2. Dances with anthropologists
SYNOPSIS

- Situating today’s lecture
- What Whorf wrought
- Opening salvo: Pederson et al 1998
- Counter attack: Li & Gleitman 2002
- The 2011 papers

- Enter MesoSpace

- Summary
the alignment between linguistic and nonlinguistic preferences is robust in population after population

the question is, is it evidence of causation or is the role of language epiphenomenal?

so far, the Levinson-Li Debate has focused on the question how robust these cultural practices really are

with the evidence on both sides being somewhat equivocal at best

enter MesoSpace: direct tests of Li & Gleitman’s epiphenomenal hypothesis
SYNOPSIS

- Situating today’s lecture
- What Whorf wrought
- Opening salvo: Pederson et al 1998
- Counter attack: Li & Gleitman 2002
- The 2011 papers
- Enter MesoSpace

- Summary
SUMMARY

- blah
SUMMARY (CONT.)

- blah
Beyond Whorf: the “sociophonetics” of the mind

reading: Bohnemeyer et al (2015); [Palmer 2015]

on Canvas shortly
References (cont.)


Thanks!