

Outline of Tool Grammar: An Intention Module for Generative Syntax

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Working Version 48.0

For a short introduction to the approach and concepts of Tool Grammar see (Smith L. , On Tool Grammar, 2017): “[On Tool Grammar](#)”, *Inference: A Review of Science*, Vol. 3 Issue 3 2017 In response to: Noam Chomsky “[The Galilean Challenge](#)” (Vol. 3, No. 1)

For an example of a perplexing syntactic phenomenon that resists solution, or even understanding, without Tool Grammar see (Smith L. , 2019)

This is a preliminary and frequently changing dynamic document responsive to reader critique and is likely not the latest version, available from the author, including major revisions. Later versions always supersede the earlier. Comments and challenges are welcome for future versions

Change Log

- 2018-12-19
 - Two sections now published as journal articles
 - Inverted Number chapter appeared in 2020
 - Reflexivization chapter expanded and updated, largely excised here
 - Added very preliminary rough working section on ergativity.
 - Minor. Changes
- 2018-4-2019
 - Inverted number published in Etudes/Inuit Studies 43: 1-2 2020
 - Added section: reflections on articles in Inference on-line journal
 - Improvements to section on reflexives as management of uncertainty
- 2018 -6-5
 - Added commentary on article in Inference Review
- 2020-09-25 Minimal edits, minimal cleanup, Reflexivity, Ergativity separated out
- 2020-11-13 Major reorganization
- 2020-12-12 Revise some sections in preparation for publication
- 2022-02-1 Major reorg/recast, improved writing, on antimicrobial after years of untreated disseminated Lyme Disease.
 - Now reduced to an outline or prolegomena for Intention Grammar, with supporting arguments and data moved out and presented in separate documents.
 - Clarify how functional perspective is foreseen/presaged by/compatible in Chomsky's writings on the generative program
- 2023-12-02 Added section on ChatGPT, Bard LLM implications
 - ChatGPT as impetus for expanded ambitions in linguistic research
 - Preparing for a new personal journal covering linguistic potential
 - Winding up this dynamic document as medical issues overtake, recognizing remaining quality issues
 - Trusting forward research with ambition, to new theory

Operative Motivating Hypotheses of Tool Grammar

1. Large language models (ChatGPT, Bard etc.) provide new impetus for expanded empirical ambitions in linguistic research. Despite Labov, linguistics, responding insufficiently to a big hint (Kučera & Francis, 1967), and Jelinek's throwing down the gauntlet, ("Every time I fire a linguist, the performance of the speech recognizer goes up") ("Frederick Jelinek," 2023), often lags the statistical numeracy revolution now quickly advancing scientific understanding in many fields.
2. A modest augmentation to the generative grammar paradigm adverting to structural purpose/intention results in an evolving architecture enabling additional descriptive and explanatory accounts in the context of function. This extends the generative model of linguistic cognition by linking interface components that otherwise would leave syntax lacking inputs. It implements an interface with functional intention envisaged by Chomsky, but which was backgrounded to allow foreground progress on manifold issues of structure and form. It also creates opportunities to better interface with the disciplines of psychology, anthropology, sociology, diachrony, etc.
3. There exists an a priori and empirically evident necessity for representation of linguistic structural action intent which has been generally postponed in the theory of language, including centralized configurational syntax in the generative program. A modularized system without inputs is in the longer run less suited to model a human generative process.
4. Linguistic structural action intent retains the basic Chomskyan focus on both competence and linguistic creativity (unbounded generation from finite means) in a level of representation which is useful for explaining and constraining the inventive means by which the species-specific features of human language are effected. Theoretical gains can be pursued by extending the Chomskyan idea to a connection of structure with intent.
5. Intention for linguistic rules potentially both enables solutions of resistant and intractable problems, and envisages a wider set of more generalized and natural solutions, while probing explanations for the multitude of syntactic observational effects uncovered by generativist methodology.
6. The explicit exclusion of linguistic intention and action from generative rules plausibly can introduce artefactual complexity and preclude the strongest possible natural constraints on characterizations of the human faculty of language.
7. Linguistic action intent points toward thinner, simplified, more directly empirical argumentation compared to indirections and complexity in syntactic analysis forced into exclusively configurational syntax. A reduction of syntactic over-generation requiring outbound artefactual filtering is possible in cases where ill-formed

sentences reflect incompatible intents that would not be instigated in the first place. Over generation competes against the Minimalist aim of seeking computational efficiency from simplicity.

8. Linguistic action intent in generative rules suggests a deepening understanding of the role of generative constructs such as C-Command and Merge to reveal a new level of significance for Minimalism's basic claims.
9. The simplicity of functional linguistic intent for patterns of syntactic effect can contribute to an understanding how human languages are so readily learned based on scant data and in the absence of negative data.
10. Exploration of linguistic intent as a methodology opens the possibility of reducing the entropy of syntactic, semantic, and pragmatic theory by independently explaining a plethora of ill formed sentences more directly without intermediate constructs, leaving a more tractable set of separate theoretical problems for these disciplines. Such reduction accords with Minimalist principles.
11. Scientific validity for modeling human linguistic competence is enhanced by extending the generative architecture from a bi-directional sound-meaning connection to a functional (possibly network) connection between linguistic action intention and external linguistic representation.

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1 Introduction and Summary¹

Note: This work has been reduced to an outline, or prolegomena, for work on intention grammar. The supporting argumentation has been moved out to companion documents.

Large language models (ChatGPT, Bard etc.) provide new impetus for expanded empirical ambitions in linguistic research. Despite Labov, linguistics, responding insufficiently to a big hint (Kučera & Francis, 1967), and Jelinek's throwing down the gauntlet, ("Every time I fire a linguist, the performance of the speech recognizer goes up") ("Frederick Jelinek," 2023), often lags the statistical numeracy revolution now quickly advancing scientific understanding in many fields.

Are there paths to explanatory theories based on extensions of the current working programmatic axioms and architecture of linguistic competence in generative grammar? This seems risky to deny in light of Chomsky's own advertisements for an interface to linguistic intention, with the implication that the generative model can attach to an interface that would otherwise leave syntax lacking inputs (Chomsky, 1995, p. 2,154,201). Furthermore, the generative endeavor is explicitly a program, as opposed to a set of fixed theories, anticipating further significant revisions as have already been introduced. An interface with functional intention has clearly been envisaged by Chomsky but was backgrounded to promote progress on manifold issues of structure and form.

The relation of form to function raised here has been clarified previously. (Newmeyer, 1004). Newmeyer, citing Chomsky extensively, documents Chomsky's openness to a role for functional factors. Any appearance that Chomsky denies functional impetus is a misunderstanding from the methodological necessity initially to divide the complexities of human language so that scientific progress could focus in the domain of structural effects.

To what extent can understanding be increased by venturing beyond the sound-meaning connection to the functional connection from linguistic intention? Might the operational presence of structural intention in generative grammar illuminate further the fundamental significance of such operations as C-Command and Merge? Could linguistic structural intent extend the basic Chomskyan focus on linguistic creativity (unbounded generation from finite means) to a new level of representation useful for explaining and constraining instrumental creativity, the inventive means by which the species-specific features of human language are effected? There exists an empirically evident necessity for the representation of linguistic structural intent which has been generally (if understandingly) postponed in the generative program. This motivates Tool Grammar², in which a sentence is an action wherein intention is the central origin

¹ We recognize that Shakespeare's admonition will apply as much to what might be said here as it is to what has gone before: "There are more things in heaven and earth, (...), than are dreamt of in your philosophy. " Hamlet (1.5.167-8)

² The term "tool grammar" (TG) is intended as a handier nickname for "Instrumental Grammar". Importantly, the term 'tool' is not used in any anthropological, archeological, anti-generativist, or reductionist sense, but only to signify that in the formation of a sentence a speaker has access to an array of devices, lexical and structural, for the purpose of externalizing an intended representation of meaning. Since TG does not derive from the toolkit approach of (Culicover & Jackendoff, 2005) or other proposed systems presented as tool sets we sometimes identify it as Cognitax Tool Grammar.

of generation rather than syntax structure building alone. A sentence intention is a formative set of decisions for external representation of thought by means of highly constrained, conventional, interlocking structures and processes, which we informally refer to as ‘tools’ Each tool is an intentional device for specific effect in the process of utterance generation, distinguished from the traditional concept of a linguistic ‘rule’ by the explicit specification of intent added to the standard structural input and output conditions. The data essential for motivating linguistic descriptions is present in explicit field transcriptions of evident user action and intent and motivates a controlled vocabulary of operators. Tool Grammar (TG) postulates that sentence generation involves linguistic instigative actions with syntax processes operating procedurally, in parallel, conforming to the Chomskyan hypothesis that humans are fundamentally “syntactical animals”. (Searle, June 29, 1972) The crux of resolution for this approach is whether TG can provide additional strong constraints and explanatory power for the definition of human language.

Several specific conceptions of language characterize the TG approach to linguistic analysis:

- While the Generative Program has not always fully pressed the need for clear definitions of the basic units of language, TG defines a sentence as that externalized communication structure which carries the selective representation of meaning resulting from the targeted set of speaker decisions made for the purpose of effecting linguistic intent. This definition orients the sentence to the origin of speaker action rather than interpretation, thereby distinguishing linguistic intent from the wider phenomena of semantic decoding and implication that characterize receptive activities. A language therefore is conceived not so much as a set of sentences that need to be accounted for, but a set of structures considered in the context of active decisions about structure and representation on the part of the speaker.³
- While the Generative Program classically presents a theory of the non-directional syntactic connection between meaning (logical form) and output (e.g. phonological form), (Chomsky, *Sophia Lectures*, 2014). TG proposes to widen the architecture of language competence rather to connect linguistic intentions to output as a directional generative process. This implies an inventory of possible intentions (or intention types) in a connected instigation module. It also defines an adjusted relationship to truth-functional interpretation semantics and the study of implication. For TG, the meanings hearers take from an utterance, which are evidently various and diverse, involve different processing from the speaker’s intentional engagement to represent particular meaning structures. This means that the various interpretations that might or might not be taken from a particular utterance warrant a separate analysis from that of the representation the speaker intended to make. Another consequence of this re-factoring is that an additional source of creativity and recursion is moved outside the purveyance of syntax to the intention module.

³ The development of a formal definition of the word is implicit in the procedures and results of TG but is not elaborated here. Suffice it to characterize a word as a prepackaged structure that is merged into an incrementally expanding hierarchical structure as a speaker makes decisions of representational and structural intent. The means by which words are selected in accordance with pattern matching against internal semantic representation are sufficiently involved and interesting that they deserve separate treatment not undertaken here.

TG holds that language has the external representation of meaning as a purpose and tools as a means of action. Natural constraints on the inter-compatibility of tools are pursued. To render some rules and constraints on configurational syntax unnecessary, in cases where unacceptable sentences reflect an incompatible misapplication of tools. Some swath of linguistic ill-formedness might be attributable to structures involving incompatible intents.

The following examples provide a taste of how the intention of the passive tool can conflict with the intentions of other tools: The passive structure, drawing attention away from the agent, is vulnerable to conflict from a tool centering on the agent.

Al visited the sick woman.

The sick woman was visited by Al.

What was surprising about Al was that he visited the sick woman.

*What was surprising about Al was that the sick woman was visited by Al (him).

We observe here incompatibility between tools in opposition, at cross purposes, to both add and take away special attention to the agent. This is one tip-of-the-iceberg example of many issues, far beyond the simple topic/focus conflict seen here, that can be considered for handling in a straightforward way if intention is represented in linguistic rules. When this approach is for many other areas of syntax, attractive and simplified solutions may emerge for a surprisingly wide range of problems

The goal is to expose where the exclusion of linguistic intention and action from generative rules may have introduced artefactual complexity and precluded the discovery of functional constraints on characterizations of the human faculty of language. The inclusion of intention in linguistic rules both enables new investigations of otherwise intractable problems and promotes the ideal of simpler, more natural and explanatory solutions within the trove of syntactic observational effects uncovered by generativist methodology. Theorizing based on linguistic intent can also encourage more directly empirical argumentation obviating some putative intermediate structures necessitated by exclusively syntactic analysis. TG argumentation, by adding a new dimension of recordable and verifiable data of intention, subject to independent validation, thereby enjoys resistance to the view that it is merely stipulative or reductionist. By accounting for a range of unacceptable sentences in terms of natural limitations on linguistic intent, further understanding is encouraged for how the complexity of human languages can be learned largely in the absence of negative data.

2 Advancing the Generative Program

To evaluate the hypotheses, we select from among difficult and vexing problems in syntactic theory and extend discussion to poetic stylistics in the Jakobsonian tradition (Jakobson & Levi-Strauss, 1962). We seek to present and defend empirically transparent and penetrating mechanisms while tightly constraining the notion of a possible human language. Success can support the primary Chomskyan goals of explaining infinite linguistic creativity from finite resources and rapid child language learning in the context of poverty of stimulus data.

Insofar as syntactic phenomena can be understood to be conditioned by linguistic action/intent descriptors, new straightforward solutions emerge when conflicting intents explain ill-formed sentences. As in all symbolic modeling, when generalizations are sought a less capable level of representation, less unnatural and unnecessarily elaborate solutions unavoidably result. Intention action directives are intended to present facilitative utilitarian resolutions so that a portion of syntax is transformed into functional processes of cognitive mechanics. Syntax is seen as a parallel form of structural cognitive manipulation, and less as an autonomous component. The Chomskyan Weltanschauung and resulting characterizations are retained and revalidated.

TG represents a sub-paradigmatic shift in syntactic theory to the extent it can be integrated to the minimalist program. The concepts of poverty of stimulus, universals, ill-formedness, recursiveness from Merge, interpretation, generative capacity, filtering, biological evolution, and so forth, are refocused in a widened architecture of linguistic competence. New light is shone on how languages are learned so quickly in the absence of this negative data, reflecting also on how constructs such as C-Command and Merge are entwined with linguistic choice. A realistic performative account of how sentences become assembled into hierarchical structures becomes possible.

The TG builds within the generative program, exposing a new level of Chomskyan linguistic creativity, far from aligning with antithetical positions (Tomasello & Ibbotson, 2016), (Everett, 2012), TG aims the direction of research to a new extended sphere.

3 Beyond Large Language Models and Generative Grammar

Despite Labov, linguistics, responding insufficiently to a big hint (Kučera & Francis, 1967), and Jelinek's throwing down the gauntlet, ("Every time I fire a linguist, the performance of the speech recognizer goes up") ("Frederick Jelinek," 2023), often lags the statistical numeracy revolution pervasively advancing scientific understanding in many fields. Chomsky, alone unsupported by comparable scientific insight, has significantly advanced the understanding of language by introducing a computational model with hierarchical structure, recursive formalism, MERGE, and other core elements, but it remains fair that, much like LLMs, Linguistics has no overarching understanding of human language. Each approach has some nominal generative ability, but neither addresses the purpose, intention, or instigation of sentences. Both LLMs and Generative Grammar operate orthogonally to a most basic fact: Language is speakers' doing. Sentences do things at many levels. (to state, declare, disparage, introduce, prevaricate, etc.) linguistics is nowhere yet enough about speaker initiative and doing, despite waymarks from J. L. Austin, John Ross, and Georgia Green (Green, 1996). Somewhere in the meld between linguistics and computation, this gap can be filled.

There are numerous promising projects, for example even in the preservation of dying languages, still awaiting advancement by the use of advanced statistical technology to support speakers productively engaged in the use of words.

3.1 The ChatGPT Challenge in the Foreground

The advent of Large Language Models and ChatGPT, as reflected in e.g. (Piantadosi, 2023), broadly challenges both the underpinnings and results of the generative tradition that has

been central and dominant since the Chomskyan revolution (Chomsky, 1957). The LLM challenge is legitimate and significant. New research, and time, will be required to evaluate its claims, implications and impact.

Chomsky has quickly identified initial nubs of contrast between generative grammar (GG) and LLMs, including:

- LLMs are statistical reductive derivations of text, albeit effective, so are relegated to a role is as transducers of input text to output text, rather than direct implementations of cognitive theory.
- The inability of LLMs to reflect impossible vs. possible human language structures limits their theoretical scope.
- LLMs do not embody the full measure of linguistic creativity which has been the theoretical fulcrum for syntactic productivity in Chomsky's generative grammar.

Basic questions are open, pointing to windows for future research;

- An important differential for ongoing consideration is that LLMs have found a means of integrating, even insinuating, real world knowledge with the grammatical system per the previously unfulfilled necessity that has often been observed for the understanding of human language.
- ChatGPT gives reasonable differentiation among some unacceptable sentences such as "AI said that himself left" and "AI and Sue is happy" Systematic broad evaluation of ill-formedness is needed, as both subjects of query and query inputs. (Haider, 2023)
- Manning and others (Murty et al., 2023) have produced evidence that LLMs implicitly incorporate large elements of the hierarchical structure which has been at the center of generative analysis, but the full scope needs evaluation, together with probes for the generative processes proposed to operate on structures.
- Lacking agency, LLMs currently only traduce without the requirement for additional modules to implement agentive intention as progress is pursued toward general intelligence.
- Lacking agentive agency and independent instigation, it is fundamental and important that ChatGPT includes a crude early processing stage to infer user intention from the prompt text it is provided. This augurs a future in which communicative and linguistic intention become formally parameterized and regulated to control ChatGPT interaction with the outside world. It is predictable that this will be independently necessary to manage the risks and consequences of artificial intelligence.
- In general, there is widespread opportunity for linguistics from amplifying research investigations in its traditional areas of interest by reconciling, advancing, and integrating with the techniques and products of new computational statistical disciplines.

3.2 Wider Potential

Such striking developments from the side, can invite linguistics to seek a fuller potential in its own wider perspectives. There can be major benefit from mini Manhattan-style projects in key areas. Better to extend than only to react and defend.

Neither statistical LLMs nor generative theory address many areas of linguistic potential. Generativism has yielded major advances in the cataloging and documentation of

syntactic effects in widespread contexts, continuing its efforts in perseverative well-worn tracks, without sufficiently expanding the scientific paradigm. Any future contraction in the perceived importance of the discipline could be attributed to unresponsive diminishing returns in generative syntax.

Many syntactic phenomena, such as ergativity, can lead to be epiphenomenal cul-de-sacs and retain a narrowed horizon even as they are researched broadly. (DeLancey, 2005) (Coon et al., 2017) Reductive accounts formulated solely in formalist terms apart from function can result in incomplete scientific explanations. Chomskyan formalist mathematical treatments, where they lack functional perspective, do not satisfactorily address the utility of syntactic processes to effect information processing, linear signal compression, linguistic intent or manifold dimensions of creativity that lie beyond the mathematical productivity of syntax. This limits functional perspective to broad abstract notions of mathematical simplicity in mental infrastructure. Deeper examination of functional purpose, user intent and instrumental creativity is at the core of why structures are as they are, but this has rarely been examined. It is a classic pitfall of symbolic systems to see generalizations and solutions at the wrong level of generalization. Syntax alone, even with projections into semantics, blurs focus on their larger *raison d'être*.

3.3 LLMs as Engineering

LLM's cannot currently innovate new answers to fundamental questions of linguistic science: what is a word, a sentence? Why is language hierarchical? LLMs are narrowly operative and functional, with descriptive components that underly their basic effectiveness, but they are not explanatory of why linguistic systems are the way they are. Scientific discovery in LLMs is sparsely and indirectly addressed (crudely at present) as a byproduct of brute force application engineering which lacks both modular encapsulation and visibility of operational function and purposeful intent.

LLMs derive from machine learning trained on vast amounts of text calculating hundreds of millions of parameters. This enables prediction of the most contextually/conceptually preferable next word from input of previous text. The algorithm uses not just the immediately preceding words but implements an ability to select, score and weight noncontiguous earlier elements to establish worthiness of special attention. This ability to learn from wider context results in a vast number of parameters defined in multidimensional vectors. These incorporate parameterized reflexes of not just syntax and semantics, but also models and attributes of the extralinguistic world, as well as some elements of logic. LLMs go where human linguistic processing goes but without comparative compactness, nor the purposeful effectiveness for which its structures and processes evolved.

Beyond next word prediction, LLMs are further trained on tasks and results that humans prefer by a process of alignment, in which a dataset of preferred outputs to text inputs are marked as preferable by humans. This step layers bespoke parameters into the system in an endeavor to have the software do human bidding. Thus, a limited set of intentions is incorporated into the LLM, which then has the advantage of tracking some human intentions and desirable informative outputs. LLMs explicitly consider human intention at a high level and only at the outset the process of generating a response. This represents only barely a partial simulation of the human language faculty for projecting intentions into linguistic action, and one which generativism has not yet contemplated. In this, there is a call to analytical research overstepping the crude brute force paradigms of LLMs and their promiscuous use of bespoke

parameters, profligate hardware, and obscurant, difficult to understand workings. The human being implements much more powerful human language in a much smaller neural network, leaving the core problems of science beyond the achievements of engineering to date.

3.4 Linguistic Potential

What might be the maximized value of scientific contribution in linguistics? The field has not in practice sufficiently addressed major areas of theoretical potential and social need. Many intellectual and social domains are available for deepening research.

- There are many dimensions of linguistic creativity beyond the syntactic recursion highlighted by Chomsky, including:
 - Lexical creativity by which new words are coined and adopted
 - Instrumental creativity by which languages achieve differences via new and revised grammatical and lexical inventions. Historical and creole linguistics have been productive but there remains much to explore beyond diachronic description, typology, and conditioning/likelihood of structures in the area of how new formations emerge for expressive intentions. This can be enabled by comprehensive maps contrasting how a given thought would be expressed comparatively in languages, and historically, before and after a phase of diachronic change. Research on the means to coverage of an expressible concept space has significant ongoing potential in historical and creole linguistics.
 - Linguistic artistic creativity such as pursued by John Ross (Ross, 2000), almost alone, extending the tradition of Roman Jakobson. (Roman Jakobson, 1987)
- Lack of focused study on the communication channel purposes of linguistic constructions, involving advantages such as management of uncertainty (reflexives), compression (complement control), and signal redundancy for transmission integrity (agreement).
- Effective technology for endangered language preservation
- Scientific understanding of the linguistic word
- Substantial problems of reading and functional illiteracy
- Dysfluency affecting up to 1% of adults permanently and 4% of children transitionally
- Mechanisms of rhetoric, influence, distortion and propaganda
- Theory and mechanisms for detecting/measuring bias using fundamental linguistic parameters underlying political framing. (Lakoff, 2004)
- Nearly all domains of linguistic inquiry can benefit from computational techniques and perspectives.

Each of these areas has benefitted from preliminary work, but much important potential remains, given their centrality in human communication.

Per ChatGPT's ability to somewhat convincingly to rewrite prose in the style of a given artist such as Joyce or Hemingway, LLMs demonstrates competences where linguistics lacks parallel deeply probing science. Linguistics risks being perceived less favorably relative to the practical achievements of artificial intelligence and engineering. Language studies in schools and colleges already show ongoing decline. Linguistics risks being subsumed into the set of humanities disciplines perceived as having value more for human appreciation than scientific rigor. It is fortunate now that LLMs, in the claims and abilities, can force a refocusing to prevent an eclipse of generativist studies.

3.5 Mutual Exclusions

The gulf between LLMs and Chomskyan approaches is huge, with divergence on many dimensions. Discussion has barely begun on what the crux of resolution might be in the progress of science. LLMs are unexpectedly successful as generative response models to input queries, far eclipsing any generative capacities of generative grammar, which was only ever actually generative in the abstract mathematical sense of Chomsky's competence framework. There is irony that the advance in actual generative capability would be both divorced from generative grammar and seemingly anathema to it. Chomsky has reasonable objections to LLMs as scientific theories of cognition, correctly asserting that without explaining forms of language that are not possible there is no understanding what a human competence is. ChatGPT ignores the fundamental scientific methodology of generative grammar data philosophy: the grammatical ear for good and bad. It has yielded new scientific perspectives, but leaves the bigger questions unaddressed.

A likely crux of resolution may lie in the area where both approaches have identical blinders: neither has fundamental orientation to function. LLMs can themselves function in a narrow domain, but do not isolate and expose function or purpose analytically. They are obscure with black box characteristics that preclude direct scientific analysis. Research is needed to penetrate and understand why linguistic units operate, beyond any ability to emulate their operation. Generative syntax itself has eschewed operational function in preference to form and tree-configurational explanations. Chomsky's methodological simplifications relate structures to surrounding context using structural implications, but leave unaddressed functional purposes which are essential to scientific description. The functional insight of MERGE, combining elements to effect predication. Its purpose is to create symbolic complexity in service to conceptual complexity. Chomsky's insight opens the door to how many other aspects of structure are not just happenstance.

Just as an LLM has no idea why the complementizer/infinitive 'to' should exist, but succeeds grandly in placing it properly, so generative grammar addresses the configurational shapes wherein such is engendered, but does not delve what larger extra-syntactic function is served by such patterns.

Anaphora/reflexive forms reduce ambiguity and increase signal integrity at the cost of controlled redundancy. Gender and verb agreement disperse features of sentential elements redundantly across structure to increase transmission accuracy. Complementizers shorten a sentence for efficiency. Compression and redundancy are two mechanisms to explain the functions of human grammars but they are in tension and potential conflict in uninvestigated ways. The study of structural conditions has yielded many generalities that can be explored from a functionalist perspective. Prominent among these are locality and fronting constraints emanating from Ross's early investigations. (Ross, 2014) While investigations swirl in unresolved issues, it is clear that there is functional unity: fronting increases salience, and locality prevents promiscuity of potential reference. LLMs to date reflect little interest in these questions that seem best explored from the acceptability data sets of linguistics. The functional need to preclude resolution of prolific arguments at embedded at structural distance has not been sufficiently explored. Elements at removed distance across multiple embeddings multiply the number of possible references to process in interpretation. Constraints on embedding distance facilitates interpretation. Function appears so many places where only configuration has been the focus.

Processes which bring material toward the front of the sentence give early guidance where a sentence is headed, and what is important. Classic machine learning work enabling transformer technology and LLMs claims: "Attention is all you need." (Vaswani et al., 2023) This is orthogonal to the functional phenomena whereby human syntax systems provide attention cues in the early parts of sentences. Fronted English words orient a sentence function and compress the signal. Other fronting constructions, such as clefting, signal focus, emphasis, or highlighting.

Humans LLMs may or may not have evolved via gradient neurological systems without separable explicit real time representation and operation of linguistic principles and rules. Connectionist systems may incorporate only by inference the range of scientific principles that linguists can infer from data sets. In either case the essential scientific questions of purpose emerge. The knowledge implicit in a system may not be localized within its implementation. The laws of physics are everywhere to be inferred but cannot be found separately instantiated at a particular physical place. Functional explanations may be implicit in LLMs but nowhere explicitly to be found. This leaves important science to linguistics.

LLMs operate, and are trained, only on the fundamental operation of predicting the next word in an emerging sequence of words. Human beings have this ability as evidenced by expectations for ensuing words, necessarily connected to what the speaker is intending and where a sentence is going in relation to purpose. To predict is to follow the trajectory of intention.

LLMs are implemented as neural networks to recapitulate the neural structure of the human brain. This fundamental alignment to biology challenges linguistics to consider that problems of linguistic structure might be increasingly understood in the framework of neural nets.

3.6 Synthesis Beyond Competence

In the process of Merge, wherein abstract elements are set-conjoined into a new one, Chomsky provides a metaphorical interface to all that is new in LLMs. Chomsky would have parameter signals joined just as in a neural net. The neural network of an LLM provides, invertedly, a structurally similar debranching in the neural node, from multiple signals into one. This is an impressionistic observation without a precise physical analog, but the process of constructing a sentence seems increasingly to be a flow through layers that combine incoming signals to produce an output contributing to a larger structure.

Both generative grammar and LLMs have arrived where the study of performance, the actual generation of sentences for purpose, is not to be postponed. A language is not a set of sentences but an activity by a speaker, with intention and purpose. As each word is added to a sentence it enacts its own modicum of intention and purpose. This is implicit in linguistic study, and inherent in the training and productivity of an LLM. Neither linguistics nor machine learning theoretically addresses the essential purposeful nature of linguistic performance. Investigation is required into the purposeful function and intent associated with each linguistic element; each merge is for purpose in effecting the performance of the sentence. Chomsky has provided Merge as a locus for scientific advance. LLMs provide impetus and data for new work. How do the purposeful pieces achieve the intended linguistic action?

3.7 Creativity

Chomsky founded much of generative grammar's computational underpinnings on one facet of creativity: infinite use of finite means in symbolic syntactic computation. This initial foray invites continuing investigation into many other dimensions of linguistic creativity. This is a fulcrum topic for linguistic theory because humans have creativity in multiple ways that LLMs don't, e.g. in the ability to forge new grammatical forms or evolve new dialects and languages. LLMs may have the ability to fabricate poems, imitate style and tell jokes, and can be aligned per constraints, but they are not able, from Paz or Neruda, for example, to initiate a new poetic tradition other than by combinations from what it has seen before. LLMs depend on existing text for their models and outputs and reflect its content and limitations, bounded by its historical creativity. There is nothing here compared to full human creativity. It's newness is a form of recapitulation creativity always implicit in what has gone before, a reformulated creativity of what was created before. AI input will result in AI output that is circular and overfitted to its own presuppositions. What appears creative and new is only the illusion created by elements combined that humans had never put together. There is no artificial general intelligence in a transducer. LLMs cannot address manifestations of the real world, except by the intermediations representations by humans. There is no LLM mechanism to establish a new word, or propose a new grammatical convention; these relate to social properties and an LLM is not in a society. Many dimensions of creativity are missing. The creativity by LLMs is constrained by its mediation through human beings, until the advent of artificial general intelligence.

3.8 Conclusions

Science is doomed to diminishing relevance or inevitable obscurity unless it ranges to new territory, both in the inner depths and outer possibilities. Linguistics can backslide in resistance to new discoveries. As in Chomsky's path to prominence, new science often comes from combining two previously unconnected fields as he combined human language study with mathematical computation. Now computation itself can substantially engulf linguistics via the full engineering potential generative grammar never embarked on. ChatGPT mines the linguistic potential embedded in the parameters of each word and those statistically selected in its context. (Wolfram, 2023) Linguistics can be left passively pondering what's next, not sufficiently active itself in advancing major innovations. The LLM has appeared, and linguistics might conceivably be appropriated by it to some large extent. Science abhors finalization. For a hermetic linguistics, there could remain only a faint hailing to sentimental entrenchment, offering romantic tributes in the spirit of humanities to the glories of human language while others extend it with technology and pursue innovative new theories.

The scientific potential of linguistics can recede for want of a renewed Chomskyan spirit of exploration. For too long, almost alone, he has advanced step function new approaches. His concentrated focus on form over function has yielded massive results. Legions of Chomskyan applicationists now mainly pursue the humanist endeavor to discover and systematically interconnect vast ranges of beautiful patterns of linguistic construction. Linguistics has accumulated a plethora of linguistic effects, almost entirely lacking sufficient functional explanation. Almost in an irony of history, rebellion against the discovery procedures of the structuralists has led to discovery procedures par excellence, through the comparison of acceptable and unacceptable sentences, and the contrivances of generative interconnections. Rebellion against discovery procedures has provided a new discovery regime which has yielded a vast mine of linguistic pattern observations. These are left without explanation of purpose, both by generative grammar and LLMs. Chomsky is to be credited with radical innovation leading to

this treasure of linguistic effects that can now nurture investigations of structural purpose in order to scientifically reconcile with the phenomena of LLMs.

Linguistics has some scant beginnings to fully understand human language, and LLMs promise so far only a little help with the big questions.

4 Background to Intention as Linguistic Action

Architectural work on large symbolic systems frequently leads to the observation that undue complexity arises when there is an attempt to capture and express regularities at the wrong level of generalization, i.e. where natural conditioning properties are inexplicit or unexpressed. A primary thesis of TG is that there can be excessive idiosyncratically contrived complexity and some resulting instability in theories of syntactic competence when generalizations have been sought apart from the factors that condition them. This implies that superior solutions might be achieved at a different level of representation. The vast syntactic literature seeking explanations for which sentences of a language may or may not be acceptable can be reviewed for potential reanalysis as functional fundamental reasons for linguistic structure formation are examined in detail. Some syntactic complexity might be reduced in a utilitarian context to more cognitive mechanics of a utilitarian kind. TG explores the world of syntax with a mindset of cognitive functional mechanics in a widened model of speaker ability and activity.

The origin of the present works goes back to discussions with an anthropologist finely attuned to the linguistic actions of a native language. As she gathered material and made progress on the phonology, morphology, lexicography, etc. of the language she was so carefully archiving, it seemed a gaping insufficiency that linguistics could not offer elicitation field tools for the vocabulary of social life actions that interested her. As an anthropologist she was so very often aware of what speakers were intending. Linguistics offered methodologies for phonetic transcription, phonemic discovery and transcription, morphological analysis, syntactic description, and promising scientific frameworks for theory, but there has been scant tradition for recording or analyzing the full inventory of intentional linguistic actions that are so obviously carried out in the process of speaking. This stands in stark contrast with the myriad expressions available in every language to characterize what a speaker is doing with words. Elicitation of semantic detail can be difficult, yet every field linguist asking what something means has likely known the experience of hearing rather than what the speaker is doing or intending to do when words are used. Why did the speaker say “Merde”? S/he was trying to inject good spirit as a challenge is faced. This is clearly not the “meaning” of ‘merde’, idiomatic or otherwise, but the intended action. This suggests an action dimension of ‘semantics’ which is closer to the surface origination and intention. This is easier to elicit and describe than the intricacies derived after the fact of utterance about possible receptive interpretation in a truth-functional model theoretic semantics framework. TG assumes the validity of a particular methodology: when a linguist elicits or records data s/he could well write down an answer to the question what a speaker is doing when a certain form is used. What is the action? A codified and validated system of descriptive terms is needed.

TG adopts the idea that elements of language are to be understood as having functional purpose as with any tool. Elements of this idea have existed in linguistics for some time, generally involving the analysis of a relatively limited set of abstract functional concepts such as focus, theme, {fore|back}ground etc. TG is distinguished by positing a rich, elaborated vocabulary of functional intentions at the controlling core of syntax, offering functional concepts/categories to

explain linguistic structure. We advert to tangential prior work by a wide range of researchers, including Halliday's systemic functional approach (Halliday, 2004), lexical functional grammar (Bresnan, 2001), the psychomechanics and psychosystematics of Gustave Guillaume, Walter Hirtle and John Hewson (Hirtle) (Hewson), cognitive linguistics of e.g. Wallace Chafe, , George Lakoff, and Leonard Talmy (Lakoff) (Talmy), construction grammar of e.g. Charles Fillmore George Lakoff, Goldberg, and Ronald Langacker (LANGACKER, 1986) (Langacker, 1999), [André Martinet](#)'s Functional Syntax: (Langue et Fonction, Paris : Denoël, 1969, ©1962, Studies in Functional Syntax, München, Wilhelm Fink Verlag, 1975, Syntaxe générale, 1985, Fonction et dynamique des langues, Paris, Armand Colin, 1989.), the Prague School, and so forth. A goal of TG is compatible with, and benefits from, elements of each of these traditions and distinguishes itself by extending the role of intention to a much greater degree and in much greater resolution than previously proposed. TG has potential to help funnel diverse elements of various theories toward a unified, inter-compatible linguistic framework.

Numerous authors connect syntax to external components. Some have shown overlap between the syntactic and pragmatic components of linguistic competence, e.g. (Chierchia, Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface, 2004) (Horn, 2000), etc. Looming large, with paradigmatic advances in linguistic understanding, the field of inferential interpretive semantics has advanced the generative program in major ways. TG is neither inferential semantics nor pragmatics but a complementary set of separate representations marking linguistic structural intent.⁴ An interesting question is the extent to which operators of TG have the potential to simplify, to regulate, or to interact with those of pragmatics and interpretive semantics; there must certainly be connections.

5 Pietroski

TG conforms to a view of sentence generation that has emerged in the literature of philosophical linguistics, as led and exemplified by Paul Pietroski. While we adhere to different lines of approach, Pietroski provides discussion of a number of important theses which open many of the questions TG raises:

- Verbs and nouns can be associated with instructions how to access combinable concepts that are formed into conjoined larger concepts.
- It is implausible that the theory of semantics be exclusively limited to truth-conditional semantics in the sense of functions involving “satisfaction conditions” on truth and reference.
- Theories of conceptual construction may involve conjunction of monadic concepts to produce derived monadic concepts in a way that suggests conceptual structures tend more to the binary than directly to higher orders of adicity.
- The central role of syntax may be to enable instructions access or put constructs into a format that allows to be conjoined to create larger concepts.
- If one extends the model of concept combination looking for an analog in grammatical combination by the inclusion of a concept of construct labelling, there emerges an

⁴ Investigations of the evident interactions among tool grammar, semantics and pragmatics best awaits preliminary exploration of the former.

understanding for the existence of grammatical types.

These can all be cast structural intentions of an abstract nature. Tool grammar sets out to enumerate an inventory of more and less abstract named instructions for the formation of grammatical structures.

6 Relationship to Speech Act Research

TG is distinct from, but conceptually compatible with, the large body of work on speech acts which itself builds on earlier work in the philosophy of language. (Krifka, April 9, 2004) A delineation of levels separating thought from action, for example, is clear from the following excerpt describing the two-world hypothesis of semantics and pragmatics:

Frege, Wittgenstein of Tractatus, Stenius suggest that there are two distinct worlds:

World of Thoughts

Thoughts can be true or false, given a state of affairs. Thoughts can be composed of other thoughts, using truth-functional operators like conjunction, negation, conditionals. The truth-conditions of a complex thought can be reduced to the truth-conditions of the constituent thoughts (compositionality). Basic notions: Worlds/Situations, truth values, reference (types s, t, e). This is the world of Semantics

World of Acts

In communication, speakers use thoughts to perform actions with social consequences. They claim that thoughts are true, they question others to find out whether thoughts are true, they order others to make thoughts true, they commit speakers to make thoughts true, they express amazement that thoughts are true, etc. They may be complex, e.g. telling a story, putting forward a complex argument. These are the speech acts of speech act theory, cf. Austin (1962), Searle (1969). They are investigated in Pragmatics

There is a clear delineation between the actions of TG and speech act analysis as it has been traditionally studied in philosophy and linguistics. TG is concerned with expressive linguistic actions that determine the structuring of particular sentences. This contrasts with traditional speech act theory which functions more broadly at a higher level, processing information relevant to social linguistic interaction and calculating which inferences might be made. Just as intention may feed structure formation, pragmatics may feed intention. Previous work on speech act domains such as performatives, illocutionary acts and so forth begs for inquiry on this interaction. Krifka (Krifka, 2014)(p. 3), for example, discusses speech acts, as communicative acts, as moves in a game a la Wittgenstein, and as varieties of proposition, but does not address syntactic formation so generally. The total speech act perspective over-floods any specific set of subtypes or delineations and is rich and deep with many facets and dimensions. TG asks whether a more integrative model is to be preferred, based on sentence instigation by intent actions.

7 Variations on Chomsky's Galilean Challenge

A version of this section is published as (Smith L. , On Tool Grammar, 2017).

8 Goals and Criteria for Evaluation

Science abhors finalization. Every theory at every stage of science, can exhibit a set of advantages and advances as well as a set of limitations. The well-known advantages of Chomsky's radical innovation via generative theories of syntax have been extensive, plainly vast, having led to stunning advances in the understanding of human language following introduction of the generative program in 1957 (Chomsky, Syntactic Structures, 1957) and continuing through and beyond the pursuits of the minimalist program. These are sufficiently well-known that they need not be referenced and recited here.

Similarly, per Chomsky himself, it pays to explore beyond current conventional understanding to identify limitations which might be addressed. Chomsky has often paid service to the notion of intention, leaving it somewhat lurking in the background as the problem of syntax was strategically reduced to manageable dimensions leading to historic scientific advances. Language is now understood as involving computational symbolic phenomena and theory is finding its place in biological evolution.

To guide our exploration, here is a list of proposed limitations, representative of aspirational goals for syntactic theory, which can be used as criteria to evaluate the advantages of the proposal to attach specifications of intent to the analysis of syntactic formations:

8.1 Empirical Limitation

Speakers and psycholinguists have verifiable access to the reasons for which speakers utilize a syntactic formation. These are available for exploitation as inputs to theoretical syntactic processes since they can be duefully transcribed from contextual observation and validated with psycholinguistic methods.

8.2 Psychological Reality

It is an evident limitation for comprehensive modeling of cognition to have no direct inputs to syntactic generation; psychological reality is enhanced by providing the intentional inputs that evidently underly sentence generation.

8.3 Overgeneration

Lacking inputs, syntactic generation has seemingly necessary recourse to overgeneration of syntactic candidates prior to later stage culling of impossible utterances using interpretive, pragmatic, semantic, etc. means. Alternatively, early steps in generation can preclude and thwart bad sentences where conflicting intents identify them as non-starters, thus curtailing a flood of non-productive generation.

8.4 Simplicity

Insofar as rational intents underly speaker generation, simple rules of compatible combination can avoid complex or contrived analyses depending exclusively on configurational structure and context. In symbolic systems, unnecessary complexity and ad hoc formulation frequently results when phenomena are addressed at the wrong level of generalization lacking pertinent fundamental information.

8.5 Modularization of Cognitive Models

Neighboring disciplines of human cognition are limited in the ability to model cognitive flow and interaction when presented with a component having no immediate psychological interface.

8.6 Scientific Definitions

Theoretical Syntax generally lacks but reasonably aspires to complete definitions for its formational structures. Many well-studied constructs such as Passive, Dative Shift, etc., are well characterized as patterns, configurations, and relationships, but without specifically defining what they are in terms of purpose, function and intent. Even a term such as 'subject' resists definition. As with any tool, it is necessary, in order to characterize in properly, to specify how and why and when it is used.

8.7 Creativity

Beyond Chomskyan syntactic creativity, discoveries based on intention extend into a wider spectrum of types, as for example to instrumental creativity by individuals and groups observed creating new formations for linguistic expression.

8.8 Interdisciplinary Connection

Transcription of linguistic intent encourages (re)connecting with the anthropological perspective on language, which was so fruitful in earlier periods of linguistic science. So also for openings to sociological theory, and better understanding of diachronic language change.

8.9 Interpretation

In syntax-centric models (operationally if not epistemically) semantics is cast as an interpretive process downstream from syntactic configuration, but the hearer interprets from what the speaker intends, so a particularly natural generative role for semantics is not retrospective, but formational intention.

8.10 Early Modularization

While formalization promotes testability, the manifold powers of symbolic representation allow opportunities for superficial artifice, attractively compatible with surface data patterns but insufficiently integrated into larger processes of cognition. Prematurely modularized solutions force choices which may be undermotivated in the context of the amplified data of intent.

8.11 Directness of Explanation

To any extent that complex and indirectly inferred intermediate apparatus can be eliminated from linguistic explanation, while accounting more directly for the same observations, the resulting theories can be enhanced. It is a limitation when theoretical explanation is less direct, transparent, natural, or cognitively realistic.

8.12 Lack of Alternatives

Whenever a phenomenon can be explained by recourse to speaker linguistic intent, but not conceivably or convincingly in terms of syntactic configurational structure, it points to the limitations of syntax without specification of intent.

8.13 Stylistic Mechanisms

To any extent that the effectiveness and impact of stylistic usage cannot be understood in configurational terms, an opening is provided for the benefits of considering the facts of structural intent.

The upshot from this list, and the launching point for this paper, is the observation that Chomsky himself often presciently referenced linguistic intention for consideration as a module of symbolic action. Here we ask whether it is now opportune to incorporate intention into the theory of syntax. For the arguments we present below, we propose that these goals and criteria will be useful for evaluating evidence for the adoption of our thesis. To the extent any of them is met in the arguments that follow we invite the reader to consider that support has been adduced for our general thesis.

9 Ill-Formedness and a Working Methodology

If language is viewed as engaging the application of a set of tools, ill-formedness, in all its variation, might result from picking the wrong tool for the intended task, or combining incompatible tools, or not having the prerequisites for some tool. In general, unacceptable sentences of the variety examined in theoretical syntax. Syntactic theory may be overburdened by the goal of explaining all the sorts of ill-formedness documented in the literature. (Ross J. R., Haj Ross's papers on syntax, poetics, and selected short subjects, 2014) We question whether there are so many manners of ill-formedness because there are many tools in a language each potentially with a set of mutually exclusive natural restrictions on their use. Relief for this situation might be found where some ungrammatical sentences might be likened to trying to paddle an elevator or forcing square pegs into round holes, or where there is no hole at all. Incompatibility of tools may provide new resources for the explanation of patterns of unacceptability

Since we claim that intended structural action can be transcribed, and is at the core of the language faculty, an operative question arises whether a set of problems which have been considered unresolved, controversial, or even intractable might succumb more easily when the fundamental actions of language are factored in.

The approach will be to analyze selected problems and key data from the following sources, with emphasis on central or difficult problems:

- Standard textbooks in generative grammar

- Well documented unresolved problems and issues

- Specific works documenting areas where generative grammar is incapable

- Problems of metaphor, stylistics, and poetics which in their finesse can be regarded as quality control on syntactic theory

In the investigation below, we hope to discover strong constraints on the limits of human language through the interaction of the intentional and syntactic components

10 Specific Objectives and Scope

A full exploration of the relationship between linguistic intention and expressed linguistic realizations is a vast project so we must begin by limiting the scope of initial work. Our purpose

here is initially somewhat negative insofar as we aim to show that there can be alternative explanations for unacceptable sentences previously attributed only to configurational structure. Many recombinant structures, which may look syntactically possible, may not, instead, ever be of a nature ever to be preconceived due to cognitive constraints. A functional view of structure conceives certain linguistic elements as functional using a limited range of operational concepts such as theme, focus, background, and so forth. We envisage a larger framework where the role of functional intent is massively elaborated to provide operational workings that support and pervade the manifestations of syntax in a more encompassing way in the pursuit of more powerful constraints on universals.

We advert to the challenge of integrating a creative recursive syntactic system with cognitive creative linguistic intention. Modeling an actual speaker precludes minimal revision by adding an interpretive intention action interface to the syntactic component but puts it rather at the instigative center of sentence generation. We limit our goals to advocating for the feasibility and advantages of such an approach.

We envisage work toward a model of linguistic competence which lends itself to incorporation in active computational models that generate and interpret sentences anticipating a day when there may be practical engineering solutions emerging from syntactic theory. We intend, by flowing from structural intention to syntactic output, to encourage a view of syntax which might eventually be incorporated in engineered solutions for natural language problems more with the capabilities of real understanding than the pattern matching advances evident today. We anticipate a possibility of machine learning algorithms attempting automatically to mediate between specifications of linguistic intent and surface syntactic structures with the possibility of reversible analysis.

The objective is programmatic and exploratory with limited goals. The objective is to show that structural decision actions can contribute to an explanation of linguistic patterning.

There is a wide range of deeply studied syntactic phenomena to be examined from the perspective of linguistic action intents. We do not here exclude autonomous syntactic solutions but merely open the door to explanations from intention.

We do not address issues of semantic analysis or semantic theory beyond the narrow and functionally restricted domain implicit in the tool grammar concept. The specification of linguistic structural intent has a qualified semantic nature but is limited to actions affecting structural choices and excludes issues of interpretation, compositionality, implication, inference, possible worlds, as well as the wider spectrum of linguistic truth-functional semantics as a general discipline. Notably, we do not propose that the full specification of received or implied meaning of a sentence instigates syntactic structures as in the earlier tradition of generative semantics. One very limited tranche of intention information is associated with linguistic choice, leaving issues of interpretation apart for separate study. Where work on generative semantics was challenged for not providing sufficient constraints on universal grammar, our hypothesis is that the theoretical use structural intention conversely opens the possibility for a stronger level of universal constraints. Generative semantics derives syntax from meaning; TG derives structure from intentions that result in selections of lexical items and constructions

Finally, many syntactic phenomena can be analyzed either as alternative related structures introduced into an utterance as a formational process, or as a basic pre-compiled lexical structure which is optionally transformed to an alternate form by a transformational rule. We do not in the present work undertake a comparison of the differences between lexical/prepackaged and derivational patternings, that is, between alternative formative constructions and options in the dynamic process of construction. For this reason we refer to the constructions involved in such alternations using the non-committal term '(trans)formation'.

11 Actionemes as Pseudo-Code

We introduce *actionemes* as pseudocode clusters of properties that represent linguistic action intent. We present hypotheses about linguistic actions using dollar sign actioneme symbols such as '\$insertReflexive' which are intended to be self-explanatory. These represent rough preliminary hypotheses aiming eventually toward a standard vocabulary of linguistic action intents. They are a form of informal pseudo-code for convenience but call eventually for an inventory of explicit, more rigorous elements and forms. Their purpose is to engage higher level questions of structure, process and organization without falling into distracting questions at a lower level of generalization. Pseudo-code shorthand is borrowed from computer architecture where it is useful for preliminary analysis of procedural processes prior to formalization into machine executable form.

Looking forward there is the possibility of a form of feature representation (e.g. \$inquireJudgment [+inquire, +judgment]) or of embeddable function representation. (e.g. inquire(judgment())), and mixed representations are possible. Embedded functions imply a tree representation, begging the question, which we leave open, whether representation of action intentions fits naturally into the merged tree structures that result from lexical selection and assembly into increasingly larger units. Whatever the form our hypothesis is that constraints on cognitive compatibility among linguistic tools can be formulated as patterns of actioneme feature or function complexes, and that these can be integrated into the larger matrix of a linguistic theory. Our current purpose is to advocate for the general approach so issues of formalization are not here addressed.

12 Intent Transcriptions and Their Use

There is an essential tradition of transcription in linguistics. Linguists record data to systematically reflect structure in phonetics, phonology, morphology, syntax, semantics, etc. But what of the particular purposes of the uses of language structures? Structural intention is the glue that connects what the speaker is trying to do to form yet it is not transcribed.

Linguistic intention is not directly observable and must be inferred but is clearly accessible to

the speaker and indirectly accessible to the field worker asking the right questions. Anthropologists, just as some linguists, and many linguistic consultants readily discover underlying linguistic intent. There seems no insurmountable barrier to its transcription so that it may become an integral part of the analysis of syntactic phenomena .

It is crucially indicative that human languages already have built-in vocabulary for expressing what one speaker posits another is doing in the course of language use. These expressions are a valuable basis of preliminary action transcription because they emanate from inside the system we would like to study. Users interpret linguistic intentions and report them using vocabulary already in the language.

We propose to begin by extracting from everyday language terms that describe what some speaker is doing, or intending, or trying to do, in using a particular linguistic construction. We draw upon this innate natural vocabulary to widen the scope of the study of grammar.

Tool Grammar is facilitated by the observation that natural languages include numerous terms to describe linguistic actions (*assert, deny, ask, tell, etc.*), so there is reason to believe that external observations about action intents cannot be refined to a form of scientifically valuable data for theorizing about the processes underlying language behavior. Language itself provides initial metadata about language which can afford a basis for developing a closed, controlled scientific . The TG framework includes assumes that those competent in a language are able to ascertain intents underlying linguistic utterances, albeit in a naïve, unformalized form, that, for linguistic analysis, ultimately will require ongoing development in a standard scientific process of empirical rectification

TG views meaning as being projected by intention, so data collection may go beyond asking what forms mean and what can be said. The operative question is what the speaker seeks to achieve by using a form. The TG view of intention and meaning is operational. What, for illustration, is the declarative meaning of ‘even’ There may be no answer prior to asking what speakers are observed to be doing when using this item in specific circumstances. Speakers are aware of linguistic actions at all levels of structure, and are able to express and refer to these routinely, albeit in crude and raw form. A single sentence or any of its units may, and characteristically does, involve a multiplicity of actions and subjects are not in general at a loss for vocabulary to describe them.

TG can rely on elicitation techniques such as the following, which are well-known to field linguists in any case:

- 1) What was the speaker doing when s/he used that element?
- 2) Why is that element there?
- 3) What’s missing if you take that element out?
- 4) Can you say something to show me how you would use that element in a different context?
- 5) If you took that element out what could you put in there that would do about the same thing? What are the differences?

To bootstrap this general idea of transcribing linguistic actions, it is instructive to reflect on at the

many everyday words that describe linguistic actions. The English for vocabulary describing language actions is extensive:

Adoption of intent descriptors in the field has the benefit of reflecting concrete interpretations of actual participants. Much work is required to fully inventory, categorize, interpret and codify intent descriptors. As a stopgap we currently only illustrate transcription of intention in an informal and exploratory way. Even with this informality, transcriptions are empirically verifiable. Inquiry and experiments can determine and validate when and whether particular transcriptions have been accurately imposed on data.

There has been a recent focus on field methods for semantic and pragmatic research and regular coverage in conferences, including Semantics of Under-Represented Languages in the Americas (SULA). (Matthewson, 2004) (Gibson, 2010) (Sprouse, 2012) These areas of methodological interest are important and can be extended for recording linguistic actions in syntactic and general studies as well.

In summary, speakers typically do multiple things at once when they utter a sentence, and it is valuable for the linguist explicitly to record these individually. There are two primary types of investigation in field explorations:

Generalization: Generally, what is the speaker doing when s/he uses a particular form or structure X?

Scenarios: Given an element X, what would typically be going on when a speaker uses X and what would a speaker be doing by the use of X in that context.

Directing field work toward the discussion of scenarios and situations, as advocated, in recent studies, enables more specific descriptions of what is being done with each formation. Such work might be expected to delight anthropologists and further connect their interests with those of linguists.

13 Some Historical Antecedents to Intention Grammar

In and from (Austin, 1975) there has been extensive work on the pragmatic and related aspects of language via linguistic use groupings such as locutions, illocutions, perlocutions, performative

verbs, illocutionary acts⁵, and so forth.⁶ Classical work into the pragmatic effects on syntax includes (Searle J. , 1979), which gives a taxonomy of pragmatic types, examples and analysis of verbal classes, and specific discussion of effects on syntax. In early generative studies there was interest in pursuing concrete derivational relationships between verbs of linguistic action and other aspects of syntactic study. John Ross pursued a performative verb hypothesis (Ross J. , On declarative sentences, 1970) that would have a verb like 'say' underlying indicative sentences. The mainstream of the generative enterprise veered quickly away a generative semantics locus for abstract action verbs (involving syntactic decomposition of lexical items and other abstract devices).

Later traditions of generative work constructing purely syntactic solutions have indirectly provided evidence for what we understand as actionemes. An example of this is Landau's postulation of underlying locative elements for experiential verbs (Landau, The Locative Syntax of Experiencers, 2010), which in our terms would be recast as an action intent (actioneme e.g. \$assertLocative). This example illustrates a body of work pointing in the direction of tool grammar analysis short of any proposal to orient linguistic syntax itself to structural action intention.

This initial scaffolding is seminal, but does not begin to reach to the large universe of diverse language actions that are evidently at work in the full spectrum of language constructions, nor does it attempt a systematic or comprehensive means for construction solutions using them.⁷

The European functionalists proposed that pragmatics and semantics underlie syntax. (Dik, 1981) Although there are sufficient differences to make a full contrast with his theories of secondary interest, the role of intention as the initiator of linguistic events appears in Dik's work. (Dik, 1981) (p.8). Dik does not identify a level of linguistic action or elaborate a level of linguistic intention so distinctly or with the functional load for the generation of syntax as we propose here. Nor does he relegate the generation of linguistic intention, the anticipation of addressee interpretation, or addressee interpretation definitively to a higher cognitive domain. He views them more as intertwined in general with syntactic processes than as separate higher cognitive function associated with sentence initiation. Tools versus Rules
A tool is not equivalent to a linguistic rule. It encompasses more and serves a different purpose.

⁵ (Sadock, Speech Acts, 2004) summarizes Austin's rough-out of illocutionary types

1. VERDICTIVES: acts that consist of delivering a finding, e.g., acquit, hold (as a matter of law), read something as, etc.
2. EXERCITIVES: acts of giving a decision for or against a course of action, e.g., appoint, dismiss, order, sentence, etc.
3. COMMISSIVES: acts whose point is to commit the speaker to a course of action, e.g., contract, give one's word, declare one's intention, etc.
4. BEHABITIVES: expressions of attitudes toward the conduct, fortunes or attitudes of others, e.g., apologize, thank, congratulate, welcome, etc.
5. EXPOSITIVES: acts of expounding of views, conducting of arguments, and clarifying, e.g., deny, inform, concede, refer, etc.

⁶See (Sadock, Speech Acts, 2004) for an overview.

⁷A useful and far -ranging treatment that maintains the formal separation of pragmatics from syntax also includes analysis of reflexives and other phenomena used to show interaction effects and some operational intermingling. (Ariel, 2008)

A rule is a productive regularity observed by a linguist. It can be a generalization or a requirement or a tendency but it is not intended to purposefully be used by a speaker to extrude a communication structure. A rule is for the theorist describing an observable pattern, a tool is for use by a speaker with an intention trying to accomplish something. A linguistic tool is used to craft a communication structure, which is an assembly of intentions represented in their particular forms. A set of sentences can be described statically or be abstractly generated by rules, but these auto-generated sentences do not serve a utilitarian purpose. Tools, in contrast, are wielded to specific effect. As the product of tools, sentences are inherently useful, whereas a purposeless generation of a syntactic structure is not.

We posit two fundamental types of linguistic tools: lexical and (trans)formational.⁸ A user constructing a sentence amalgamates a complex of intentions by selecting and assembling lexical items (via Merge). Lexical items are merged into integrated structures according to constraints of phrase structure and phrase merging. As lexical items become merged they form intermediate configurations which become eligible for (trans)formation. Transformations are linguistic tools that reflect the intention to configure or modify the communication in a particular manner for particular effect, stylistics in the widest possible sense. They take syntactic structures in configurational syntactic complexes as input and generate modified configurational syntactic complexes as output, but always with some stylistic or other ancillary/informational intent.

To recited well-known practices, a rule is characterized as a familiar schema with two basic parts: structural requirements and structural effects

RULE

Structural input requirements

Structural output effects including optional introduction of new material
(Extraneous parameters)

The structural requirements specify the conditions for applicability. The structural effects specify the modifications on input structure when the rule applies. Any third part records extraneous parameters of applicability as required by a particular theory. A rule may be characterized as 'optional', or can be selected as 'active' or ordered among a collection of universally available rules and conditioning effects which may or may not be activated in a particular language Any number of ancillary parameters can be considered although specificity weakens theory.

A tool, in contrast, can be specified with these same parts, but including, crucially, an additional part to specify utilitarian intent.

Tool Schema

Utilitarian intent

Structural input requirements

Structural output effects including optional introduction of new material

⁸ An alternative view of grammar would create the respective constructions independently without the intervention of transformation mechanisms. We do not consider this possibility here.

(Extraneous parameters)

To illustrate the difference in a preliminary and casual manner, consider one simplified case of adding a lexical item and effecting a (trans)formation. We illustrate Merge with a simple English perfect construction. A user chooses to insert a perfective morpheme to communicate that an event is completed. There is an input requirement that there be an event of continuance instantiated in a verb. New material is specified. The effect of the tool is to merge the new material, the perfective marker, into the input structure.

Perfective Tool:⁹

Intent: \$assertCompleted

Input requirement: verb of continuance: “He eats”

New material: ‘have + en’

Output effect: merge perfective marker: “He has eaten”

This process illustrates a possible integration with Minimalism’s Merge.

Now, consider the operation of a classic stylistic (trans)formation.

Passive Tool:

Intent: \$ bringPatientIntoAgencyEventFocusFrontToSalientPosition

Input requirement: verb plus object: “He eats the cake”

New material: ‘be + en’ (‘by_’)

Output effect: The cake is eaten by him.

Move object to front, subject to by-phrase, Merge passive marker: “The cake is eaten by him” Note: This structure might alternatively be analyzed as a lexical choice involving no transformational restructuring.

This illustrates basic commonality with the generative program, grafting on a role for intention.

The main difference from standard generative grammar is that TG inclines to natural utilitarian processes as part of the human endowment for problem solving and cultural furtherance with tools. The linguistic mind is projected as not so abstractly foreign to the conscious utilitarian human mind. Rationales for tools may be recognizable and understandable as intuitive inventions. Linguistic rules may have originated as some inventor’s novel idea at some point prior to adoption by a community, for which they must be understandable with regard to motivation and intended effect. The importance of human creativity is here amplified well beyond any simplified setting of parameters (Chomsky, *The minimalist program*, 1995).

The crucial analytical difference between a rule and a tool is that the latter specifies intent using vocabulary of linguistic intent descriptors. We anticipate these can be conventionalized over time from linguistic fieldwork in order to develop a putative universally available set, even while the structures realized from them can be differentiated and diverse. For the purposes of TG, the original ‘meaning’ of intent is circumscribed as a series of functional and purposeful steps taken

⁹ Operations are not formalized where we intend only to illustrate high level concepts.

to enact a plan for desired effects. These are able to be observed and captured by the field linguist undertaking the analysis of language.

14 Grammar, Meaning and Sentence Construction

Since TG would motivate syntactic rules using action directives of intent, the question naturally arises as to the fundamental distinction between grammar and meaning. Chomsky's original bifurcation usefully distinguishes types of ill-formedness that intuitively seem either structural or semantic: (Chomsky, *Syntactic Structures*, 1957) p. 15

- (1) *Colorless green ideas sleep furiously.
- (1) *Furiously sleep ideas green colorless.

Whereas the first of these is viewed as grammatically correct but semantically amiss, the second lacks even grammatical well-formedness. TG leads to a natural expression of the grammar vs. semantics distinction based on the proposal that lexical selection and syntactic structures are complementary tools for representing configurations of thoughts:

Semantic ill-formedness results from the selection of incompatible ideas in the formation of an utterance.

Grammatical ill-formedness results from the use of functionally incompatible tools in building structures for external linguistic representation

In the first example above, green is a color, ideas cannot sleep at all, let alone furiously, putting the ideas at odds. In the second less than optimal example, assuming no expressive license, commas, or the like, , the tools have requirements which are not met:

- 'sleep' has high expectation of predication for a noun
- 'furiously' is a tool designed to modify a verb
- 'ideas' is a tool designed to fill a slot/predication calling for a noun
- 'green', 'colorless' are tools designed to fill slots modifying a noun

This original pair of examples was used to make a particular point, which is not the same as our concern here, so the contrast is not so targeted for our purposes. It combines elements of semantic and grammatical conflict and is also subject to various expressive and stylistic interpretations rendering them more acceptable. A better example for our purposes illustrates the point more directly:

- (2) *In sleeps the.

The inclusion of structural action in the formulation of rules as tools enables a clear distinction between sense, which concerns ideas, and grammar, which concerns representational structures. There are two types of linguistic tools: lexical insertion and structural formation. Lexical tools

are designed to map configurations of ideas to a conventionalized word structure. They bring with them, by virtue of operating on ideas, constraints on the selection of other words. Structural, or (trans)formational tools elaborate structure and determine the chosen form of for presentation in the external medium. Because there are two types of tools¹⁰ there are three main types of grammatical ill-formedness depending on whether a conflict is

- lexical-lexical (e.g. subcategorization) e.g. *In sleeps the.
- structural-structural (formational conflict) e.g. *It was a watch to my brother that I gave.
- lexical-structural (e.g. government). e.g. *I wonder you are meeting?

The program of TG is to illustrate and defend these three types.

It is useful to lay out what a linguistic utterance is in TG terms, and to clarify the relationship to semantics. TG holds that there is a higher context of cognitive ideation from which an utterance emanates, but it does not directly abide in the output linguistic utterance, which includes only signals reflecting incompletely the full intention of the speaker. The hearer is left to interpret the intention of the speaker from the signals in a generative act distinct from utterance creation.

A linguistic utterance is conceived as action directives selected in a higher pre-linguistic cognitive component There are two types of action directives from which an utterance is formed:

- A selection of lexical items, which are pre-packaged objects of expression with semantic affinities deemed sufficient (pattern) matches for the ideas to be represented.
- A set of formational tools, which are directives determining various aspects of utterance structure. Each is associated with a specific action intent and some intentions may not be compatible. Passives, clefts, focus constructions, and so forth extensively, including the phenomena the syntactic literature, are products of formational tools.

A sequence of selection merge operations transduces a complex of lexical items into hierarchical structure workspace while formational tools render the structure per their input and output specifications into an intended derived form of representation

For TG utterance generation does not envisage the full range of possible semantic interpretations but only projects intentions. There can be, and often are, misunderstandings. The understanding of what is meant or intended or implied or anticipated for an utterance is in the province of a separate interpretive process outside the mind of the speaker. This can of course be modeled by the speaker in consideration of the generation of the output representation. In this way semantics

¹⁰ There are more to the extent that one considers the exigencies and incompatibilities that arise when lexical items are merged into larger structures.

is partially but not fully separated from syntax for TG in the way that Chomsky once prescribed:

[T]he study of meaning and reference and of the use of language should be excluded from the field of linguistics...[G]iven a linguistic theory, the concepts of grammar are constructed (so it seems) on the basis of primitive notions that are not semantic ..., but that the linguistic theory itself must be chosen so as to provide the best possible explanation of semantic phenomena, as well as others. (Chomsky, *Essays on Form and Interpretation*, 1977) p. 139

15 An Initial Illustration of Intent in Syntax

To illustrate the notion of intention tool conflict, consider the selection of complements for verbs. A small subset of these admits of indirect question complementation. (Johnson, 2004) p. 51

- (1) a. Martha denied that John has left.
- (3) b. Martha said that John has left.
- (4) c. * Martha wonders that John has left.
- (5) a. * Martha denied whether John has left.
- (6) b. Martha said whether John has left.
- (7) c. Martha wonders whether John has left.

'say' and 'wonder' allow an indirect question. These data show that they implement the action \$countenanceAlternative.. In contrast, 'deny' does not. Furthermore 'wonder' doesn't allow 'that' clauses for the cases under consideration

- (8) *Al wonders that Sue will leave.

This illustrates the role we propose for intentional structural actions. The indirect question complementizer 'whether' is a tool used by the speaker to \$raiseAlternativesAsQuestion, while 'deny' has the action \$ruleOutAlternative. The complementizer 'that' effectuates \$assertSpecificFact. This reveals a selectional constraint which is direct for precluding the instigation of conflicted intent.

Cross-Purposes Constraint

Don't introduce structures that work against each other in basic utilitarian intent (such as at once raising and excluding the possibility of alternatives in the same construction).

Some verbs explicitly raise the possibility of alternatives so are compatible with complementizers that intend the same. There is no practical point in raising alternatives while also denying them. A verb like 'deny' works to narrow possibilities to a single specific action and requires a compatible complement. These evident characterizations are available from direct representation of intention and can be obfuscated by excluding the data of intent.

16 Exploring Purposeful Syntactic Construction :

An extensive inventory of difficult syntactic problems resistant to solution have been analyzed to support the use of linguistic intention. These are to be found outside this document as a set of companion papers.

17 Presentation of Supporting Arguments

An extensive inventory of difficult syntactic problems resistant to solution have been analyzed to support the use of linguistic intention. These are to be found outside this document as a set of companion papers.

18 Conclusion and Summary: Stronger Constraints for the Faculty of Language¹

Analysis of particular linguistic problems in the TG framework yields a set of putative constraints on linguistic structure formation. We have proposed a preliminary set of constraints at the level of cognitive intentional formation. We list them here by name without further elaboration to give a flavor of the approach. Note the general theme of incompatibility of intent¹

- Single Focus Constraint
- Overlapping Exclusion Constraint
- Cross Purpose Constraint
- Required Purpose Constraint
- Vacuous Action Constraint

- Constraint on Elaboration Beyond Essential

- Unknown Specification Constraint
- Unknown Interrogation Constraint
- Likelihood Uncertainty Constraint
- Subordinate Focus Constraint
- Conjunction Constraint on Unknowns in Assertions
- Superfluous/Null Construct Constraint
- Wasteful Structure Constraint
- Specific Expectation Constraint
- Incompatible Estimation Constraint
- Advanced Notice Quantification Constraint
- Imaginary Construct Sequence Constraint
- Imaginary Construct Differentiation Constraint
- Concept Negation Closure Constraint
- Conflicted Determinacy Constraint
- Vacuous Judgment Constraint in Non-negatable Circumstances
- Compatible Modification Constraint
- Conflicted Determinacy Constraint

These constraints remain individually to be validated in further investigations, but, even in first glimmerings, they accumulate to an evident reality in the faculty of language that underlies rapidly learned creative language use based on sparse data. They clearly overlap in ways that

suggest that they invite a smaller, combined general set. These promise more concentrated and stronger limitations on the notion of possible human language compared to those available from analysis of exclusively structural patterns rules alone. It is evident that many of them conflate in a more formal analysis to a single meta constraint:

Linguistic Intention Umbrella Constraint

In selecting an element for construction of a sentence to represent meaning do not make a choice which conflicts in intent with another element chosen for this sentence.

This general conclusion places the present work within the Chomskyan paradigm, even while it proposes a shift in perspective. Stronger constraints on the characterization of the human faculty of language contribute to an understanding of infinite linguistic creativity from finite resources and how it is that children learn language so quickly when the data experience to them is so limited. All this fits into the evolutionary biology program of explaining how linguistic capability evolved so quickly in the development of the species.

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