Chapter 1

Introduction: What is Phonological Analysis?

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Two subfields of linguistics deal with the 'sound aspect' of language: phonetics and phonology. Phonetics studies the production, the acoustic properties and the perception of speech sounds, while phonology studies the *sound patterns* in language. To put it differently, phonetics is about sound *substance* and phonology is about the sound *system*, the way speech sounds *'behave'* systematically (in a particular language or in languages in general). **Phonology** is categorical, i.e. its rules are clear-cut, 'black and white', as opposed to phonetics, which concerns itself with phenomena that are, by nature, gradual, 'shades of grey'.

As alphabetical spelling is always an imperfect reflection of sound shape (think of the several different sounds the letter *O* can stand for in English: e.g. [oʊ] *go*, [ɒ] *got*, [ʌ] *son*, [ɪ] *women*, [ɔː] *story*, [uː] *lose*, [ə] *atom*), phonetic phenomena and phonological patterns are to be described irrespective of the spelling.

This course is an introduction to *phonological analysis*: our main topic is how sound patterns can be analysed.

The analysis one comes up with can be interpreted in two ways. One may take a *realist* stance and claim that the 'right' analysis is psychologically real in that it is identical to the native speaker's internalised phonological grammar, i.e. it is what is actually represented or 'encoded' in some way in the native speaker's mind. Alternatively, one may be an *instrumentalist* in claiming that no such connection between analysis and psychological reality exists: if different analyses can account for the same facts equally well (i.e. they describe the same pattern), then one may be preferred to the other(s) on the grounds of simplicity (which one is the simpler analysis according to some measure), 'elegance' (whatever it means), etc., but not on the basis of 'reality'. An instrumentalist would argue that we do not know enough about the human brain to claim that our models are 'real' in this sense. Linguists of the realist inclination claim that phonological universals (recurrent phonological patterns in the world's languages) show what a possible phonological pattern is for humans in general, and thus argue for the psychological reality of the 'correct' analysis.

Our principal aim is not so much to single out the one 'right' analysis, or argue about its interpretation, but

(a) to show that phonological analysis is 'non-unique' because, on the one hand, the possibility of a certain analysis depends on the theoretical framework that one assumes ('viewpoint creates the object' to be analysed), and, on the other, even within the same framework more than one 'observationally adequate' analysis is frequently possible (an observationally adequate analysis is one that can account for the facts in a fully explicit way: it can determine for any utterance (sentence) if it is well-formed or not); and

(b) to give the student an idea of how to argue for or against a particular analysis, how to identify the choices, decisions and consequences involved, to weigh the pros and

cons, the 'costs and benefits' of alternative analyses by examining the predictions particular analyses make and confronting these predictions with data so that some of the analyses may be falsified, i.e. shown to be false.

Throughout the course (which is part of an English BA programme) we shall analyse the sound pattern of English, primarily that of Southern Standard British English (BrE), but we shall also frequently discuss General American (AmE) and occasionally mention other accents of English.

1.1. Phonological patterns

There are three kinds of phonological patterns that we aim to account for in a phonological analysis:

(a) *allophonic patterns*, i.e. the distribution of non-contrastive sound features.
E.g. L-darkening (when is /l/ dark and when is it clear?)

(b) *morpho-phonological patterns*, i.e. the distribution of non-contrastive OR contrastive sound features in the allomorphs (alternants) of the same morpheme (i.e. how a sound feature alternates).
E.g. voicing in the allomorphs of the plural {-s} in English (when is the plural realised as [s] and when is it realised as [z]/[ɪz]?)

(c) *phonotactic patterns*, i.e. how sound segments can combine into words.
E.g. which consonants can occur initially in a three-term cluster at the beginning of an English word? (e.g. [#spl-] is possible in English but [*#psl-] is not)

In phonological analysis these patterns are described

(i) with reference to two *levels of representation*, the phonological/underlying representation (UR) and the phonetic/surface representation (SR) and

(ii) with reference to their relationship, the *mapping* of the underlying representation onto the phonetic representation (i.e. the derivation, see later).

We summarise the properties of the two levels of description in (1):

(1) The two levels of description

phonetic	↔	phonological
surface representation (SR)	↔	underlying representation (UR)
sounds	↔	phonemes
predictable + unpredictable features	↔	only unpredictable features
redundant + distinctive features	↔	only distinctive features
transcription: [ ]	↔	transcription: / /

Each utterance has these two representations. The predictable properties of sound patterns (e.g. darkening of /l/ in BrE) are not part of the underlying representation, but are expressed by the mapping of the underlying representation onto the surface representation by phonological rules such as (2) below

(2) $l \rightarrow ɫ \; / \; \_\_ \; \{C, \#\}$

Thus, the surface representation of an utterance consists of predictable ***and*** unpredictable features of sound and is basically the utterance as it is articulated/transmitted/heard.[1] The underlying

[1]This is a(n over)simplification: the surface representation also abstracts away from certain sound properties that belong 'performance' (as opposed to competence), such as the individual characteristics of the speakers's voice, the effect of (various degrees of) drunkenness or fatigue on pronunciation, hypercorrection/overarticulation due to nervousness, etc.

representation, then, is an abstraction that only[2] 'records' the unpredictable sound properties, and thus encodes contrast (i.e. properties that can minimally distinguish morphemes/words from one another.)

The 'AS IF' assumption

The way in which the phonological 'behaviour' or 'value in the pattern' is encoded in this approach can be informally summarised in the 'AS IF' assumption. Phonological analyses in general are based on this assumptions which consists of two (related) parts

(3) The 'AS IF' assumption

a. If two or more units of the phonetic/surface representation 'behave as if they were' the same, then they ***are*** the same phonologically/underlyingly.
b. If a unit *X* of the phonetic/surface representation 'behaves like' unit *Y*, then *X* and *Y* ***are*** the same phonologically/underlyingly in some respect.

In (1a) the expression 'behave as if they were the same' means that the two or more units of the given surface representation do not contrast: again, an obvious example is dark [ɬ] and clear [l] – they are phonologically the same, namely the phoneme /l/ (they are in complementary distribution and hence, cannot contrast). It is not a trivial question how much significance the analyst should attribute to the presence or the absence of *surface* contrast (i.e. minimal pairs), whether the presence of contrast at the surface necessarily means the presence of underlying contrast as well. The answer will essentially determine the 'distance' between the two representations, i.e. how *abstract* the underlying representation is. We shall address the problem of abstractness in Chapter 2 (and in passing in Section 1.2 of this chapter).

In (1b) the expression 'behaves as' has a somewhat different meaning: *X* and *Y* are

[2]You will see in Chapter 3 that this view of the underlying representation may be questioned: contrast may utilise features that are actually predictable.

considered to behave in the same way if they follow the same pattern, if they have similar/identical distributions – in this case they belong to the same category, they are members of the same class of objects.

A simple example is the English consonant [w]. Phonetically, [w] is labio-velar, i.e. it has two places of articulation (two 'articulatory gestures'), a labial one and a velar one. Phonologically, however, it is clearly a labial (and not velar) since it patterns with the labials phonotactically. Consider the way stops and non-nasal sonorants combine into word-initial consonant clusters.

(4) Word-initial stop + non-nasal sonorant clusters

	l	r	w	j
p	+	+	–	+
b	+	+	–	+
t	–	+	+	+
d	–	+	+	+
k	+	+	+	+
g	+	+	+	+

Phonologists explain this pattern by saying that the missing combinations are those where the two consonants have the same place of articulation (they are 'homorganic'). */tl/ is not possible word-initially because both consonants are alveolar, but /kr/ is possible since /k/ is velar and /r/ is post-alveolar. This shows that /w/ is labial *phonologically/underlyingly* since */pw/ and */bw/ are missing and /p/ and /b/ are labial (not labio-velar or velar).

Another example is *á* [aː] in Hungarian. Phonetically [aː] is a central vowel, but phonologically/underlyingly it is a back one, since it patterns with the back vowels in vowel harmony: e.g. the suffix in ***h****á****z-b****a****n*** (where the stem vowel is *á* [aː]) is *-ban* just like in the word ***ó****l-b****a****n* where the stem vowel *ó* [oː] is phonetically truly back. Thus /aː/ is *phonologically/underlyingly* back – even if at the surface it is realised as a central vowel..

In section 1.2, we give you an illustration of how phonological analysis works.

1.2. Example: the phonological analysis of the velar nasal [ŋ] in English

Phonetically, there is nothing special about [ŋ]: it is like the other English nasals [m] and [n] (all three are sonorant, voiced, non-continuant), and differs from them only in place of articulation (velar as opposed to labial and alveolar, respectively). Distributionally, however, [ŋ] is curiously different from the other two. Consider Figure (5):

1.2.1 Limited contrast

(5) The distribution of [ŋ]: limited contrast

			[m]	[n]	[ŋ]	possible contrast with other nasals
i.	morpheme-initially	#_	***m**ap*	***n**ap*	–	NO
ii.	morpheme-medially	_V	*E**mm**y*	*a**n**y*	–	NO
		_C	*li**m**p*	*li**n**t*	*li**n**k* [lɪŋk]	NO
iii.	morpheme-finally	_#	*so**me***	*su**n***	*su**ng*** [sʌŋ]	YES

As you can see in (4i), [ŋ] does not occur morpheme-initially. There are no morphemes/words in English like *[ŋæp], for instance. In this property, it is unique among the consonants of English as all the other consonants can occur in this position.[3]

[ŋ] also does not occur morpheme-medially before a vowel, thus *[eŋi] is not a possible morpheme, see (4ii). (There are very few exceptional morphemes with a truly morpheme-medial prevocalic [ŋ], notably *hangar* [ˈhæŋə], and words ending in *–ingham*, e.g. *gingham* [ˈgɪŋəm], *Nottingham* [ˈnɒtɪŋəm], etc. Note that words like *singer* [ˈsɪŋə], *longish* [ˈlɒŋɪʃ], *hanging* [ˈhæŋɪŋ] etc. are not counterexamples because in these words [ŋ] is not prevocalic *within the morpheme* since it is always followed by a (strong) morpheme boundary: [#sɪŋ#ə#], [#lɒŋ#ɪʃ#], [#hæŋ#ɪŋ#].) Again, the fact that [ŋ] does not occur in this position makes [ŋ] unique among

[3]With the possible exception of [ʒ], which only occurs initially in a few (typically learned) recent French loans like *genre* [ˈʒɑ̃:rə] .

the consonants of English: all the other consonants can occur in this position.

[ŋ] does occur morpheme-medially before a consonant, e.g. *li**n**k* [lɪ**ŋ**k], *ta**n**go* [ˈtæŋgoʊ], etc.(2ii). This, however, does not mean that it contrasts with the other nasals in this position. The reason is that (due to another phonotactic constraint) nasals must be homorganic with the following consonant within the morpheme. Thus, preconsonantally within the morpheme [ŋ] can only occur before /k, g/ (which are the other two velar consonants in English) – where the other nasals /m, n/ cannot occur as they are not velars. Note again that words like *banged* [bæŋd], *youngster* [ˈjʌŋstə] are not counterexamples because in these words [ŋ] is not preconsonantal *within the morpheme* since it is followed by a (strong) morpheme boundary: [#bæŋ#d#], [#jʌŋ#stə#], etc.

Morpheme-finally [ŋ] is well-behaved: it does occur and this is the only position where it can contrast with the other nasals, cf. the minimal pair *sin* [sɪn] vs. *sing* [sɪŋ] (5iii).

The distribution of [ŋ] suggests that it belongs to a nasal phoneme of English that is distinct from /m/ and /n/ – if one accepts the 'once a phoneme, always a phoneme' principle. According to this principle (which was a tenet of taxonomic phonology, see Chapter 2), if two sounds contrast in *some* environment, their difference should *always* be assumed to be distinctive.[4]

However, a phonological analysis of [ŋ] should be able to explain its curiously unique distribution and (consequently) the extremely restricted possibility of contrast (its limited 'functional load') compared to other English consonants. We should be able to give an analysis that can connect this with other facts of English phonology and come up with a representation and mapping that explains these facts.

1.2.2 [ŋ] vs. [ŋg]

Another interesting distributional property can be seen if we compare the distribution of 'plain'

[4]To put the same thing in a different way: if a sound is assumed to be the allophone of phoneme X, it must be the allophone of phoneme X only (this was referred to as the requirement of 'biuniqueness' by N. Chomsky later).

[ŋ] (i.e. [ŋ] not followed by velar consonants) and [ŋ] plus velar consonant clusters ([ŋk, ŋg]):

(6) 'Plain' [ŋ] and [ŋg] in complementary distribution

	[ŋ]	[ŋg]	[ŋk]
morpheme finally	*sing* [sɪŋ]	–	*sink* [sɪŋk]
morpheme medially	–	*anger* [æŋgə]	*anchor* [æŋkə]

As can be seen in (6), [ŋ] and [ŋg] are in complementary distribution: [ŋg] *never* occurs before a morpheme boundary (e.g. *sing* [#sɪŋ#] but *[#sɪŋg #], *singer* [#sɪŋ#ə#] but *[#sɪŋg #ə#]) while [ŋ] can occur *only* before a morpheme boundary (e.g. *finger* [#fɪŋgə#] but *[#fɪŋə#]). (There are but a handful of counterexamples to this: (i) on the one hand, the word *hangar* and those ending in *–ingham* mentioned above, where 'plain' [ŋ] occurs without a following morpheme boundary, (ii) on the other hand, the words *longer, stronger, younger, longest, strongest, youngest,* all pronounced with [ŋg], where [ŋg] occurs before a morpheme boundary.[5]) This complementary distributional relationship between single segments and the clusters containing them does not generally hold for other single segments and clusters in English: compare e.g. [ŋ] - [ŋk]: *sing* [sɪ**ŋ**], *sink* [sɪ**ŋk**]; [n] - [nd]: *money* [mʌ**n**i], *Monday* [mʌ**nd**i], *ten* [te**n**], *tend* [te**nd**]; [s] - [st]: *soul* [**s**oʊl], *stole* [**st**oʊl], *decimate* [ˈde**s**ɪmeɪt], *estimate* [ˈe**st**ɪmeɪt], *miss* [mɪ**s**], *mist* [mɪ**st**], etc. Preferably, an analysis should explain this unique relationship between [ŋ] and [ŋg].

1.2.3 Pre-[ŋ] vowels

Only the phonologically short vowels [ɪ, e, æ, ʊ, ʌ, ɒ] can occur before [ŋ] – there are no words like *[eɪŋgə] or *[θi:ŋ]. (Usually, *oink* [ɔɪŋk] is cited as the only counterexample. But

[5]This may be attributed to the different status of the morpheme boundary before comparative *-er* and superlative *-est*, see Chapter 8.

note that *oink* is not a 'true' word, but an onomatopoeic expression.) This, again, is a unique characteristic of [ŋ]. Other single consonants place no restriction on the length of the vowel preceding them – phonologically long and short vowels can equally stand before them: e.g. *hat* [hæt] – *hate* [heɪt], *letter* ['letə] – *meter* ['mi:tə], etc.

We have seen that in many ways [ŋ] is distributionally unique among the English consonants. Let us now review some phenomena that are independent of [ŋ], but can be brought into an analysis that can account for the singular properties of [ŋ].

1.2.4 Some independent facts

1.2.4.1. Nasal plus stop clusters

The first of these facts is one that has already been referred to: the phonotactics of morpheme-final nasal+stop clusters. Figure (7) shows the possible combinations of nasals followed by stops at the end of a morpheme.

(7) Word-final nasal-plus-stop clusters

	voiceless stop			voiced stop		
	p	t	k	b	d	g
m	lɪmp	–	–	–	–	–
n	–	tent	–	–	lend	–
ŋ	–	–	lɪŋk	–	–	–

The following two generalisations can be made on the basis of (4) above:

(8) i. $C_{[nasal]}C_{[stop]}$ clusters must be homorganic (i.e. agree in place) within the morpheme.
ii. Non-coronal voiced stops do not occur after nasals morpheme-finally.

1.2.4.2. Onset clusters and sonority

The second fact concerns the phonotactics of the onset. As is discussed in the chapter on syllable structure (Chapter 4), onsets have a rising sonority in English, so syllables like *[**lp**eɪ],*[**rt**aɪ],*[**wt**ɪst] are ill-formed as opposed to syllables like *play* [**pl**eɪ], *try* [**tr**aɪ] and *twist* [**tw**ɪst], which are well-formed.

1.2.4.3. The length of vowels before morpheme-final consonant clusters

The last relevant independent fact is about the phonological length of vowels before morpheme-final consonant clusters. There is no restriction on phonological vowel length before **coronal clusters** (clusters both of whose consonants are coronal), i.e. both phonologically long (tense) and short (lax) vowels can precede a morpheme-final coronal cluster: *mount* [maʊnt], *sent* [sent], *field* [fiːld], *build* [bɪld], etc. However, before morpheme-final **non-coronal clusters** the following restriction applies:

(9) Only the phonologically short vowels [ɪ, e, æ, ʊ, ʌ, ɒ] can occur before morpheme-final non-coronal clusters

Thus, hypothetical English words like *[eɪŋk] and *[hiːlp] are ill-formed as opposed to *tank* [tæŋk] and *help* [help], which are well-formed.

1.2.5. Analysis

Based on the facts discussed in 1.2.1, 1.2.2, 1.2.3, and 1.2.4 above we can make the following observation:

(10) [ŋ] behaves as if it were a non-coronal cluster, specifically, a cluster of a nasal plus a voiced velar stop

In accordance with the 'AS IF' assumption this means that 'plain' [ŋ] is actually a cluster of a nasal plus a voiced velar stop *phonologically*: /$C_{[nasal]}$g/. This means that phonologically, there is no difference between [ŋ] and [ŋg], since both are underlyingly /$C_{[nasal]}$g/. This makes it possible to analyse [ŋ] as an allophone of /n/ since now (given the assumptions above) [ŋ] only occurs if it is followed by an underlying /k/ or /g/, a position where [n] never occurs (they are in complementary distribution). Therefore, [ŋ] (and [ŋg]) is underlyingly/phonologically /ng/.

1.2.5.1 Benefits

What are the benefits of analysing [ŋ] as /ng/? It is an attractive analysis since it manages to explain (by linking them with independent facts) the unique properties of [ŋ] we discussed above.

(i) It can explain why [ŋ] does not occur morpheme-initially (see 1.2.1): because morpheme-initially /ng/ would form an onset with falling sonority, which is ill-formed in general (see 1.2.4.2);

(ii) It can explain why the /g/ of /ng/ does not appear phonetically in words like *sing*: because non-coronal voiced stops do not occur after nasals morpheme-finally in general (see 1.2.4.1);

(iii) It can explain why 'plain' [ŋ] and [ŋg] do not contrast (see 1.2.2): because phonologically they are the same: both are surface realisations of /ng/;

(iv) It can explain why pre-[ŋ] vowels must be short (see 1.2.3): because only short vowels can occur before non-coronal consonant clusters in general and /ng/ is a non coronal cluster phonologically.

1.2.5.2 Costs

What does this analysis 'cost' us compared to the standard taxonomic one which analyses [ŋ] as a realisation of the phoneme /ŋ/ based on its surface contrast with [n, m] in morpheme-final position?

(i) *Theoretically*, the main item on the costs side is a higher degree of abstractness.[6] The phonological representation assumed by the **generative** analysis proposed in 1.2.5 is more abstract than the one assumed by the standard taxonomic approach. This manifests itself

(a) in the rejection of the 'once a phoneme always a phoneme principle' and, more importantly, the rejection of the idea that *surface* contrast is a surefire indicator of underlying/phonological contrast. In the generative analysis [ŋ] and [n] are realisations of the same underlying segment *although* [ŋ] and [n] *do* contrast at the surface;

(b) as the possibility that the location of underlying and surface contrast need not be the same: there is a surface contrast between the nasals [ŋ] and [n] in e.g. *sing* [sɪ**ŋ**] vs. *sin* [sɪ**n**], but in the generative analysis the underlying/phonological contrast is 'really' between the presence vs. the absence of /g/: /sɪn**g**/ vs. /sɪn/, i.e. not the nasals at all!

(ii) '*Technically*', the generative analysis is more complex than the taxonomic one. While the latter only has a simple allophonic rule referring to [ŋ], according to which the phoneme /ŋ/ is always realised as [ŋ], the generative analysis must have a more complex mechanism that maps underlying /ng/ sometimes to [ŋ] and other times to [ŋg] at the surface.

The difference between the phonological status of [ŋ] in a taxonomic and a generative analysis is illustrated in (10).

[6]See a detailed discussion of abstractness in Chapter 2.

(11) The phonological status of [ŋ] in a taxonomic and a generative analysis

		taxonomic analysis	generative analysis
	SR	UR	UR
sin	[sɪn]	/sɪn/	/sɪn/
sing	[sɪŋ]	/sɪŋ/	/sɪng/

It must be noted that if we decide that the benefits outweigh the cost, and choose the generative analysis proposed in 1.2.5, then we must work within a theoretical framework that allows for the abstractness discussed above. In this book we adopt such a framework called *generative phonology*.

1.3. Generative phonology

Generative phonology implements the 'AS IF' assumption in the following way. Phonological 'behaviour' is represented by the mapping between the phonological representation and the phonetic representation, i.e. by the mechanism of *derivation* in which the phonetic (surface) representation is derived from the phonological (underlying) representation by the application of a set of phonological *rules* which are *sequentially ordered*. Phonological rules change representations by adding predictable properties to the representation (input) to which they apply. The generalised format a phonological rule is this:

(12) $A \rightarrow B / C \_\_ D$

which means that *A* changes to *B* if it is between *C* and *D* (i.e. *CAD→CBD*) where *A*, *B*, *C* and *D* may be segments or features and *C*, *D* may also be morphological or prosodic boundaries or constituents (e.g. strong (#) or weak (+) morpheme boundary, syllable boundary, onset, rhyme etc.).

Phonological rules are only sensitive to their immediate input, so if the state of affairs required by a rule i.e. its *structural description* is satisfied by an input at the point in the derivation where the rule is ordered (*CAD*), then the rule applies and changes the input in the way described in the rule, i.e. the

structural change (*CBD*).

Thus a generative phonological analysis aims to 'explain' the phonological pattern by (i) identifying what the phonological (underlying) representation is, (ii) identifying what the phonological rules are; and (iii) showing how the rules apply to derive the phonetic (surface) representation from the underlying one (by identifying their ordering and application). We illustrate this below using [ŋ] as an example.

1.3.1 Deriving [ŋ]

Assuming that the underlying representation of [ŋ] is /nɡ/, we need two rules to account for the surface distribution/realisation of [ŋ]. **Nasal Place Assimilation** expresses the regularity we observed in (8i) ('*α*place' means 'the same place given elsewhere in the rule'):

(13) [nasal] → [*α*place] / __ [stop, *α*place]

Rule (13) applies within the morpheme and makes a nasal homorganic with the following stop. The other rule is **Post-nasal g-deletion**, a special case of the regularity observed in (8ii):

(14) ɡ → ∅ / [nasal] __ #

Rule (13) deletes a /ɡ/ after a nasal and before a strong[7] morpheme boundary.

The derivations of *sing*, *singer* and *finger* are as follows:

[7]It is possible to analyse the comparative and the superlative suffixes as having a weak boundary – hence the presence of [ɡ] in words like *younger* ['jʌŋgə], see Chapter 9.

(15) underlying representation	/#sɪng#/	/#sɪng#ə#/	/#fɪngə#/
(13) Nasal Place Assimilation	#sɪŋg#	#sɪŋg#ə#	#fɪŋgə#
(14) Post-nasal g-deletion	#sɪŋ#	#sɪŋ#ə#	–
surface representation	[sɪŋ]	[sɪŋə]	[fɪŋgə]

Note that crucially, (13) has to be ordered before (14) because if the /g/ is deleted first, Nasal Assimilation cannot apply since its environment is no longer satisfied. Given the underlying representations, the rules and their ordering in (15), the surface patterning of [ŋ] is accounted for, i.e. the correct surface forms are derived in all cases.

1.4. Summary

The main point of this chapter is that an analysis is *underdetermined* by facts: in addition to the observed facts the possibility of a particular analysis is crucially determined by (i) the *theoretical framework* one adopts and (ii) *how much* importance one attributes to *which* facts – and this latter, at least partially, also derives from the theoretical framework (this is what is meant by 'viewpoint creates the object'). To take the example of [ŋ], if the analyst adopts a taxonomic framework, then (s)he will see the surface contrast (e.g. between *sin* vs. *sing*) essentially important and the analysis will treat the facts discussed in 1.2.1, 1.2.2, 1.2.3 *and* their relationship to those discussed in 1.2.4.1, 1.2.4.2 and 1.2.4.3 as accidents (and thus irrelevant). If however, the analyst adopts the framework of generative phonology, then the facts discussed in 1.2.1, 1.2.2, 1.2.3 and their relationship to those discussed in 1.2.4.1, 1.2.4.2 and 1.2.4.3 can be seen essentially important, facts that the analysis must account for while the actual surface contrast between *sin* [sɪn] vs. *sing* [sɪŋ] is no more than a by-product of the mapping.

1.5. Checklist

★ phonology vs. phonetics
★ allophonic patterns
★ morpho-phonological patterns
★ phonotactic patterns
★ underlying representation
★ surface representation
★ derivation/mapping
★ contrast
★ the distribution of [ŋ]
★ the taxonomic analysis of [ŋ]
★ the generative analysis of [ŋ]
★ generative phonology
★ generative phonological analysis
★ the formalism of phonological rules
★ rule ordering
★ Nasal Place Assimilation
★ Post-nasal g-deletion
★ ‘viewpoint creates the object’
★ ‘once a phoneme, always a phoneme’ principle.