Philosophy 208
The Language Revolution
Russell Marcus
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Class 27 - Linguistic Platonism


GNOME CHOMSKY
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Chomsky-Katz

- Chomsky made (at least) two revolutionary claims.
- One is called nativism: our knowledge of language is, in part, built-in to our brains.
  - Epistemological claim
  - We are born with an innate capacity, or propensity, to learn languages.
- Nativism was developed in response to both Skinnerian behaviorism and Piagetian developmental psychology.
  - According to the behaviorist, we are born with a Lockean blank slate, and our linguistic abilities are completely learned.
  - Developmental psychologists explored the process of learning language
- Chomsky's project requires physical structures in the brain to account for the nativism, but no special faculty of intuition.
- Katz took Chomsky's conclusions one step further.
  - Language are abstract objects.
  - Our abilities to learn them are based in our ability to reason about languages.
  - Katz's project requires a special faculty of intuition, but makes no commitments to the physical basis of that faculty.
- The central argument for nativism is called a poverty of the stimulus argument (POTS).

Poverty of the Stimulus: Grammar

- Children learn too much grammar too quickly for us to account for their grammatical abilities on the basis of behavioral stimulus.
- A grammar, roughly, is a set of rules for generating the indefinite number of sentences of a language.
  - More precisely, it is the formal system that produces the infinite set.
- We can generate the indefinite stock of sentences from a finite base set of lexical particles.
  - The lexicon must be finite, since human language-users can learn it.
  - Compositionality/recursion
  - "The central problem of the theory of language is to explain how people can speak and understand new sentences, new in their experience or perhaps in the history of the language" (Chomsky 682).
- The classic example:
  1. John is easy to please.
  2. John is eager to please.
  3. It is easy to please John.
  4. It is eager to please John.
- 1 and 2 are identical, grammatically.
- If children were learning grammar behaviorally, they would make the reasonable inductive conclusion that since 3 can be inferred (and used) on the basis of 1, 4 should similarly be derivable from 2.
- But, children just do not make that kind of mistake.

Poverty of the Stimulus: Lexicon

- The POTS argument also relies on the claim that children learn the lexicon of their first language too quickly to be explained purely behaviorally.
  - "It is a very difficult matter to describe the meaning of a word, and such meanings have great intricacy and involve the most remarkable assumptions, even in the case of very simple concepts, such as what counts as a possible "thing." At peak periods of language acquisition, children are "learning" many words a day, meaning that they are in effect learning words on a single exposure. This can only mean that the concepts are already available, with all or much of their intricacy and structure predetermined, and the child's task is to assign labels to concepts, as might be done with very simple evidence" (689).
- Thus, Chomsky concluded, our abilities to use language must be built into our brains.
- There might not be a specific language module of the brain, though Broca's area and Wernicke's area are both important for speech and language processing.
- Chomsky is committed only to a built-in language center at some abstract level of organization.

The Language Faculty and UG

- The dedicated mental organ for learning language is described or explained, in its initial state, by a very general universal grammar (UG).
- UG may be transformed into the particular grammars of our particular languages by transformations according to set parameters.
- The grammars of all particular languages, Chomsky claims, differ only in trivial ways.
- All languages have essential common features, aside from their differences in lexicon, explicable by biology.
- "From an angel's point of view, all languages would appear identical, apart from trivialities, their fundamental features determined by facts about human biology" (Chomsky 687).
  - Consequences for Quinean indeterminacy claims

Evidence

- The claims about nativism and UG are controversial, but they may be supported or refuted empirically.
- To establish that there is a universal grammar, we would need to evaluate Chomsky's claims about the triviality of differences among natural languages.
- We would need a linguistic theory of each language, and of UG, and a description of the parameters and transformations that take UG to those natural languages.
- Thus, what I have called Chomsky's first revolutionary claim led to an intense and productive research project in linguistics, and to the opening of linguistics departments, in the 1960s and 1970s, in universities around the world.
- Establishing nativism is trickier.
- One way to defend nativism is to show that behaviorism is as explanatorily vacant as Chomsky claims.
- We would need to show that the stimulus is really that poor.
- Such a defense will require appeal to Chomsky's second revolutionary claim.

The Competence/Performance Distinction

- Chomsky's second revolutionary claim is methodological: there is a distinction between competence and performance in language.
- People often fail to use their own languages correctly.
  - They use words they do not intend.
  - They fail to finish their sentences.
  - They speak ungrammatically.
- People's performance varies widely, even in their native language.
- If the study of language were the study of the performance of speakers of the language, linguistics would be extremely messy.
- Performance varies so widely, it would be difficult even to distinguish one language of the various speakers who can all understand each other.
- Performance errors, though, do not impugn the competence of a speaker, which can be taken as the real locus of the study of language.
- We idealize the object of our study of language by appealing to the competence of native speakers, rather than their actual performance.

Against Folk Linguistics

- The common understanding of language involves broader concepts about performance: dialect, interpretation, class structure, and authority.
- Explanations of these broader concepts all, it could be argued, require appeals to social conventions.
- Chomsky argues that these broader facets of language fail to explain many linguistic phenomena.
- Pronoun binding (from Anne Bezuidenhout):
  5. Mary expects to pay for herself.
  6. I wonder who Mary expects to pay for herself.
  7. Mary expects to pay for her.
  8. I wonder who Mary expects to pay for her.
- 7 and 8 are identical to 5 and 6, except for the substitution of the pronoun ‘her’ for the pronoun ‘herself’.
- But, the reference of the pronoun varies.
- In 5, the pronoun has to refer to Mary, whereas in 7 it has to refer to someone else.
- In 6, the pronoun has to refer to someone other than Mary, whereas in 8 it can refer to either Mary or someone else.

Language is Not Conventional

- If we take language to be concerned with performance, then the differences among 5-8 should be explicable in terms of some sorts of social conventions.
- But, there are no social conventions that dictate the binding of pronouns.
- We can choose to switch our conventions.
  - We can drive on the other side of the road.
  - We can stop using francs and lire and start using euros.
- What govern the references in 5-8 are something more like linguistic rules than conventions.
- Chomsky takes language to be independent of the social forces on language.
- Linguistics became a formal discipline, like logic or mathematics.

Ontology

- Epistemological claim: nativism
- Methodological claim: competence/performance distinction
- Chomsky's epistemological and methodological claims leave open the question of the ontology of language.
- We might take languages to be abstract objects, independent of us.
- Or, we might take languages to be psychological objects, products of our minds.
- In Chomsky's terms, we can take language to be extensional (E-language) or intensional (I-language).

I-languages

"I" is to suggest "intensional" and "internalized." The I-language is what...grammar purports to describe: a system represented in the mind/brain, ultimately in physical mechanisms that are now largely unknown, and is in this sense *internalized*; a system that is *intensional* in that it may be regarded as a specific function considered in intension - that is, a specific characterization of a function - which assigns a status to a vast range of physical events... (Chomsky 679).

E-languages

- An E-language is extensional in that it is a set of objects, perhaps inscription types or meanings.
- It is external in the sense that it is not a mental object.
- E-languages transcend any particular users, since they are not constructed by us, and are objective.
- In contrast, Chomsky thinks that language is intensional, and argues against those who take linguistics to study E-languages.
- Chomsky discusses two possible ways to refine the notion of an E-language.
  - language as sociological phenomenon
  - language as abstract object

Bloomfieldian Linguistics

- Bloomfieldian linguistics characterizes language as the totality of utterances that can be made in a speech community.
- A speech comminuty is an ideally homogeneous group of language users.
- Bloomfield's account of language is essentially behaviorist, relying on a taxonomy of language in use.
- The actual uses of language are not sufficient, though, since people can form novel sentences on the basis of their understanding of lexicon and grammar.
- Thus, Bloomfieldians had to include possible utterances in their ontology.
- Two awkard notions for a behaviorist
  - Possible utterances, utterances which are not actually used.
  - Speech community, which is an idealized, homogeneous group of people.
- Chomsky's argument against Bloomfield is that a behaviorist can not really help him/herself to these notions.

Chomsky Against Bloomfield

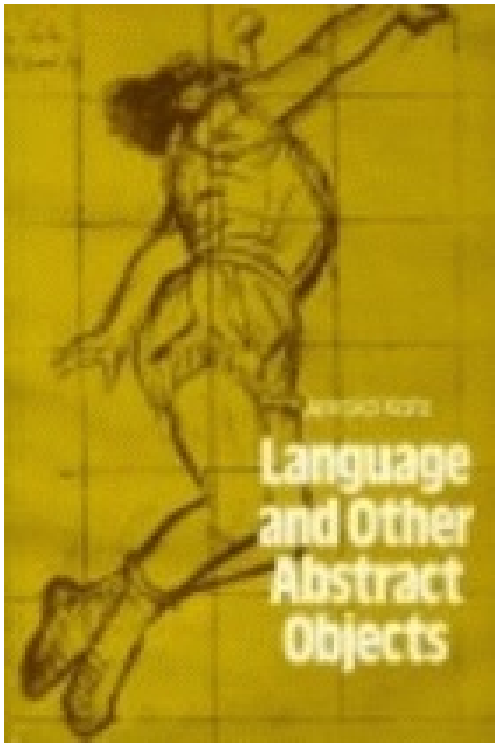
- Bloomfield presented a linguistic theory which relies on linguistic tokens rather than linguistic types.
  - "Bloomfield construed linguistic reality nominalistically, as concrete acoustic phenomena... Bloomfield and his followers formulated a methodology for nominalistically constructing grammars as category structures which taxonomize all expressions of a natural language. The methodology consisted in segmentation and classification procedures which, working up from actual expression tokens in a nominalistically acceptable way, construct a categorical structure describing all expression tokens of the language, including the possible but not actual ones" (Katz 275-6).
- Chomsky: there are not enough tokens to account for the novel and indefinite number of sentences that speakers can form.
  - Generative grammars have compositionality built-in.
  - Given a lexicon and principles which guide the composition of sentences, we can construct an indefinite number of sentences.
  - But, generative grammars are not nominalistically acceptable because they allow for too many linguistic objects.
  - "The nominalist interpretation of grammars as descriptions of acoustic phenomena was thus replaced with a conceptualist interpretation of grammars as theories of the linguistic aspect of human psychology, or, as he...now expresses it, a 'language organ' in the human brain" (Katz 277).

The Chomsky Boomerang

- The argument against establishing a semantic theory on the basis of linguistic tokens was that there just are not enough of them.
- We need a denumerable infinity of linguistic objects.
- There are not enough acoustical tokens.
- But, there are not enough neural tokens, either.
- Chomsky's argument against linguistic nominalism thus also applies to linguistic conceptualism.
- "Infinity in linguistics cannot be squared with concretism in the foundations of linguistics" (Katz, 279).

Languages as Abstract Objects

Katz



- Katz concludes that the only plausible position on linguistic ontology is platonism.
- If, on the other hand, we take a language to be an abstract object, we have plenty of room.

Philosophy of Mathematics and Philosophy of Language

Ontology

- Mathematical realism (platonism)
  - Mathematical objects exist, independently of us, as abstract objects.
  - Plato, Descartes, and Frege
- Mathematical conceptualism (intuitionism)
  - Mathematical objects are mental constructs.
  - Kant
- Mathematical formalism (nominalism, fictionalism)
  - Mathematics is just a formal game, with no ontology beyond that of mathematical inscriptions.
- Three analogous positions concerning the ontology of language.
  - The linguistic nominalist claims that languages have no ontology beyond that of token inscriptions or utterances.
    - Bloomfield
    - Wittgenstein
  - The linguistic conceptualist claims that languages are mental constructs.
    - Chomsky
    - Locke
  - The linguistic platonist claims that languages are abstract objects.
    - Katz

Abstract and Concrete

- “The source of the problem is taking linguistic reality to be concrete. Taking expressions to be acoustic objects is just one way of taking linguistic reality to be concrete. Another way is taking expressions to be mental/neural objects... The fundamental problem of...the abstractness of language was not solved in the Chomskyan revolution, but swept under the rug” (Katz 277-8).
- Once we accept the consequences of the initial observation that linguistic theories are theories of linguistic types, we have adopted a platonist ontology in language.
- All attempts to naturalize this platonism, to conceptualize abstract objects, are doomed to fail.
- The only way to do justice to the conclusion is to accept that linguistics is a formal theory, of abstract objects, rather than a physical theory, of concrete objects.

Generative Grammar and Psychology

- Chomsky was drawn to conceptualism by his desire to make linguistics compatible with natural science.
- He agreed with Bloomfield that linguistics is an empirical theory, with empirically testable results.
  - His claim against Bloomfield was that it could not account for indefinitely many novel sentences.
- The Chomskyan revolution in linguistics was really centered on the move from taxonomies of utterances to generative grammar.
- But, Chomsky placed the generative grammar in the brain.
- Linguistics became a branch of empirical, cognitive psychology.

Katz and Formal Linguistics

- Katz argues that any discipline, and its methods, must correspond to the objects it studies.
- Along with Chomsky's generative grammar came the abstract objects of linguistic types.
- Since linguistics studies abstract objects, Katz argues, it must be a formal science, not an empirical science.
- There are empirical questions we can ask about a formal science.
  - We can ask about our knowledge of mathematics, and of language.
  - We can trace our learning processes.
- But, when we study the language itself, we are no longer engaged in empirical research.
- We have entered into a formal, rather than empirical, science.

How Generative are Generative Grammars?

- Once we accept linguistic platonism, we have to wonder whether generative grammars are sufficient to yield the requisite abstract objects.
- Katz considers an argument from Langendoen and Postal that generative grammars fail to yield enough sentences.
  - There are more than denumerably many sentences of English, but generative grammars can only produce denumerably many sentences.
- The argument is based on Cantor's diagonal argument which yields that there are different levels of infinity.
  - There are more real numbers than there are integers, even though there are the same number of even integers as there are integers.
- To better understand the Langendoen and Postal claim, we will take a detour into infinity.

The Infinite Hotel

- The hotel is fully booked.
- A new guest arrives.
  - Shift every current guest from Room n to Room n+1.
  - For any finite number of guests, m, shift all current guests from Room n to Room n+m.
- An infinite bus with an infinite number of guests arrives.
  - Shift every current guest from Room n to Room 2n.
  - All the even-numbered rooms are filled, but the odd-numbered rooms are vacant.
- An infinite number of infinite busloads of guests arrives.
  - Shift all current guests from Room n to Room 2^n.
  - Lots of empty rooms
    - Place the people on the first bus in room numbers 3^n
    - the people in the second bus go to rooms 5^n
    - the people in the third bus go to rooms 7^n
    - etc.
  - There will be lots of empty rooms left over!
- Are there any sets of guests that the infinite hotel could not accommodate?
  - What is the fine structure of the numbers?
  - Are there different sizes of infinity?

Cardinals and Ordinals

- Numbers have at least two different functions:
  - measuring the size of a set
  - ordering, or ranking, a series
- When we use numbers to measure size, we use cardinality.
- When we use them to measure rank, we use ordinality.
- It has become useful to consider the numbers in their different uses as different objects altogether.
  - Ordinal numbers (first, second, third...) measure rank.
  - Cardinal numbers (1, 2, 3...) measure size.
  - We use one-one correspondence to characterize cardinal numbers.

Size and One-One Correspondence

- With finite numbers, the size of a group is the same as the correspondence between the objects in the group and some initial segment of the natural numbers.
- Hume's principle
  - "We are possessed of a precise standard by which we can judge of the equality and proportion of numbers and, according as they correspond or not to that standard, we determine their relations without any possibility of error. When two numbers are so combined as that the one has always a unit answering to every unit of the other, we pronounce them equal..." (Hume, *Treatise* §I.III.1, p 8).
- With transfinite numbers, two concepts of size diverge.
  - The size of the integers seems to be bigger than the size of the even numbers

    The size of a whole is greater than the size of its proper part.

    The even numbers are a proper part of the integers.
  - The even numbers (E) and the integers (N) can be put into one-one correspondence with each other.

    E: 2, 4, 6, 8...

    ↕ ↕ ↕ ↕

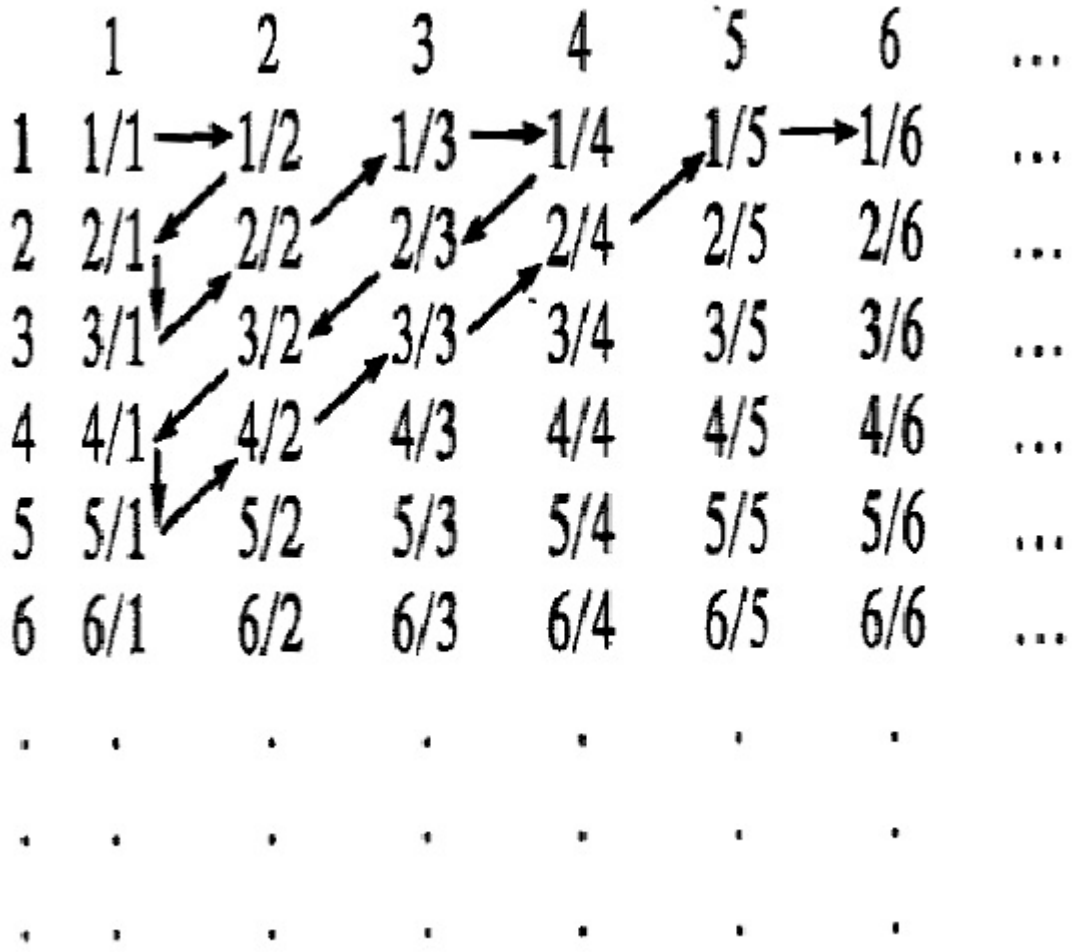
    I: 1, 2, 3, 4...

Two Concepts of Size

- Two sets have the same *size*$_h$ if they can be put in one-one correspondence with each other.
- Two sets have the same *size*$_w$ if it is not possible to put either in one-one correspondence with a proper part of itself.
- So, N and E have the same size$_h$ but different size$_w$s.
- "N and E will have the same 'number' of elements even though there are infinitely many numbers in N which are not in E, so that in this sense N is 'bigger than' E. This suggests that the elements of an infinite set are without number not just because the notion of number, as a measure of size, can get no grip here. All infinite sets *seem to* come out as being of the same 'size' if one-one correspondence is taken as indicating the sameness of size for sets" (Tiles*, The Philosophy of Set Theory* 97; emphasis added).
- Despite appearances, not all infinite numbers have the same size$_h$.

Lists and Infinite Sizes

- Cantor relies on $size_h$ to generate different kinds of infinite, or transfinite, numbers.
- When we list the members of something, we are putting them into one-one correspondence with the natural numbers.
  - We can list the even numbers.
  - We can list the prime numbers.
  - We can even list the rational numbers.


1 2 3 4 5 6 ...
1 1/1 1/2 1/3 1/4 1/5 1/6 ...
2 2/1 2/2 2/3 2/4 2/5 2/6 ...
3 3/1 3/2 3/3 3/4 3/5 3/6 ...
4 4/1 4/2 4/3 4/4 4/5 4/6 ...
5 5/1 5/2 5/3 5/4 5/5 5/6 ...
6 6/1 6/2 6/3 6/4 6/5 6/6 ...

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- When we list the members of something, we are putting them into one-one correspondence with the natural numbers.
  - We can list the even numbers.
  - We can list the prime numbers.
  - We can even list the rational numbers.
  - All of these sets have the $size_h$, despite having different $size_w$s.
- If there were some kinds of sets whose members could not be put into a list, then that set would be strictly larger than the set of natural numbers, both in $size_h$ and $size_w$.
- We could show that there are different sizes of infinity, whatever way we measure size.

The Diagonal Argument

- Cantor shows that we can not list the real numbers.
  The real numbers may be represented as their decimal expansions.
- Imagine that we have a list of all the real numbers.
- Let's represent that list abstractly, using a concatenation of variables.

  L $a_1\ a_2\ a_3\ a_4\ a_5\ a_6\ a_7$...
  $b_1\ b_2\ b_3\ b_4\ b_5\ b_6\ b_7$...
  $c_1\ c_2\ c_3\ c_4\ c_5\ c_6\ c_7$...
  $d_1\ d_2\ d_3\ d_4\ d_5\ d_6\ d_7$...
  ...
- Consider N = $a_1\ b_2\ c_3\ d_4\ e_5\ f_6\ g_7$...
- Create N*:
  – add one to each digit of N other than nine
  – replace all nines in N with zeroes
- N* is certainly not in L.
  N* is different from the first number in L in its first digit
  different from the second number in L in its second digit
  and so on.
- All possible lists of real numbers are necessarily incomplete.
- There are strictly more real numbers than natural numbers, on both a one-one correspondence notion of size ($size_h$) and a whole-is-greater-than-the-sum-of-its-parts notion of size ($size_w$).

Intermission (on Mathematics)

- Our interest in the diagonal argument is in its application to linguistic ontology.
- To see how Langendoen and Postal use the diagonal argument, we have to look a bit more closely at transfinite arithmetic, and the set theory which underlies mathematics.
- Cantor's diagonal argument applies both to numbers (as above) and to sets.
- We need to consider the argument as it applies to sets.
- But the number-theoretic version is easier to understand.