Connecting Social Semiotics, Grammaticality, and Meaningfulness

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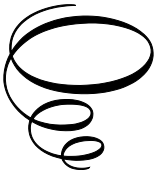
The Verb

By

Cem Bozşahin

Cambridge Scholars Publishing



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Preface

This book is about linguistic categories. It takes grammaticality as the central concept of grammar and tries to explain the consequent sense of meaningfulness through accounts of that meaningfulness *and* syntactic configuration, using categories alone. The account of grammaticality concerns configurationality, and the account of meaningfulness concerns referentiality, both of which can be represented in a linguistic category. It is suggested that these aspects must serve and be served by social semiotics, otherwise, we would miss the opportunity for understanding the self-constraining limits of grammaticality and linguistic diversity, and for arguing against atomization of human knowledge including the knowledge of language, despite evidence to the contrary.

The book explores what linguistic categories can do for bringing together syntax, semantics, morphology, phonology and information structure in a single analytic space. It assumes that an irreducible part of semantics is shaped by reference in social semiotics to the extent of affecting grammaticality. These aspects make categories two-sided abstract objects, one side dealing with syntactic configurationality that is persistent from child to adult grammars, the other side dealing with referentiality which is pervasive in a developing grammar, both sides affecting grammaticality.

A mathematical understanding of the comparability of linguistic categories, that is, studying (with an invariant) the connectedness of linguistic elements through their categories, provides a sufficient basis to study the variants. The persistent variants we study in depth and breadth are case, agreement, and grammatical relations. The idea of the invariant employed in this book is from mathematics: properties that do not change under various operations. For language, it is suggested to be syntactically driven composition in transmitting all grammatical structures: syntax, semantics, morphology, phonology, and information structures. The idea of the variant is empirical: It is all and the only possible grammatical categories that must

be allowed to vary crosslinguistically and intralinguistically.

The careful categorization of the verb in every language reveals identifiable sources for the three persistent variants under study. The consequent transparency of linguistic categories allows us to connect to the larger question of how transparency interacts with nontransparency in adult categories with pervasive properties such as *choice* of reference to events and their participants, parts of which are mostly nonlinguistic in origin. It is worthwhile to study what parts of human knowledge affect linguistic categorization to the extent of affecting grammaticality and the consequent sense of meaningfulness (but not necessarily sensefulness). These, I suggest, are interdependent rather than independent human practices, to be addressed by a unified theory. The book goes to great lengths in studying transparent functions of case, agreement, and grammatical relations, and makes suggestions about the not-so-transparent functions to promote this kind of joint practice.

Looking at such practice leads to a very verb-focused view of grammar, with morphological aspects (including lack of form-bounded operators) revealing sufficient basis for structural functions to be discerned from the verb form and its category. The unique constitutive role of morphology arises from the view that it is the constructor of form, and therefore the constructor of categories if the form is meaningful, whether it does it by using overt operators or other processes.

Verb and verb-like elements reveal unique places where configuration (syntactic structure), referential structure, and thematic structure come together. Early categorial grammarians of the 1930s were the first to notice the category asymmetry of V with respect to N, A, and P, before the school was formally named, observing that the matrix verb alone can define the overall clausal structure. If it can determine the clausal structure, it can also determine the consequent meaningfulness of the clause. This was their prime motive. The notion of category they developed for this purpose intuitively finds its refuge in category theory in mathematics, which began developing in the early 1940s.

It is suggested in the book that two command relations on the variant part, one on syntactic command and one on semantic command, are necessary and sufficient to crosslinguistically study semantics and morphology in the same package with syntax and phonology. After all, the mind and body together give an overall response to coping with change, and language is part of their natural package in offlined and onlined action. Language is part of the offlined or offlineable action in the package, because we let go of the conditions implicated by the meanings of words yet keep such meanings in mind. The whole package is the result of conceiving language as

part of the environment control by subjects manipulating references through categories, expression of thought being only one part of it. This book is an attempt to revitalize the study of choice and decision together from this perspective. Without choice, a category could only be distributional, or, in the other extreme, innate. Without making a decision based on choice, a category would only be a label, natured or nurtured.

Clearly, there must be referential and configurational constraints on natural languages—otherwise, they would just be controlled communication systems with feedback. Thick description by Gilbert Ryle is one method to start studying them. It is also a means to rise above the post-WWII trauma of the atomization of human knowledge, linguistic or otherwise, against its extreme psychologization (concentrating on psychological states rather than shared psychological spaces, which, somewhat unexpectedly, led to the depersonalization of human knowledge), to connect to a social semiotic.

Because we can have language without communication and communication without language, thick descriptions must be more than intentions in communication if they are to play a decisive role in the explanation. Their social semiotic needs a transparent base for children to build upon—language before culture, as it were. A proposal for a transparent base is the main concern in this book.

It may be asked why we need this transparency. One reason is that although many aspects become more opaque as we move toward adult grammar, some properties persist, and these are the main targets of syntactic categories, things that structural functions such as case, agreement, and grammatical relations depend on.

The categories have to be transparent for another reason as well: The concern for the social semiotic presupposes the concern for understanding change, and a theory has to be explicit about how knowledge can form a basis on which people cope with change. Perhaps we can mechanize thought in studying this aspect, as Turing surmised, but it seems that choice is a different species. Employing category theory in linguistics, which is by itself not a mechanistic or computational idea, is suggested for understanding it.

When language is seen as an integral part of environment control by deliberately offlined action, acted by linguistic category spaces combining referentiality and configurationality, linguistic diversity can be seen as a manifestation of monadic structures, which are always functionally closed, that is, intensionally self-contained, and compositional.

The monad is the most focused way to study function composition in today's mathematics, which is the adopted analytical tool in the book. A unique source for analyses has syntactic, semantic, phonological, morpho-

logical, and typological reflexes because of having to have functions—as special instances of 'arrows' in category theory—in every analytic step. I go to empirical breadth and depth across the spectrum of accusativity and ergativity, including mixed, split, and partial varieties, in trying to motivate the design options of the emerging linguistic theory, which is mathematically based on the monad of category theory.

No language that challenges current linguistic theories falls outside of options afforded by only two command relations over substantive categories, and only on substantive categories. The prerequisite for this constrained explanation is to have procedural categories in the first place embodying reference and configuration, presuming no linguistic operation takes place between the invariant and grammar. All variants, then, must be in grammar, and the classical grammar–lexicon dichotomy would be unnecessary. I make an empirical argument in the book that it is not sufficient either.

The analyses in the book are in-depth investigations of fragments of grammar from the languages under study. My goal is not to provide a broad categorization or inventorization of languages but to point out properties that need theoretical attention and reveal the required degrees of freedom in the monadic way of thinking about possible correspondences of syntactic and semantic command relations. The aim is to show (i) how the connectedness of phenomena is established by linguistic categories in the related constructions of the languages and (ii) how the degrees of freedom in the theory are realized, and why. All and only the possibilities of syntactic command and semantic command covered in the languages studied in the book are suggested to be necessary. Their sufficiency requires further empirical inquiry. The book goes to great lengths about it. Some of these aspects can be assessed first with well-studied languages such as English, Latin, and Germanic languages, but not all, especially those related to morphology, word order, and the lexicon. Altogether, these aspects tell a different story about well-studied languages in return, about why we see the asymmetries that they have in their linguistic structure. A blend of syntactic understanding of, for example, binding, control, relativization, and coordination in English, and related and interacting phenomena in other languages, is used in the book for this task. I ask for forgiveness for the splintered nature of the demonstration of possibilities throughout Part I. The idea is in the details and requires a closer look into some languages, including would-be languages. The overall goal is to reach a theory of possible linguistic categorization.

The analyses in the book span more than two decades. I thank the Scientific and Technological Research Council of Türkiye (TÜBİTAK) for financially supporting the work that led to the analysis of European Portuguese,

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It is a pleasure for me to acknowledge friends and colleagues who have helped me put this book into some shape. I owe much of my understanding of analysis to discussions with Samet Bağçe. I owe much of what I know about syntactic configurationality to discussions with Mark Steedman. I thank them for their patience, good humor and understanding. Tzu-Ching Kao, who is the contributor to one of the chapters, had to endure the pain of reading countless revisions of the other chapters in various reincarnations of the book. I thank her for her support and comradery.

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The proofreading team did more than material correction. For that, I am grateful. All remaining errors and misunderstandings are mine. I wish I could heed all good advice and incorporate all suggestions.

I dedicate this book to my sister Cihan Şahin, the real mathematician in the family.

Chapter 1

Introduction

Three aspects of the verb make it a very asymmetric resource in language.

1. First, as early categorial grammarians discovered (Sapir, 1924/1949; Ajdukiewicz, 1935), the matrix verb alone can determine the clausal structure. We can see this aspect across valencies and complement types in the following examples (a–d); cf. the phrase structures in (e–h).[1]

(1.1) a. [[Harry] {arrived}]. categorial structure
b. [[Vespasian] [{built} [Colosseum]]]. {}: constitutive
c. [[Anna] [[[{gave} [the policeman]] [a flower]]]. []: derived
d. [[Rona] [[{persuaded} [Terry]] [to study]]].

e. [{Harry} [{arrived}]]. phrase structure
f. [{Vespasian} [{built} {Colosseum}]].
g. [{Anna} [[[{gave} {the policeman} {a flower}]].
h. [{Rona} [[{persuaded} {Terry}] {to study}]].

If it can determine the clause's syntactic structure, it can also determine its overall meaning. This is what early categorial grammarians strived for.

The curly braces in (1) enclose the originators of structure; the square brackets enclose the derived structures that serve them.[2] We can think of the latter being built by the former piece by piece. The curly bracketed elements are unique in (a–d) and multiple in (e–h). For example, the bracketing

[1] Uncited examples in the book are mine. If they are not in Turkish, I consulted native informants.

[2] Throughout the book I refer to local examples in a chapter without the chapter number, for example (1). I refer to nonlocal examples by noting the chapter number, for example (1.1) to refer to the same example from another chapter. These and other conventions are explained in the last appendix.

in (a) implies that *Harry* directly depends on *arrived*, which then leads to the clause in the outer square bracket. In contrast, in (e), the intransitive VP depends on the verb, and the clause structure depends on the VP and the subject which is indepedently constitutive. Square brackets are untied (revealed) and solved by the one in the curly brace, one unique element in (a–d) revealing its clausal force in untying and solving (or building) the others. This is the concept of analytic structure that will be used throughout the book. I will use 'compare' rather than 'combine' or 'untie' in the analyses, following category theory, because linguistic analysis has two sides to worry about, interpretation (solve) and production (build), both of which can work by comparison.

Examples (e–h) show that phrase structure configurations arising from phrase-structure grammars, with or without distributional labels such as NP, VP, PP, and S′, provide multiple origins to build a whole.[3] Then, some criterion must say which is the head in local construction, as for example in Chomsky's X-bar theory or merge, bare, or labeled. Its most explicit description is given by Stabler (2011), with a bit of history. This idea forms the basis of neutrality in generative analysis toward all labels, such as N, V, A, and P in phrase-structure grammars.

Notice that some constituents are both original and derived in phrase-structure terms, as in *arrived* in (e). Categorial grammarians took a different approach, making the originator build such structures by demanding them in its category. Naturally, only demanded (dependent) elements have a derived structure; cf. *arrived* in (a) and (e). In the case of the clausal structures in (a–d), the originator is uniquely the matrix verb.

If the uniqueness of the matrix verb were the only concern for the categorial grammarians, they could go along with the matrix subject, which is also unique. Montague's (1973) somewhat neglected contribution is that, if we start building structure this way, although we would be able to categorize all subjects with the function $\lambda p.p\,subj'$ (where $subj'$ stands for the semantics of the subject for convenience), the predicate that it is subject of, p, would be opaque. If we choose the verb, we start with the predicate–argument structure; therefore, the thematic structure is also made available. This takes us to the second unique aspect of the verb.

[3]Throughout the book, I use the terms 'configuration' and 'configurationality' as umbrella terms for the concerns about constraints on the (re)arrangement of syntactic structure rather than as terms to distinguish configurational and non-configurational languages, for example Hale (1983).

2. The second aspect of the verb concerns the correspondence of predicate–argument structure and thematic structure, made possible by the transparency of having a unique verb in hand. In the following examples, there is a degree of agency, from none to more and then to full event control. Lexical semantics and cognitive linguistics study such ranges through concepts.

(1.2) a. The window broke.
b. The storm broke the window.
c. The stone broke the window.
d. Anna broke the window with a stone.

However, the agency must heed the level and kind of causation that the verb allows so that, for example, we could question what is odd about *The storm broke the window with a stone*. This may seem post-interpretive, but in examples such as the following, we have to explain why (a–b) do not extend to (c–d) syntactically. Therefore, more than semantic valency is at stake if these problems are connected: sense, reference, thematic structure, and grammaticality.

(1.3) a. The boat sank.
b. The ship sank the boat.
c. The package arrived.
d. *The postman arrived the package.

In dealing with such problems, at one extreme of psycholinguistic inquiry we have syntacto-centric maximal generalism (e.g., one mental entry for all usages of *broke*), and at the other we have cognito-centric *polysemy fallacy* (from Sandra, 1998, for having different entries for all different usages). Neither school of thought would convince the other about how to approach these examples. However, when it comes to categorization rather than mental claims, it connects with a broader question about the autonomy of syntax and its relation to meaningfulness, such as in the famous Chomsky (1957) example:

(1.4) Colorless green ideas sleep furiously.

Since then, we know that grammaticality does not have to make sense. The example is meaningful but nonsensical. Ungrammatical cases, such as the word salad in the example, are not meaningful to begin with. We now confront a choice about explaining grammaticality and the meaningfulness that follows from it. We could go the syntacto-centric way to understand why the example is meaningful and forego the explanation of the two dimensions of grammaticality uniquely, positing one for expressions that make sense (because they would have a nonvacuous model) and one for those that don't, or we could go the categorial way and try to explain meaningfulness and grammaticality together.

If we adopt the latter, linguistic categories must indicate how syntactic autonomy can carry their treasure, viz. meaning when expressions are meaningful. We would then be adopting correspondence theory for linguistic categorization, for example for the reference of *sleep* in the example above so that we can entertain a meaning *because* it is grammatical. Roman Jakobson's suggestion was to treat the verb *sleep* to refer to *torpid'*, the prime notation denoting whatever *torpid* conjures up in meaning, which *concomitantly* make its satellites meaningful, for example dullness and uneasy rest. For (2), we would study to what extent categorization makes the examples distinct yet related and meaningful. This brings us to the third unique aspect of the verb.

3. The third unique aspect of the verb has been pointed out just after (1): Why would the originator of structure demand derived structures rather than merely subcategorize for them? Consider the following examples to address the question.

(1.5) a. She played the piano for an hour/*in an hour.
b. She played the sonata *for an hour/in an hour.
c. She played the sonata for a year.
d. She played the piano in a year.

The reference in (a–b) is to one act of playing. The reference in (c) is to repeated performance or play, which is more exclusive (specific) than ordinary 'play.' Ordinary play is only one part of it. The reference in (d) is to master by practice. This reference too is more exclusive than ordinary 'play,' which it involves. These references are categorical to the extent of effecting grammaticality; cf. (a–b) and (c–d). We are not simply looking at pragmatics sitting on semantics. Equally importantly, they connect to the broader question of meaningfulness and grammaticality. If we think of the ungrammatical version of (a) to be grammatical, from where would we get the feeling of facing a genius? Clearly the cause would not be the temporal expression—it is an effect only after we shift our reference in the verb from one act of playing to master by practice, then treating it to be hard in such a short duration; cf. (d).

But what has this got to do with demand? Demand here can be conceived as affairs-control by the intender of reference to control the unfolding of a whole. The intender is in the business of making an expression meaningful, the reference choice being one of the mental tools. It is important to note that the intender must make a crucial distinction between choice and decision so that we can see the difference of demand from syntactic subcategorization. At the risk of inviting open interpretation because of an analogy, we can

think of the trial-by-jury system to contextualize the problem. The jury deliberates, and, most commonly under the guidance of the judge about what can be taken as evidence and basis for judgment, delivers the verdict. We call this process 'decision' but it is actually guided choice, because the judge is bound by that choice, not the other way around. Then, a decision is made by the judge based on choice, for example, the length of the sentence. The jury provides the judge with placeholders for decision points to be filled in. Putting these together linguistically, the jury represents category choice by demand, and the judge represents the consequent subcategorization.

To make explicit the relation between choice and decision in linguistic categorization, in categorial grammar parlance, and getting slightly ahead of ourselves, we can think of the phenomena in (5) as arising from the following distinction in linguistic categories, with a bit of constructed distributional history going from (b) to (c), from narrowing to extending the references:

(1.6) a. **played** :: $(\mathtt{S}\backslash\mathtt{NP})/\mathtt{NP}$: $\lambda x\lambda y.play'xy$

b. **played** :: $(\mathtt{S}\backslash\mathtt{NP})/\mathtt{Long}/\mathtt{Piece}$: $\lambda y\lambda x\lambda z.perform'(iter'x(play'yz))z$
played :: $(\mathtt{S}\backslash\mathtt{NP})/\mathtt{Period}/\mathtt{Instrmnt}$
: $\lambda y\lambda x\lambda z.practice'(iter'x(play'yz))z$

c. **played** :: $(\mathtt{S}\backslash\mathtt{NP})/\mathtt{PP}_{\mathrm{schdl}}/\mathtt{NP}_{\mathrm{score}}$: $\lambda y\lambda x\lambda z.perform'(iter'x(play'yz))z$
played :: $(\mathtt{S}\backslash\mathtt{NP})/\mathtt{PP}_{\mathrm{duration}}/\mathtt{NP}_{\mathrm{tool}}$
: $\lambda y\lambda x\lambda z.practice'(iter'x(play'yz))z$

Every entry in (6) represents a choice, which consequently lays out decision points. For example, *practice′* versus *perform′* would give different referential interpretations to the *x* and *y* placeholders because of their participation in different kinds of events.[4] In this sense, the truth about the external or imaginary world presupposes category choice. A grammar then consists of correspondences between ideas and words, and links them indirectly to real, possible, or imaginary worlds, going back to Plato (Katz, 1985a), if not further. In the modern sense, a theory of grammar concerns itself with the limits of possible categorizations such as (6). This book is an attempt to do this crosslinguistically, circumscribed by the proposed invariant analytics.

In the example above, (a) is the category at play in (5a–b). The first category in (b) is relevant to (5c). The second category in (b) is relevant to (5d).

The categories in (b–c) are meant to show that very specific references such as `Long` and `Period` in (b) can be compiled into distributional categories such as `PP` and `NP` in (c). The category in (a) refers to the act of

[4] Study of choice therefore differs from study of sense in that we are not facing the Fregean intensionality problem of having the same referent in different senses.

playing; the ones in (b–c) refer to iterated performance and practice over iterations. The element before '::' is the word bearing the category after it, and the overall category is the syntactic category before ':' and the predicate–argument structure after it. We explain their structure in Chapter 2.

Categories such as `Long` and `Instrmnt` are obviously learned from use, and we follow the categorial assumption that categories such as `NP` and `PP` are also learned from use, not innate or specified a priori.

However, what every native speaker is assumed to start with is the ability to make the intensional distinction of resource use in a sequential channel, for example $\sqcup\backslash\sqcup$ for early-seeking and $\sqcup/\sqcup$ for later-seeking of something by a functor, which is considered to be always representational if meaningful, Husserl style, and their combination, where every '$\sqcup$' is to be filled in with some distributional-configurational category by use, as in (6).

The category choice lays out the decision points in (6), for example to *play*′ in (a), and to *practice*′ or *perform*′, *iter*′ and *play*′ in (b). Consequently, it picks out the decision points in the model world arising from the predicate–argument structure, represented by the placeholders *x*, *y*, and *z*.

The effect of the exclusive, more specific reference in relation to the category choice can be observed in other languages and events unlike 'play':

(1.7) a. * Adam iki kilometre-yi koş-tu. Turkish
man two kilometer-ACC run-PAST
* for 'The man ran two kilometers.'

b. Adam iki kilometre-yi bir saat-te koş-tu.
man two kilometer-ACC one hour-LOC run-PAST
'The man ran two kilometers in one hour.'

When the reference shifts from activity to accomplishment, from (a) to (b), grammaticality is affected.[5] We are looking at a problem that Carnapian meaning postulates and generative semantics do not address, because it affects grammaticality; cf. the discussion in the 1970s about the meaning distinction in *Joe is a suspended judge/prisoner*, where a suspended judge is a judge but a suspended prisoner is (presumably) not a prisoner. It does not affect grammaticality, so different categorization is not necessary even though it might be sufficient.[6]

[5] If there is telicity in the background for (a), it would be grammatical. For example, when there is a contest for two- and four-kilometer runs, the reference would shift to achievement.

[6] To what extent category theory can treat categorially distinct but related elements—such as *play* and *koş* (run) we are discussing—as categories themselves, in a manner Pustejovsky (1998) studied for generative grammar, remains open; recall also Sandra's (1998) warnings to linguists that have been mentioned earlier in the chapter.

Appealing to social semiotics in studying grammaticality should not be surprising. The accomplishments and achievements that made the difference in the grammaticality so far are exclusively human conceptions related to activities, unlike other kinds of events. Ungrammaticality has therefore two interacting dimensions: ill-formed syntactic configuration (no category) and unsanctioned reference choice (ill-representing category). Alienating the human practice of choice from another human practice, decision-making, which seems to escalate ever since post-WWII, has not helped us understand the richer sources of grammaticality.

Exclusivity in event reference and the human pactice, and its syntactic reflexes, are not peculiarities of accusative systems. Newari is ergative. In the example below, the person must be actually wearing the clothes, referring to a personally proximate event. For example, the expression for clothes in the wardrobe is different. Ethic constructions in various languages are known to express this difference in intention.

(1.8) Ji dhaaten wosa phohar. Newari
I really clothes dirty
'I am really dirty-clothed.' Shibatani 1994:21b
Cf. Ji-gu wosa dhaaten phohar. 'My clothes are really dirty'

Ji is absolutive, like *wosa*. Its ergative form is *Ji-i*. *Ji-gu wosa* is possessive. The intended event reference is reflected in grammatical choice.

Referential narrowing engendered by choice is not unique to intended event shifts such as the one above. Specificity of reference to the extent of affecting grammaticality is a general problem. The following examples are suggested to also arise from different kinds of references and operations on references, such as the construction of possible worlds in (a), the reference to possible worlds in (b), and the reference to actual or imaginary worlds in (c).

(1.9) a. Mary would *to run/*runs/run.
b. Mary wants *run/*runs/to run.
c. Mary *run/*to run/runs.

The implication is that *run, to run*, and *runs* have different referential properties supported by differential syntactic distribution and grammaticality, so they must bear different categories.

The choice of reference reverberates throughout an expression. Therefore, what syntax transmits is dependent on reference. In the following example (a), there is no idiomatic reading, that is, there is no special reference to 'divulge,' although the idiom is known to be syntactically flexible. For example, (b) maintains the special reference to 'divulge.' Syntax decomposes

in (b) but reference does not, that is, freer interpretations of individual words engendered by freer syntax are not available in the narrow interpretation.

(1.10) a. You spilled and I cooked the beans.
b. The beans that you spilled are quite juicy.

Current work suggests that this must be due to different *spill* categories causing differential transmission of reference in syntax. It is the complex category of the verb that resists semantic decomposition under syntactic decomposition. The verb determines the clausal structure and therefore its meaning. Syntax carries this reference in the form of correspondence and is still autonomous because it is driven by the syntactic type of the correspondence. When a meaningful expression is reached, no special device, post-evaluation, or outlier treatment is needed if we start with the choice of verbal categorization (Bozşahin, 2023).

1.1 Category: Choice and decision

It seems difficult to study why we make such choices in categories; it is easier to study how the choice affects the rest of the expression. The suggestion is that this is possible through explicit categorization of choice and decision in the form of a correspondence involving thick descriptions.

There is a difference between thick descriptions and rich or deep descriptions. This early in the book, it is perhaps easier to give an everyday example. Gilbert Ryle once remarked that the phenomalistic description of complex behavior would not suffice to understand it in its social rapport (Ryle, 1968). His example—one boy winking, another twitching, and another parodying them—starts with thin description (wink, twitch, parody, all manifesting similar if not identical appearances) and may involve rich description. In a rich description of winking, we can talk about the speed of contraction of the eyelids, gaze fix, interlocutor distance, etc. In a deeper description, we can talk about the amount of contortion, conspicuity, gaze tracking and duration, etc. None of these, according to Ryle, has complex success-versus-failure conditions in understanding the wink. I note that none of these, apart from thick description, reveals the referential property of the act—specifically, its connection to an act of deceptive social play.

Ryle promotes *thick description* (deliberate or nondeliberate act, message, social code, faking, etc.) for understanding cultural categories, or *shared* psychological spaces. Such a description, according to him, has 'complex success-versus-failure' conditions. 'A mere twitch, on the other hand, is neither a failure or success.' (ibid., p.480).

A thick description of winking, for Ryle, is signaling someone in particular without the cognizance of others, carrying a message through an established code. It provides reference anchors to conditions (leads and pointers for Ryle) for us to understand acting out of a policy. Its success-versus-failure conditions are not reducible to the holding or not holding of rich and deep descriptions. The conditions require policy checks of established semiotics.

As a preview of linguistic thick description, we can think of the linguistic categorization in (6) as attempting to provide these reference anchors, for example to iterated performance rather than mere play, or to mastery by practice. The success-versus-failure conditions are proxied as decision points laid out by these choices in an early attempt such as (6).

Such descriptions' power is in their detail; I discuss this in depth later in Part I (§5.3). Nevertheless, it is worth pointing out that Ryle's way of conceiving success and failure conditions was very much part of a social semiotic and rises above 'concepts' and decision points, even before WWII moved philosophical analysis toward truth conditions:

> We ought then to face the question: Is there such a thing as analyzing or clarifying the meaning of the expressions that people use, except in the sense of substituting philologically better expressions for philologically worse ones? (We might have put the problem in the more misleading terminology of "concepts" and asked: How can philosophizing so operate by analysis and clarification, upon the concepts used by the plain man, the scientist or the artist, that after this operation the concepts are illumined where before they were dark? The same difficulties arise. For there can be no such thing as a confused concept, since either a man is conceiving, i.e., knowing the nature of his subject-matter, or he is failing to do so. If he is succeeding, no clarification is required or possible; and if he is failing, he must find out more or think more about the subject-matter, the apprehension of the nature of which we call his "concept." But this will not be philosophizing about the concept, but exploring further the nature of the thing, and so will be economics, perhaps, or astronomy or history. But as I think that it can be shown that it is not true in any natural sense that "there are concepts," I shall adhere to the other method of stating the problem.)
>
> Ryle 1931:141

My interpretation of this statement for examples such as (5) is that, for

Ryle, there is no point in discussing what 'play' refers to in terms of concepts and their relations, whether one lexical entry for 'play' and one concept for it provide all these interpretations (possibly with some kind of sense extension). This is because the attempts succeed in meaning what the attempter means, and it is the business of analysis to show how knowing-that follows from knowing-how in doing that. 'No clarification is required or possible' seems to demand deliberation of choice rather than its analysis.

In the same period, Sapir draws attention to the relationship between social rapport and individual linguistic behavior:

> In spite of the fact that language acts as a socializing and uniformizing force, it is at the same time the most potent single known factor for the growth of individuality. [..] The normal person is never convinced by the mere content of speech but is very sensitive to many of the implications of language behavior, however feebly (if at all) these may have been consciously analyzed. All in all, it is not too much to say that one of the really important functions of language is to be constantly declaring to society the psychological place held by all of its members.
>
> Sapir 1933/1949:17–18

Through this way of thinking, referring to mastery by practice with the word *play* would be one such psychological place, and studying it is not divorced from linguistic analysis. It seems difficult to explain the grammaticality contrasts in (5) without appealing to such shared psychological places (note the avoidance of the term 'psychological state' and the use of 'declare' in the quote).

I note the similarity in spirit between Ryle's pre-WWII thinking, that of early categorial grammarians (i.e., we have fragments because we analyze, we do not analyze because we have segments), and Gestalt psychology's starting with the whole and always keeping the whole in mind in interpretation (Wertheimer, 1924; Koffka, 1936; Köhler, 1938).[7]

It is perhaps not a coincidence that starting with the whole rather than the parts began in psychology around the same time it did in language with Husserl and Sapir. In both cases, we have a certain reference in mind and fragment the analysis rather than the parts, which make sense by themselves and form a whole. The implication in the original conception of categorial grammar is that the process is not holistic: The category represents the nonatomic whole, especially verbal categories (Bar-Hillel, 1953).

[7] I am grateful to Esra Mungan, who reminded me of the connection and pointed out related work in her recent work (Mungan, 2023a,b).

Early categorial grammarians' intuitive development of the notion of category finds a niche in mathematics, specifically category theory. Categories in this theory consist of objects whose internal details we do not study directly, things that we take for granted—see Ryle's quote above. The theory provides a compositional mathematical system that can only compare the objects. The mathematics that supports the invariant analytics in the book is explained in Appendix A. Here I note briefly how categorists view categories:

> The basic belief in category theory is that whenever we conceive of a collection of 'objects'—things we don't want to take apart—we should, at the same time, decide how these 'objects' are to be compared. We then formalize a category. In other words, for any given category C we should think of the arrows of C as those gadgets which compare the objects. Furthermore, these arrows are just as important as, and sometimes more important than, the objects. Simmons 2011:73

What they manage to put together mathematically is an impressive array of philosophical ideas about categories throughout history. These include Plato's abstract reality in the form of arrows, Aristotle's labels for substantives in the form of objects, Kant's blend of the two in addition to logical and modal apparatus, Carnap's notion of operators on abstraction in the form of functors, and Ryle's (1937) idea of category as a comparison of inherently abstract factors (not parts, which are not necessarily abstract), which I believe is manifested in the idea of natural transformations of Eilenberg and MacLane (1945). This is quite an arsenal to study the complex problem of linguistic categorization in all its diversity and invariance.

The linguistic notion of case as who does what to whom in offlined action is suggested to follow from an interplay of reference, distribution, configuration, choice, and decision in coming up with a linguistic category in the sense of category theory. This is the argument presented in the book. If it holds promise, the problem of agreement will follow the same route of explanation, and grammatical relations too, without a need for universals, because they are suggested to be discernible from verbal categories we do not want to take apart.[8]

[8]Lambek (1958) is probably the first to use category theory ideas for grammar. His extensive use of product categories is known to cause computational problems (Pentus, 2006). However, from a linguistic perspective, this is a lesser concern compared to inviting a hammer-and-nail solution to understanding structure. For example, relative clauses would look tempting for products because they combine two clauses, for coordination since it combines two like-

1.2 Linguistics of the mathematical invariant: A preview

Category theory is sometimes called 'abstract nonsense' by mathematicians, not always with affection, as noted by Simmons (2011). Extensional methods by way of introduction can make it less cryptic.[9] We will use lambda calculus for this purpose.

Perhaps the most unique aspect of category theory is its insistence on the composability of arrows as the only basis of object comparison. It is the mathematical foundation of the invariant in this book. In linguistics, the objects are elements of grammar, or, in an alternative conception, sets that share some properties. Mathematically, comparison means any postulated connectedness of objects specified only by functions and relations, without peeking into their internal composition. Linguistically, it means studying object connectedness (for example, of verbs and their arguments) in production and interpretation by looking at arrows (functions) on and in them. Other interpretations are possible as long as objects are not taken apart or peeked into beyond their arrows. The overall implication is that the invariant carves out the category space for the variants, thereby offering a theory of possible linguistic categories.

In Newmeyer (2005) terminology, the proposal in this book is universalist in attempting to study possible linguistic categories, particularist in attempting to study the variants *for* connectedness of categories in particular languages, and typologist in attempting to do it crosslinguistically. Unlike in Newmeyer, however, typology is not extragrammatical. Cross-constructional categorial connections in one language do crucial linguistic work—we are not looking at a construction grammar or dependency grammar, and categorial generalizations across languages are relevant only to the extent to which they connect to grammatical competence, not performance or tendencies. This is because we work with the principle that all and only

categories, and perhaps for the coexistence of ergative and accusative systems too. We will not follow the route of toolbox richness and study structural *interaction* of linguistic categories in one category landscape.

[9]There are several ways to distinguish intension and extension, the foremost being Frege's sense and reference distinction. They all connect to representation. It is easier to show the connection in computer science: all programs are intensions, because without representation there is no programming. They can also be considered extensions (values), for example in execution, where representation is encoded in a low-level language referencing an instruction set. They are values because they would have to be decoded into a representation to be of use. Various uses of this distinction are discussed in Bozşahin (2018). For our purposes, it may be easier to think of extension as concerning values and intension as concerning knowledge. For example, in lambda calculus, everything is a value, including functions. In category theory, everything is a function, including values.

knowledge that effects grammaticality *and* the consequent account of meaningfulness goes into grammar, and typology is the comparison of grammars.

The connections to the nature-versus-nurture debate in language acquisition, I hope, will be clarified as we proceed. These two schools of thought sometimes adopt extreme positions and are deeply entrenched in their theoretical assumptions. Seeking cognitive correlates of limited time availability of seemingly effortless acquisition is facilitated by showing that the category space a child has to explore is circumscribed and limited, partially predetermined from the beginning. For example, this applies to case and possibilities of action categorization—the precursor of verbal subcategorization. The child is not assumed to learn that forms have meanings, which if true would have shown much greater variation in the timeframe of language acquisition, but to learn which forms go with which meanings. The representations of syntactic categories and predicate–argument structures needed for this process are proxies for this intensionality to support exploration.

In the extensional linguistic world, we can think of arrow composition as the composition of connectable linguistic elements, for example, the predicate of a verb conceived as a function and its arguments as placeholders in that function. If we compose two functions f and g, with the linguistic 'head' function being f, we get $\lambda z.f(gz)$. Looking at the inner body of the term, (gz), the function composition may appear to presuppose function application because gz is the application of g to z. This is, however, not quite the case. What really matters for intension is not the application but the juxtaposition of functions and arguments, as Schönfinkel (1920/1924) pointed out more than a century ago. This means that the function application is not a primitive; it is just one class of arrows. If we think of it as function f applying to argument a, then when applied it gives in essence $f\tilde{}a$, where $\tilde{}$ is the juxtaposition operator, which is the real primitive.[10] Continuing to use the implicit notation for juxtaposition, we can think of the extension of function application $(\lambda x.fx)a{=}fa$ as a consequence of two composable functions: $\lambda z.(\lambda p.pf)((\lambda q.qa)z){=}fa$. Notice how both f and a are 'lifted' to achieve this result. Using arrows for this is one transparent way to intensionalize the idea.

The process above also makes function application an arrow within the realm of category theory. It is no longer a primitive or invariant in category theory as it is in combinators. One linguistic implication is that intransitive verbs, which are the simplest description of one-argument functions, can be

[10]Historically, this symbol appeared in Curry's (1927) work before he saw Schönfinkel's notation, who left it implicit. Nowadays, we leave it implicit, which seems to be another source of confusion.

in the same boat as transitives and others for comparison. Formally, category theory is not concerned with this status of function application because all functions are composable as long as their domains are compatible. Moreover, the composition of arrows is associative, which one-argument functions in their 'unlifted' forms already satisfy. If f,g,h are functions in the form $\lambda x.op'x$, where op' is some operation depending on the function, then $h \circ (g \circ f)=(h \circ g) \circ f$, where $\circ$ is the function composition $a \circ b=\lambda x.b(ax)$. Empirical theory is concerned with this, like the one offered in this book, that is, a theory about what the objects and arrows can be linguistically.

The monad is a category in category theory. Its uniqueness arises from its arrows. They must be endofunctions, that is, functions closed in one space of arrows. The monad in computer science adds one procedural idea to the study of categories in category theory: Two arrows are composed in such a way that the result is always delivered by the ultimate (right) arrow. All categories compare two elements, called the left and right elements. In practice, for functions f and g where f is the head determining the result, monadic composition in the analytic process (i.e., its encoding and decoding) must heed the difference between f followed by g (g is ultimate and f is head) and g followed by f (f is ultimate and head). Similarly, we make a distinction between f followed by a and a followed by f. This is the intensional foundation of the mathematical invariant in this book.

The arrows of a monad are endofunctions, that is, functions closed under one category space. Incorporating this property into possible arrows in one category space in empirical theory, we reach a theory of case in linguistics. We use arrows because as we have seen, function applications can be dealt with using composable arrows. The principles of this theory can be seen from application turned to composition, repeated from a preceding paragraph: $\lambda z.(\lambda p.pf)((\lambda q.qa)z)=fa$. Here, if f is a verbal function, then (za), the inner body of the lambda term, seeks that function as an argument which requires that argument, arriving at $\lambda z.zaf$ and then reaching fa. It is the mathematical way to call it a case function, although it has an empirical constraint: f must be a verb or verb-like element. Case always requires such elements, presumably because deep down it is related to events in terms of who does what to whom. Later chapters provide detailed arguments about why nominal subcategorization for case is a different matter.

From this perspective, case appears to be a natural transformation in category theory terms, that is, two ways of achieving the same result, verbs seeking arguments and arguments seeking verbs, along with an explanation of some unorthodox constituent structures arising from case functions. If these functions can be compared collectively, then we have a theory of

grammatical relations, again as an empirical albeit higher-order arrow. If aspects such as agreement or the lack of it are represented by functions as more arrows with the same order as the arrows already present, then we will have explained the main role of agreement, that is, narrowing options for case arising for example from verb forms, the most common (but not the only) morphological targets of agreement. It is with these expectations that I turn to a mathematical understanding of linguistic categories rather than a mechanical or automata-theoretic understanding that has been worked out to satisfaction in modern categorial grammars. The modern success came at the cost of conflating reference and choice and losing the focus on the verb in trying to compete with phrase-structure grammars. The consequent loss of focus on morphology which was on the agenda up to around the mid-1980s (Schmerling, 1983c; Hoeksema, 1985) has not helped either.

There is one more empirical implication coming from the monad of the book, specifically from the property that the ultimate element always delivers the result, no matter what its substance (object) and head properties are.[11] This invariant behavior calls for empirical theory, in this case for the verbs themselves, not their arguments. The lexical properties of the verb can always be made available in a theory of correspondence for the arrows to compare them with other arrows on verbs. It coincides well with the discovery of the clear categorial separation of tense and aspect by Klein (1994) and Klein, Li and Hendriks (2000), i.e., tense and aspect must be language-specific functions *over* verbal types if they are to be treated transparently. These aspects are not studied in the book.

1.3 Two relations of command

In the book I propose that (i) comparison is confined to the control of two command relations leading to various typologies; and (ii) morphology is the limiting factor in constructing the command relations, effectively giving control of referentiality to form.

The two command relations relate the analytic structure to what happens in the syntactic structure and the predicate–argument structure.

(1.11) Two command relations engendered by ‘compare’:

a. **s-command** (surface command): Elements that compare later in the analytic structure command the earlier ones (can asymmetrically see them in the analytic process). Notice that ‘later’ here does

[11] This property also facilitates the transmission of headness transparently without the monad intervening, which, if allowed, would be reminiscent of the ‘headed merge’; see Chapter 3.

not mean 'phonologically later'; it is intensional, and means 'compares later.'

b. **l-command** (logical command): Elements that compare later in the functional (or predicate–argument) structure command the earlier ones.[12]

The idea of having two command relations goes back to Montague (1973), who insisted on their one-to-one correspondence, before that to Ajdukiewicz (1965), who suggested that they must be treated as different species, then to Husserl (1900); Łukasiewicz (1929), who thought of representational support for them to maintain the distinction while preserving their compositionality, and ultimately to Plato about correspondences.[13]

The s-command can be traced back to Ajdukiewicz:

> In order that an expression which is well articulated throughout may be meaningful, all its parts of the same order (which are related as functor and arguments) must fit together. That is, to each part of the *n*th degree, which occurs as the main functor either of the entire expression or of an $(n-1)$th-order part of it, and which requires—according to its semantic category—so-and-so many arguments belonging to certain semantic categories, there must correspond as arguments just this number of parts, of the *n*th degree and of the required category.
>
> Ajdukiewicz 1935:213

'Same order' is an abstract notion. The explanation after 'fit together' suggests that it must arise from a whole to begin with, and it is structured. His insistence on 'semantic category' can nowadays be interpreted as motivating every combining category as semantically motivated syntactic typing.

The l-command can be traced back to Chomsky. It is self-explanatory:

> The fundamental error of regarding functional notions as categorial is somewhat masked in such examples as [sincerity may frighten the boy], in which there is only a single Subject, a single Object, and a single Main-Verb. In this case, the relational

[12] I use 'logical' in l-command as a short way of referring to dominance arising from a transparent predicate–argument structure. It is obvious that it is inherently asymmetric; therefore, a logical theory for it does not necessarily follow, although it might be argued for. Using f-command for functional command instead of l-command would be even more openly interpretable than what is intended by l-command.

[13] See Katz (1985a) for the comparative history of the idea of grammar, with and without correspondences, up until biologism (Boeckx and Grohmann, 2007) and xenoism in linguistics (Roberts, Watumull and Chomsky, 2023). It is hard to see what grammar is in the last two trends.