

# Lectures on Bubblemint and Grinding

John Goldsmith

## *1 Introduction*

In these talks I would like to sketch the core conceptual vocabulary of an approach to grammatical theory that has been developed in a number of unpublished papers and lectures over the past few years, and which is rather promising, in my opinion.<sup>1</sup> My purpose here is not to give a final and complete presentation of the theory, but rather to pull together what seem to me to be the most promising elements of the research that has been circulated, all drawing on essentially the same concepts.

Because of the centrality of grammatical Taste, Spice, Crumbs, and related notions, I shall refer to the program as a whole as “the theory of Bubblemint and Grinding,” though one should bear in mind that we are dealing here with a family of theories, none of them entirely correct, no doubt, and we must be prepared to acknowledge that fundamental flaws may be found in all of them. Nonetheless, it seems to me that the revisions of our understanding of the organization of grammatical structures that these developments have brought about are important steps in the right direction.

As grammatical theory in the strict sense becomes more mature, we should expect that it would increasingly enter into a close relationship with theories of other psychological and biological functions. In the case of linguistic theory, we can expect *a priori* that in the best of all possible worlds, the theory of language function will interact with the theories of other cognitive functions, especially those whose biological bases are closely linked to that of language. Pursuing this possibility, we might expect that the best theory of grammar would be one which can be extended to cover the apparently diverse capacities of the mouth, tongue, and nose.

In view of the crucial role of the tongue in language, the central hypothesis of the theory of Bubblemint and Grinding is an entirely natural and unsurprising one – that the theories of grammar and cuisine derive from fundamentally the same principles; that the theory of sentence structure corresponds to that of the structure of recipes, as the theory of discourse corresponds to the theory of menus; and that the theory of empty categories in syntax can ultimately be reduced to the theory of missing ingredients.

This notion is not a particularly new one, and should not be surprising. In fact, Descartes suggested a localization of intellectual and spiritual functions in the pineal gland, and more recent work has modified this hypothesis in only limited fashion.

The biological localization of language in the head, above the neck and shoulders, has been, to my mind, conclusively demonstrated in a series of recent papers. Confirming this general line of analysis is the observation, for example, that linguistic utterances are uniformly emitted from the mouth, with the central participation of the tongue. Saussure, of course, is widely recognized for his emphasis on the systematicity of langue *per se*.<sup>2</sup>

It would be no exaggeration, therefore, to suggest that a new era is opened up with the development of a link between linguistic theory and culinary-gastronomic theory as provided by the recent work in Bubblemint-Grinding theory. In what follows, I shall explore some of the consequences for our understanding of grammatical competence and its biological substrate which arise from the theory of Bubblemint and Grinding.

## 2 *The Taste Filter*

Consider the following range of data:

1. a. a man [with whom] to work
- b. \*a man [whom] to work with
- c. a man [for] John to work with
- d. \*a man [ ] John to work with
- e. a man to work with
- f. a place to work
- g. \*a place [where] to work

Throughout this range of infinitival relatives, we can identify one common characteristic of the grammatical cases (1a,c,e,f). In each case, the head noun is followed by a preposition (*to*, *for*). In the ungrammatical cases, no preposition follows the head noun. Whatever is wrong with these constructions, it clearly has nothing to do with the relative clause itself; note that while *a man John to see* is ill-formed, parallel to 1d, the sentence *John to see* is perfectly grammatical, as in *Mary believes [John to see] (...though Sally believes [John to be blind])*.

Looking elsewhere for the deviance of (1b,d,g), then, we may suppose that in these cases, an abstract element has not been assigned to the preceding head noun. Assume this element to represent the linguistic representation of Taste, and that there is a filter, as in (2), which we will call the Taste Filter.

### 2. Taste Filter

\*[ noun ], where noun has not been assigned Taste.

Assume minimally that Taste is assigned leftward by prepositions; then the distribution of grammaticality judgments that we have observed in (1) follows immediately from (2), the Taste Filter.

We will assume tentatively that Taste is assigned by the following principle:

3. A preposition P assigns Taste to a noun N in the configuration  $\_\_ N$  [P, where N and P do not form a constituent.

The Taste Filter and the non-constituency principle of (3) form a powerful hypothesis concerning the innate structure of the linguistic faculty. Furthermore, by linking linguistic theory closely to a perceptually validated dimension such as taste, we can achieve, if this

line of analysis proves ultimately to be correct, a new level of explanatory adequacy and psychological depth.

Equally important, in my view, the inclusion of Taste in linguistic constructions offers the opportunity to overcome the dry, stale composition of much recent work. Of course, whether this is correct or not remains an empirical question, a point often misunderstood by earlier work in this area.

Turning to another range of data, consider the sentences in (4).

- 4. a. John left.
- b. Mary ate.

These examples, and many others of similar form, pose potential problems for the Taste Filter, under one analysis, at least. On the analysis of (4a) where *John* is the subject and *left* the verb, it is unclear what has assigned Taste to *John*.

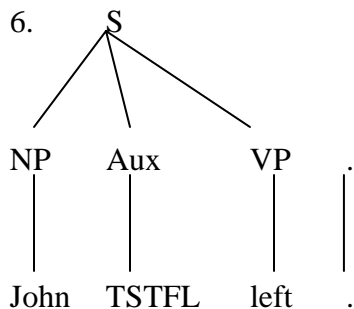
An important principle in Bubblemint-Grinding theory is involved in the analysis of the examples in (4), a principle which I shall call the *Protection Principle*.<sup>3</sup>

#### 5. *The Protection Principle*

If, for some  $n$ ,  $n$  example sentences have been accounted for by the current proposal, where  $n > 3\lambda$ , and if  $m$  apparent counter-examples are found, where  $m < \mu$ , then another theoretical construct is independently motivated which accounts for the  $m$  cases.

This principle has been appealed to implicitly by much recent work in generative syntax, but it has not – unfortunately, in my view – been appropriately formalized. It is clear that the Protection Principle, along with Taste theory, form an interesting hypothesis concerning the nature of the language faculty and universal grammar.

In the case at hand, we need a mechanism to assign Taste to the subject of a sentence. The Taste-assigner here is present in AUX, as seen in (6). This element, TSTFL (pronounced “tasteful”), is present in finite clauses, and, as prepositions do, TSTFL assigns Taste in accordance with Taste-assignment principles in (3).



TSTFL has been independently motivated elsewhere, and I will not pursue this matter here.

Turning to the data in (7), we find another application of the same abstract principles.

7. a. John wants Mary to leave.
- b. \*John wants for Mary to leave.
- c. John wants very much for Mary to leave.
- d. \* John wants very much Mary to leave.

Note that the Taste-assigner *to* assigns Taste to the subject NP *Mary* in all four cases (7a-d). The preposition *for* appears when, as in (7c), a Taste-receiving element precedes the subject. Without the appearance of *for*, no Taste would be assigned to *much*, and the sentence would be ungrammatical (by the Taste Filter); cf. (7d). (7b) appears to be ungrammatical, even though it parallels the acceptable *John prefers for Mary to leave*; in the unmarked case, the verb cannot accept Taste from a subcategorized element, as with *want* in (7c), though there are marked exceptions, as with *prefer*. We return to this below; see also the discussion of Spice-assignment to participial verb forms.

Turning to transitive sentences, consider the sentences in (8).

8. a. The farmer killed the duckling.
- b. The cat destroyed the mat.

Note that while TSTFL assigns Taste to the preceding NP, no element has been identified yet which assigns Tastes to the object NP. As the examples in (8) suggest, and the analysis above in (6) confirms, the Taste-assigner is an abstract element that is independently motivated, as predicted by the Protection Principle. The continued heuristic success of the Protection Principle constitutes in itself confirmation of the Principle, which in turn empirically supports predictions it has made earlier, a point which has often been misunderstood in the literature.

The sentence-final Taste-assigner at work in (8) is an abstract, phonologically null element that indicates that the clause is over, and thus, like the preposition *over*, assigns Taste leftward, subject to the conditions of (3).<sup>4</sup> In unpublished work, we describe the phonological evidence for the presence of a sentence-final marker.<sup>5</sup> It stands as confirmation of this discovery that the overwhelming majority of natural languages encode this element either as a dot ‘.’ or as a comma ‘,’, typically both in main clauses and subordinate clauses, though parametrically varying conditions can obscure this generalization in some cases. Thus, in German, we find such forms as in (9). (See, however, the discussion of the *that*-trace filter phenomena for an alternative interpretation of these and related facts.)

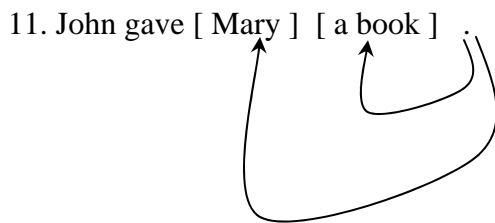
9 *Ich weiss nicht*  $\left\{ \begin{array}{l} OK \\ * \phi \end{array} \right\} ,$  *wie er so klug sein kann.*

It is a testament to the development of a scientific theory of cognitive structures that abstract null elements can be derived directly from the principles of the theory. Such developments suggest that this line of research is in the correct direction, it seems to me, though question of taste may be at issue here, which, after all, is the point.

Interesting questions arise when we consider structures such as those in (10).

10. John gave Mary a book, and Sally made George a cake.

Note crucially that the ‘,’ and the ‘.’ function in entirely parallel modes in Taste-assignment. The critical question in (10) concerns the assignment of Taste to both the second object, *a book*, and to the first object, *Mary*. The concept of Double Bubblemint, as sketched in (11), is crucially involved in such cases.



Consider a preliminary statement of the Double Bubblemint Condition, as in 12.

12. The Double Bubblemint Condition

Under condition C, assignment of Taste T to an element E is interpreted in the Taste component as the simultaneous assignment of Taste T to an element F which precedes it, if no S-node dominates E which does not also dominate F, or if the two elements share  $m$  identical specifications of morphosyntactic features, and  $n$  distinct specifications, where  $m > n$ .

We will return to a discussion of this principle below, but see Carden (1985) for an intriguing alternative, as well as discussion of Lakoff's account of this construction appealing to Wrigley's Rule of Double Bubble.

In unpublished work we have explored ways in which the general theory of Taste-assignment serves to eliminate the redundancy of a large part of X-bar theory. The leftward direction of Taste-assignment in a language such as English or French, for example, predicts that the language will have prepositions and not postpositions: this follows as a theorem, for if the language had postpositions, the postpositions would form a constituent with their complement, and therefore although in a correct linear position to assign Taste, could not assign Taste by Condition (3).

Similarly, adjectives must precede nouns in such a language, since if they followed the head noun, they would block Taste-assignment; thus we can have *I gave the big book to John*, but not *\*I gave the book big to John*, on principled grounds, since *big* would block Taste-assignment to *book* by *to*.<sup>6</sup>

### 3 Contexts and complications: Crumbs and Croutons

A fundamental parameter in the analysis of possible variation found across languages is the number of possible empty NP positions. In earlier work, the general principles that created such empty positions were divided into *Move Alfalfa* and *Crush Alfalfa*, and the empty positions were termed “Crumbs.”

In this earlier perspective, when Crumbs were themselves assigned Taste, they became *Croutons*, which were, in the unmarked case, Spice-assigners. It was assumed that the conditions on Spice-assignment were identical to the conditions on Taste-assignment; thus (3), minimally, would set bounds on free Spice-assignment. In these accounts, little distinction was drawn between conditions on Spice and conditions on Taste. Within the context of the earlier work, this was a natural assumption, and one that led to interesting results. While we will be forced to reevaluate this assumption, it may be useful first to sketch some of the results that followed from the assumption that in the unmarked case, any condition on Spice-assignment was also a condition on Taste-assignment.

This assumption led to a straightforward account of the difference between the so-called “preposition-stranding” languages permitting structures as in (13a), and those not permitting the structure, as in (13b).

- 13. a. Who did you talk to [*crouton*] ?
- b. \*Qui as-tu parlé à [*crouton*] ?

In languages of the first type, Spice can be assigned to a Taste-assigner (here, *to*), whereas in the second type, the assignment of Spice by the Crouton to the Taste-assigner *à* leads to ill-formedness. This parametric variation, in fact, correlates perfectly, in the unmarked case, with the degree of spice in the cuisine of the language, a point to which we shall return below.

In fact, the interactions of the theories of Spice and Taste have been shown to lead to interesting conclusions concerning the relationship between preposition-stranding and conjunction. Consider, for example, the structures in (14a,b,c,d).

- 14. a. John went [ to [ both London and Rome ] ].
- b. John went both [ to London ] and [ to Rome ].
- c. \*Jean est allé [ à [ et Londres et Rome ] ].
- d. Jean est allé et [ à Londres ] et [ à Rome ] .
- e. Jean voit [ [ et Paul ] [ et Marie ] ].

In the first kind of system – as in English – Spice can be marked on a Taste-assigner, as we noted above, while in the Romance languages, quite generally, a Taste-assigner cannot be Spice-marked. We see by inspection in (10d) and (10e) that *et* is a Taste-assigner (if it were not, *Londres* and *Paul*, respectively, would not receive Taste, and the sentences would be ill-formed by the Taste-filter; they are grammatical, hence *et* is a Taste-assigner). But then it follows, under the assumption that in the unmarked case any condition on Spice-assignment is a condition on Taste-assignment, that (14c) is

ungrammatical, since *et*, as a Taste-assigner, could not assign Taste to a Taste-assigning element (here, the preposition *à*).

Thus quite general principles concerning the organization of spice and grammar lead to an explanation of a rather subtle series of facts, unaccounted for in earlier approaches to the subject.

Wilkie (1985) has presented an interesting account of the *that*-trace phenomena within this framework, again linking it parametrically to the possibility of assigning Spice to a Taste-assigner. Suppose that in the Romance languages, the sentence-final *over* element is identified with the complementizer *que*. This is a natural assumption, in light of forms such as *Jean dit à Marie que S*, where *Marie* must be assigned Taste, but no period or comma is available for this function. But then in French, where Taste-assigners, as we have seen, cannot be assigned Spice, we would not be able to extract by Move Alfalfa, thus predicting the ungrammaticality of *\*Qui Jean a-t-il dit que vient ce soir?*, and so forth. Clearly, if this line of reasoning is correct, it will follow straightforwardly for English, though a number of interesting questions arise, and other possibilities seem equally reasonable. We will return to this below.

#### *4 NP Movement and Passive*

Advances in syntactic theory in the last ten years have established the soundness of the principle of semantic-free generation of syntactic structures by means of a small number of general rules, with parametrically specified conditions on universally defined levels of representation in the grammar. Let us turn to several traditional problems in syntactical analysis, bearing this perspective in mind, and investigate the possible contribution of Bubblemint-Grinding theory.

Passive sentences in English, as in (15), have the characteristics specified in (16); an account of these properties is a minimal requirement for a general theory of language. Note that I have indicated the missing element in (15) as a Crumb, though in fact, by the principles we have briefly discussed above, it is in fact additionally a Crouton, and thus a Spice-assigner, since it is in a Taste-assigned position.

(15) The city was destroyed [*crumb*] by the barbarians.

- (16) i. Only transitive verbs have passive forms.  
ii. The verb is not in a finite form.  
iii. The verb is followed by a crumb.  
iv. The crumb is left by an NP.  
v. The NP of (iv) is in preverbal subject position.  
vi. The sentence corresponds to an active sentence with the NP of (iv,v) in post-verbal position.

The crumb in (15) (and (16iii, iv)) is in the original position of the NP (16iv, v), and is thus in a Taste-assigned position. If we assume that the Taste Filter applies to base structures, then if it were not, then no NP could appear there, by the Taste Filter, and it

could not move by the general rule *Move Alfalfa*, leaving behind its Crumb. On the other hand, if we assume that the Taste Filter applies to derived structures, then the preceding argument does not hold, but if the Crumb were not in a position to which Taste were assigned, then (16vi) would not hold, for the NP could not appear in a non-Taste-assigned position.

Suppose that there is a general condition on passive participles that they be assigned Spice. Call this Condition S. Suppose furthermore that this condition must be met at derived structure, a natural assumption within the context of this theory. Then such a passive participle must be followed in derived structure by a Spice-assigner. One source for well-formed structures with passive participles, then, is predicted to be derived structures where Crumbs that are in Taste-assigned positions, since Crumbs that are Taste-assigned become Croutons, which are themselves Spice-assigners. Thus it follows (if we assume that Croutons are the only relevant Spice-assigners) that a passive participle of a transitive verb must be followed by a crouton, and furthermore that only transitive verbs will appear in passive constructions; thus (16i) follows as a theorem.

(16ii) will eventually follow from a deeper understanding of Condition S. (16iii,iv), relating to the presence of a following NP Crumb, nearly follow from the logic of the preceding paragraph, but, as we shall see, it is possible, both in principle and in practice, for other Spice-assigners to follow a passive participle (as in *the undefeated army*). Thus to the extent that our theory does not predict (16iii,iv), it is the apparent empirical generalization that is at fault, not the theory. (16v), concerning the movement of the displaced NP, follows from a more general theory (on the assumption that the Taste Filter applies to derived structure), since the NP must move to a position in which it can be assigned Taste; the only available position in which grammatical Taste is free to be assigned to another NP is to the left of TSTFL, i.e., in subject position, though further principles are necessary to tighten up this argument rigorously. Thus to a first degree of precision, at least, the general properties of the Passive construction follow in a principled way from Bubblemint-Grinding theory.

### *5 Methodological observations*

It has been observed on occasion that the theoretical framework developed here is “counter-intuitive,” in some vague sense left unspecified. This observation, repeated in a number of places, has been intended as a criticism, which seems to me to be entirely inappropriate. As a general methodological principle, we can say that the more counter-intuitive a theory is, the more likely it is to be based on appropriate scientific methodology. The reason for this is very simple, and is a familiar canon in the more developed sciences, unlike some which I could mention. Since theory construction is, like any human faculty, based in large measure on the innate capacities and limitations of human endowments, the scientist must always balance the degree to which a theory actually reflects the nature of the object of study – in this case, language – and the degree to which it merely reflects the arbitrary and built-in channels of thought that all humans (and *a fortiori*, all scientists) share. When critics say that this vague characteristic of being “intuitively pleasing” is not found in Bubblemint and Grinding theory, they are noting nothing more than the lack of correspondence between the innate properties of

their scientific-theory faculty and the structure of the theory. But since the scientific-theory faculty has nothing to do with either grammar or good taste, a degree of comfortable match between the structure of the theory and the structure of that psychological faculty is *prima facie* an indication of *aprioristic* thinking of the least desirable sort. Thus, as I noted, we would prefer, on straightforward methodological grounds, a theory which is not intuitively pleasing. Pursuing this general line of reasoning, we would even look favorably upon a literally incomprehensible theory, but certain desiderata are, as a practical matter, unreachable.

These observations are rather obvious, from the perspective of a significantly developed science, but must on some occasions be repeated. In work in progress, we investigate some further properties of Spice, Taste, Bubblemint, and the Generalized Pizza Condition.

## References

---

Alcock, K.J., R. Passingham, K.E. Watkins, and F. Vargha-Kahdem. 2000. Oral dyspraxia in inherited speech and language impairment and acquired dysphasia. *Brain and Language* 75, 17-33.

Carden, Guy. 1985. A note on datives in the BG framework. *University of Chicago Working Papers in Linguistics*. Volume 1. pp. BG13-19.

Edwards, J., M. E. Beckman, and J. Fletcher. 1991. The articulatory kinematics of final lengthening. *JASA* 89(1): 369-382.

MacNeilage, P. F. 1998. The "Frame/Content" theory of evolution of speech production. *Behavioral and Brain Sciences* 21: 499-511.

MacNeilage, Peter F. and Barbara L. Davis. 2000. On the origin of internal structure of word forms. *Science* vol 288, 21 April.

Wilkie, W. 1985. *That-trace, that face, that place, etc.* Unpublished ms.

---

<sup>1</sup> This work is the child of an earlier generation of grammatical theory, and is a lightly edited revision of a paper that appeared in the *University of Chicago Working Papers in Linguistics* (Volume 1) in 1985. I was indebted at the time to several useful suggestions from Jessie Pinkham and George Lakoff, and I thank Jeni Parham for comments on a recent rewrite. Haj Ross was my teacher in graduate school, and it is from him that I learned to really do syntax, so I am, or at least I must be, heavily indebted to him for all of the insights contained in this paper.

<sup>2</sup> Rutman (n.d.) has articulated a rather different approach to this question, though pursuing a similar insight. He notes, "The mouth is not, as some would have it, the

---

evolutionary link between chewing and speaking, but the moral interface between the soul and the body. Thought—the flowing, incorporeal issue of the soul—is given concrete form through the organs of speech. Speech, which can be employed for good or for evil; to promote peace or propagandize for war, to commune with G-d or to deny His existence.” See Rutman’s <http://www.torah.org/features/secondlook/missinglink.html>. James Q. Jacobs has suggested that increased jaw strength due to developing animal-hunting skills may have been instrumental in the development of human language. See his <http://www.jqjacobs.net/anthro/paleo/scavenging.html>.

It is, however, Peter MacNeilage who has most energetically pursued the general perspective sketched in the Bubblemint/Grinding model, notably in MacNeilage 1998, and widely discussed in the popular press (e.g., *New York Times*, May 18, 2002: “Some Language Experts Think Humans Spoke First With Gestures,” Emily Earkin). The interested reader may also wish to pursue the biogenetic link between language, chewing, and swallowing analyzed in the famous language-gene case (see in particular Alcock, Passingham, Watkins, and Vargha-Kahdem 2000 – really). I may treat the subject more thoroughly in a paper in progress provisionally entitled “Chewing the fat: the origins of human language.” Be that as it may, it may not be entirely preposterous to consider early work in Bubblemint and Grinding theory – in the early 1980s, largely inspired by the present paper – to be seminal to this recent rush of academic activity. Then again, maybe it would be.

<sup>3</sup> An alternative formulation of this principle has been discussed in the literature under the rubric of the Empty Claims Principle (ECP).

<sup>4</sup> I am indebted to George Lakoff for this observation.

<sup>5</sup> Others have followed up on this suggestion; see, for example, Edwards, Beckman, and Fletcher 1991.

<sup>6</sup> In French, with both prepositions and adjectives that follow the head, there is evidence that the adjectives are themselves Taste-assigners, or else there is evidence that adjectives are shifted to the right from a pronominal position after the Taste-filter applies.