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Turbid Output Representations and the Unity of Opacity[1]

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0. Introduction: The Hobgoblin of Opacity

As proposed in Prince & Smolensky (1993), the grammatical mechanisms of Optimality Theory (OT) are output-based. For example, the constraint component CON consists of two types of constraints that adhere to this strategy of explanation. *Faithfulness* constraints evaluate the equality of the input and the output only; they do not consider failed candidates or morphologically related forms. *Structural Harmony* constraints evaluate the structural well-formedness of the output only; they do not consider the presence or absence of structure in the input. Similarly, the evaluation component EVAL decides the relative harmony of all candidates in one optimization; it does not allow for intermediate forms between the input and output.

Problematic for this approach is the existence of opacity effects (Kiparsky, 1971, et. seq.), which involve the violation of faithfulness unmotivated by surface structural harmony. These effects are inexplicable in the proposed grammar: all unfaithful mappings must be surface motivated.

Such effects were easily explained in derivational frameworks by the utilization of intermediate representations. Rules could apply at these intermediate representations, altering underlying structure; later derivational stages were free to eliminate the structures that triggered these rules. This type of explanation is not available to us in the proposed grammar; by hypothesis, there are no intermediate representations.

[1] This paper is based on ongoing work with Paul Smolensky. Portions of this work were presented at the Hopkins–University of Maryland–Rutgers University Meeting (HUMDRUM) in March 1999 and the University of Maryland Mayfest 1999. Thanks to Mark Allen, Laura Benua, Luigi Burzio, Lisa Davidson, Paul Hagstrom, Rolf Noyer, the participants of HUMDRUM and Mayfest, and especially Colin Wilson and Paul Smolensky for insightful comments and discussion. All errors are mine alone.

The question we then face is: how should we increase the descriptive power of OT? Previous OT researchers (e.g. Benua, 1997; McCarthy, 1998) have detailed proposals that deviate from the output-based explanatory strategy of Prince & Smolensky (1993). In particular, these proposals have advocated altering CON to include constraints that relate the candidate output to forms other than the input.

In contrast to these approaches, we propose that output representations must be reconceptualized: they must contain covert/'Turbid' structure[2]. The output of the grammar will now contain unpronounced material which can influence the 'surface'—the portion of the output which is pronounced. By utilizing a single, complex output representation, we can maintain the output-oriented approach of Prince & Smolensky (1993) while extending our descriptive coverage to include opacity effects.

1. Turbid Primitives and Compensatory Lengthening: The Case of Luganda

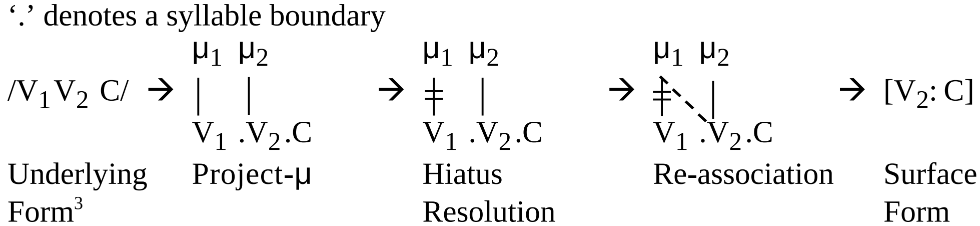
1.1 Vowel Deletion

To illustrate the proposed approach, let us examine the restrictions on vowel length in Luganda (Bantu: Clements, 1986; Rosenthal, 1994; Wiltshire, 1992, 1999). In this language, vowel length is generally contrastive, with several notable exceptions. First let us focus on the facts illustrated in (1): vowels are always long following deleted vowels.

(1) /ka + tiko/ → katiko 'mushroom'
/ka + oto/ → ko:to 'fireplace (dim.)'
/ka + ezi/ → ke:zi 'moon (dim.)'

Derivationally, this can be analyzed as follows (adapted from Clements, 1986):

(2) '.' denotes a syllable boundary



This rule ordering produces opacity: Project-μ is counter-bled by Hiatus Resolution. In OT terms, the surface vowel is unfaithful to its underlying length without surface motivation.

How can these facts be accommodated in the OT framework? We propose to re-interpret the two autosegmental relations of μ_1 by distinguishing between two types of output associations (see also Zec, 1995). We interpret the cancelled association line ǂ as

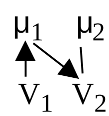
[2] This grows from 'containment' (Prince & Smolensky, 1993). OT precursors include: Cole & Kisseberth, 1994; Hagstrom, 1997; Ito & Mester, 1994; Kager, 1997; Merchant, 1996; Zec, 1995.

[3] Following Richness of the Base (Prince & Smolensky, 1993), we do not assume moras are systematically present in the input; the pattern is presumed to hold regardless of the underlying weight of the vowels.

denoting Projection—an abstract, structural relationship between the mora and the vowel (roughly equivalent to notions of “Licensing”). In contrast, we interpret the dotted association line ⋱ as denoting Pronunciation—an output relation that describes the surface realization of structure. The output structure in (2) can thus be interpreted as encoding μ_1’s relation to both vowels: μ_1 is Projected by V_1 but Pronounced as V_2.

Our constraints can now be re-written to take full advantage of this representational extension. This can be seen through examination of the pattern of constraint satisfaction and violation associated with the optimal structure for the vowel deletion case. The optimal structure is shown below. Projection relations are depicted as up arrows; Pronunciation relations are depicted as down arrows. A solid line depicts cases where both relations hold between the two autosegments; for example, in the structure below, μ_2 is Pronounced as V_2 and μ_2 is Projected by V_2.

(3)



This candidate structure satisfies MAX: *All input segments have a correspondent in the output.* Note that this constraint does not specify whether the correspondent must be Pronounced. The potential for compensatory lengthening arises due to the interaction of MAX with V-WT↗[4]: *All vowels must Project their own mora.* Again, note that this constraint is blind to the Pronunciation status of the vowel in the output—a vowel must Project a mora regardless of whether it is Pronounced or not. Together, these two constraints force the presence of V_1 and μ_1 in the output.

In order for the covertly present structure to have any effect on the output, the winning structure must satisfy the constraint PRONOUNCE-μ↘: *All moras must be Pronounced.* Again, note that this constraint is insensitive to the Projection status of the mora; it merely provides a pressure for all output moras to be Pronounced.

Finally, the optimal candidate also satisfies *VV↘: *Do not Pronounce two vowels adjacently.* This constraint will force the surface deletion of the vowel—but be insensitive to whether the vowel remains covertly present in the output.

The divergence of Projection and Pronunciation structure is not the unmarked state of affairs: usually, all autosegmental relations are audible. To express this, we define RECIPROCITY^X_Y ($\mathcal{R}^X_Y$): *If Y Projects to X, then X must Pronounce Y.* (Here, $\mathcal{R}^{\mu}_{RT}$: *If a root node Projects a mora, then the mora must Pronounce the root node.*) This constraint on the Realization of structure demands that Pronounce and Project agree; but it can be dominated by Structural Harmony constraints, forcing opacity.

The other constraint violated here is PRONOUNCE-RT↘: *All root nodes must be Pronounced*, as the vowel root node is present in the output but unPronounced.

The tableau in (4) illustrates the competition which produces the compensatory lengthening candidate as a winner.

[4] The arrow following each constraint is a mnemonic to indicate the relation to which the constraint is sensitive to (up arrow=Projection; down arrow=Pronunciation).

(4) Assume DEP-C undominated. The first line of each candidate denotes the surface (audible) structure of the candidate.

/ V_1 V_2 /	*VV↘	MAX	V-WT ↗	PRONOUNCE -μ↘	$\mathcal{R}\ \mu_{RT}$	PRONOUNCE -RT↘
A. [V_2] μ_2 | V_2		*!				
B. [V_2] μ_2 | V_1 V_2			*!			*
C. [V_2] μ_1 μ_2 ↑ | V_1 V_2				*!		
D. [V_1 V_2] μ_1 μ_2 | | V_1 V_2	*!					
☞ E. [V_2:] μ_1 μ_2 ↑ ↘ | V_1 V_2					*	*

Because MAX outranks $\mathcal{R}\ \mu_{RT}$ and PRONOUNCE-RT, the (inaudible) presence of V_1 is forced (candidate A). But the mere presence of V_1 is insufficient; the vowel must Project a mora (B) and the mora must be Pronounced (C). Ultimately, the high ranked *VV constraint prevents V_1 from Pronouncing the mora it has projected (D)[5], forcing the creation of opaque structure (E).

We have proposed a distinction between audible, surface autosegmental relations (Pronunciation) and abstract, structural relations (Projection). The unmarked case is for Projection and Pronunciation to agree ($\mathcal{R}\ \mu_{RT}$). However, Structural Harmony constraints can override this pressure, as illustrated here in Luganda, and produce opacity.

1.2 Extensions of the Analysis

Luganda exhibits other restrictions on vowel length. Vowels are always long before prenasalized stops and after consonant-glide clusters. These generalizations are illustrated in (5) below.

[5] The preference for not Pronouncing V_1 (as opposed to V_2) is not explained here (see Casali, 1997 for an analysis of hiatus resolution).

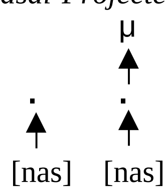
(5)	/ku + linda/	→	kuli:^{n}da	'to wait'
	/mu + ntu/	→	mu: ^{n}tu	'person'
	/ba + ntu/	→	ba: ^{n}tu	'people'
	/ki + buga/	→	kibuga	'town'
	/ki + uma/	→	k^{y}u:ma	'metal object'
	/mu + kazi/	→	mukazi	'woman'
	/mu + oyo/	→	m^{w}o:yo	'soul'

Clements (1986) analyses these facts as products of compensatory lengthening. For the prenasalization case, he assumes that all prenasalized stops are underlyingly /nC/. The /n/ projects a mora before it is absorbed into the following consonant (as the only surface codas in Luganda are geminates, the /n/ must be absorbed). The stranded mora then reassociates as in the vowel deletion case above. Similarly, for the glide cluster case, he assumes that all consonant-glide clusters are underlyingly /CV/; the vowel in this cluster projects a mora before it glides (in order to avoid hiatus).

Beginning with the prenasalization case, the Turbid analysis can be extended to account for these facts. First, if a nasal feature is present in the output, a Pronunciation constraint forces the nasal features to be Pronounced: PRONOUNCE-F↘: *Features must be Pronounced.* Since the features cannot be expressed on an independent segment (due to the restriction of codas to geminates), this constraint forces the nasal features to be Pronounced by the following segment.

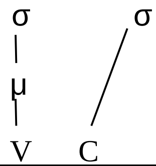
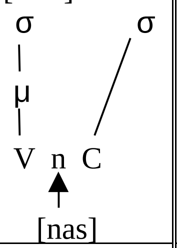
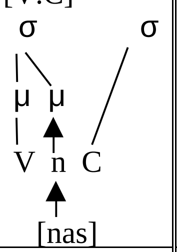
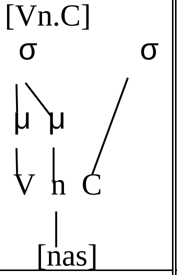
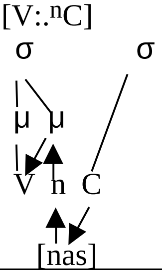
Second, nasal segments must be subject to a weight constraint similar to our V-WT constraint. This is defined in (6).

(6) NAS-WEIGHT↗: *A nasal-Projected root node must Project its own mora.*



The activity of this constraint, in conjunction with PRONOUNCE-μ, will force compensatory lengthening just as the constraint V-WT did above. This is illustrated in the tableau in (7).

(7) CODACOND➚: *Only the first half of a geminate may be Pronounced in coda.* GEN ban on the gemination of prenasalized stops prevents consonant lengthening (see Steriade, 1993).

/ V n C /	CODA COND ➚	MAX	NAS-WT ➘	PRONOUNCE -F, -μ➚	$\mathcal{R}^{\mu}{}_{RT}$ $\mathcal{R}^{RT}{}_{F}$ [6]	PRONOUNCE -RT➚
A. [V.C] 		*!				
B. [V.C] 			*!	*		*
C. [V.C] 				**!	**	*
D. [Vn.C] 	*!					
☞ E. [V:.ⁿC] 					**	*

[6] $\mathcal{R}^{RT}{}_{F}$: *If a feature Projects to a root node, then the root node must Pronounce the feature.*

The inaudible presence of the /n/ is forced by MAX dominating PRONOUNCE-RT (candidate A). As before, mere presence of the /n/ and its features is insufficient (B). Slightly better formed is the candidate which has the nasal projecting a mora (C), but this too is suboptimal. The nasal segment cannot Pronounce the mora (D) due to CODACOND. The opaque outcome is forced in order to satisfy Structural Harmony (E).

The consonant-glide cluster cases can be accounted for using our current set of constraints (in a manner similar to the prenasalization case). V-WT will cause the underlying vowel/surface glide to Project a mora, while PRONOUNCE-F will cause the vowel features to be realized as a secondary articulation on the consonant (Rosenthall, 1994). This extension of the Turbid analysis (following Clements' lead) has provided an example of the descriptive adequacy of the representational extension.

1.3 Comparison with the Sympathetic Account of Opacity

Sympathy (McCarthy, 1998, 1999) provides an alternative analysis of opacity effects within OT. In this approach, opacity is conditioned by a faithfulness relation between the output and some failed candidate(s) (designated the flower candidate(s)). The flower candidate is the most harmonic candidate which satisfies some designated faithfulness constraint (the sympathetic selector).

In order to better understand the contrast between Sympathy and Turbidity, we can sketch a Sympathy analysis of Luganda (based on McCarthy, 1999):

Prenasalization case: sympathetic selector is UNIFORMITY(*coalescence). Unlike the output, the flower candidate lacks coalescence of nasal and following consonant. A Project-μ constraint causes the nasal to project a mora in this candidate. Faithfulness to the mora count of this flower candidate (Sym_{UNI}) causes lengthening in the output.

Vowel deletion case: sympathetic selection is MAX[7]. The deleted vowel is present in the flower candidate. As above, Project-μ causes the vowel to project a mora. Faithfulness to the mora count of this flower candidate (Sym_{MAX}) causes lengthening in the output.

For the case of Luganda, we can now contrast the mechanisms of opaque interactions assumed in these approaches[8]. In both analyses, two covert processes produce moras that could induce lengthening: (1) underlying vowels project moras; (2) underlying nasals project moras. Given that a mora has been covertly produced by some process, what is the mechanism that forces the appearance of that mora on the surface?

For Turbidity, a single pressure applies to both moras and forces them to appear on the surface: PRONOUNCE-μ >> $\mathcal{R}\,\mu_{RT}$. This is illustrated in (8) below.

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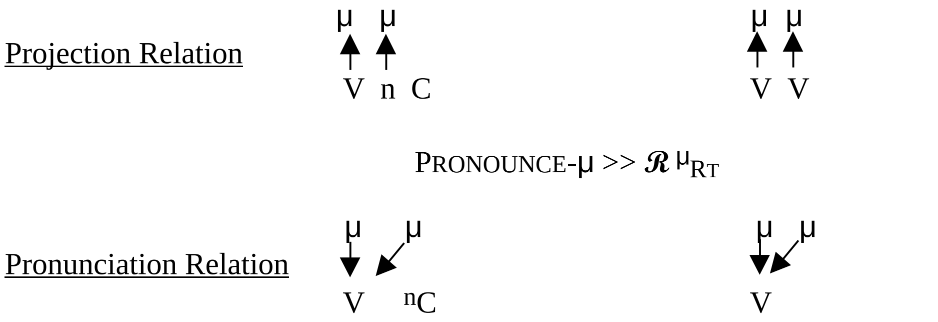
[7] This assumes that the outcome of hiatus resolution is the deletion of the vowel, not coalesence of the two vowels into one long vowel. The point, however, can be made for any two processes that have the same outcome but violate two different faithfulness constraints.

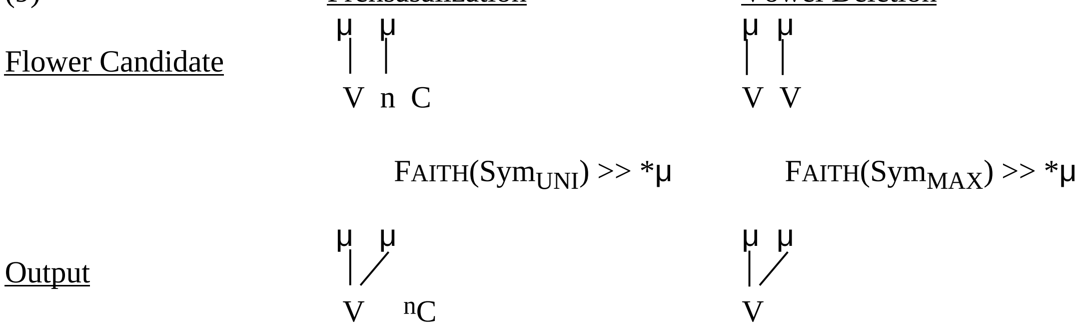
[8] Note that no claims are being made about differences in descriptive power, restrictiveness, etc.: we are comparing the separate types of formal mechanisms deployed in account for these facts.

(8)



In contrast, Sympathy assumes that two different pressures produce the surface lengthening: FAITH(Sym$_{UNI}$) >> *μ and FAITH(Sym$_{MAX}$) >> *μ. The pressure for a mora to appear on the surface is dependent on what Faithfulness violation produced the mora (as depicted in (9) below).

(9)



Lugandan compensatory lengthening provides for a distinct contrast between these two approaches to opacity. In the Sympathy approach, the pressure for covert moras to become audible is based on what process produced the mora; in Turbidity, a single pressure applies to all covert moras.

2. Transderivational Opacity: German Dorsal Fricative Assimilation

2.1 German Resyllabification Effects

Having considered opacity at the moraic/segmental interface, we now turn to an opacity case at the syllabic/segmental interface. As illustrated in (10) below, German exhibits syllable bounded fricative assimilation in [back] (data from Hall, 1989; Merchant, 1995, 1996; Moltmann, 1990).

(10) '-' denotes a morpheme boundary

[x] after tautosyllabic back vowels		[ç] elsewhere	
.bu[x].	'book'	.pe[ç].	'bad luck'
.na[x].	'after'	.ge.sprä[ç].	'conversation'
.ma.so[x].	'Masoch'	.ma.so.[ç]-ist.	'masochist—Level I'

Problematic for this syllable-bounded analysis of assimilation is overapplication of the process under Level II affixation:

(11)

[x] in onset:	compare with:
rau.[x]-en. 'to smoke—Level II'	frau.-[ç]en. 'little woman—Level II'

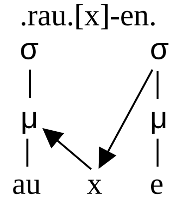
Derivationally, this problem was circumvented through the use of cyclic syllabification. In this approach, syllabification occurs prior to Level II affixation. Fricative assimilation applies at this stage of the derivation, where it is properly conditioned. A later resyllabification rule eliminates this environment, producing opacity. This derivation is illustrated below.

(12)

	Level I affix [ç] in stem	Level II affix [ç] in stem	Level II affix [ç] in affix
INPUT	maso[ç]+ist	rau[ç]+en	frau+[ç]en
Level I affixation	maso[ç] + ist	rau[ç]	frau
Syllabification	.ma.so.[ç]ist.	.rau[ç].	.frau.
Assimilation	---	.rau[x].	---
Level II affixation	---	.rau[x].+ en	.frau. + [ç]en
Reyllabification	---	.rau.[x]en.	.frau.[ç]en.
Assimilation	---	---	---
OUTPUT	.ma.so.[ç]ist.	.rau.[x]en.	.frau.[ç]en.
	Normal app.	Over app.	Normal app.

How can this analysis be reconceptualized in Turbidity? We propose that the segment Projects as a coda even though it is Pronounced as an onset. Constraints sensitive to abstract structural relations can be triggered by the segment's covert structural relations, while other "lower-level" constraints will be sensitive to just the position in which the segment is phonetically realized. This reconceptualization can be most easily seen through the pattern of constraint satisfaction and violation associated with the optimal resyllabification candidate, shown below with its surface form.

(13) .rau.[x]-en.



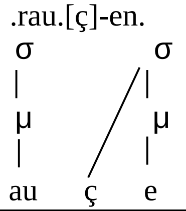
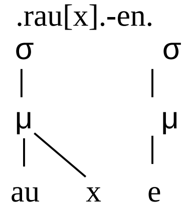
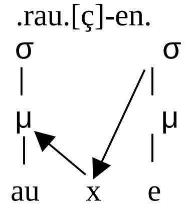
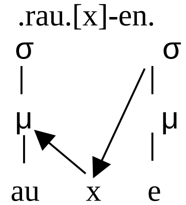
The Projection relationship between the fricative [x] and the previous syllable is motivated by ALIGN-X(Morph, σ)▾: *Segmental edges of morphemes of class X must coincide with syllable edges of the same morphemes.* (Here, ALIGN-II(Morph, σ)). Since "edge" is defined over the Projection relations (a segment is a member of a syllable if the segment Projects to the syllable), a Projection relation between the [x] and the previous syllable satisfies this constraint.

This candidate also satisfies ONSET↖: *All syllables must Pronounce a segment before the nucleus.* The opaque structure is created by the simultaneous satisfaction of two constraints that would have been impossible to satisfy simultaneously under previous representational assumptions. Since ONSET is sensitive solely to the Pronunciation relation, it can be satisfied at the same time as Projection-sensitive ALIGN by allowing the different relations to diverge.

Since the covert relationship has an effect on the backness of the dorsal fricative, the assimilation constraint must be sensitive to the Projection relation. It is therefore defined as: ASSIMILATE(back)↗: *A segment Projecting as a coda to syllable σ_i must share the [back] specification of the vowel Projecting to syllable σ_i.*

Finally, the optimal candidate violates two constraints. First, FAITH(back): *Segments should be Projected to by the feature X to which they are underlyingly associated;* this must be violated in order for assimilation to occur. Second, of course, is RECIPROCITY $^{\mu}{}_{RT}$. The tableau for this competition is shown below.

(14) Assume MAX, DEP high ranked: deletion and epenthesis are not options.

	/rau[ç] + en (class II)/	ONSET ↖	ALIGN -II ↗	ASSIM (back) ↗	$\mathcal{R}$ $^{\mu}{}_{RT}$	FAITH(back) ↗
	A. .rau.[ç]-en. 		*!			
	B. .rau[x].-en. 	*!				*
	C. .rau.[ç]-en. 			*!	*	
☞	D. .rau.[x]-en. 				*	*

The bind that non-Turbid OT is placed in is shown in the comparison between candidates (A) and (B). (A) satisfies ONSET, but not ALIGN; candidate (B) does the opposite. Candidate (C) takes the middle ground afforded by Turbidity, violating RECIPROCITY to satisfy two constraints that normally conflict. Since the Structural Harmony constraints are sensitive to different parts of structure, they can be simultaneously satisfied.

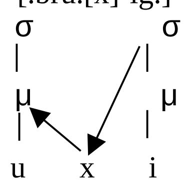
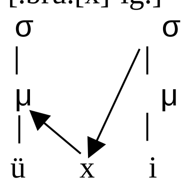
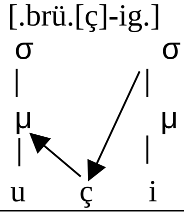
Candidate (D) illustrates how the covert structure created by the interplay of Structural Harmony constraints has an effect. The ASSIMILATE constraint, responding to the same structure as ALIGN, forces the dorsal fricative to change its backness.

Turbidity reconceptualizes resyllabification as the divergence of Projection and Pronunciation structure, caused by Structural Harmony constraints dominating RECIPROCITY. Overappplication is triggered by constraints which are sensitive to the covert Projection structure.

2.2 Interaction of Umlaut and Fricative Assimilation

Interestingly, affix-driven umlaut bleeds fricative assimilation, as shown below.

(15)	<u>[x] in unaffixed</u>		<u>[ç] in Level II affixed</u>	
	.ba[x].	'brook'	.bä[ç].-lein.	'small brook—Level II'
	.bru[x].	'break'	.brü.[ç]-ig.	'breakable—Level II'

	/bru[ç] + ig (class II)/	ONSET	UMLAUT[9]	ALIGN -II	ASSIM (back)	ℛ μ_{RT}	FAITH(back)
	A. [.bru.[x]-ig.] 		*!			*	*
	B. [.brü.[x]-ig.] 				*!	*	**
☞	C. [.brü.[ç]-ig.] 					*	*

[9] This constraint is similar to the ASSIMILATE constraint: segments which are projecting as nuclei in adjacent syllables must be Projected to by the same [back, front] features. Note that UMLAUT is stated over the Projection relation; this is consistent with the Turbid characterization of long-distance spreading (Goldrick, 1998).

As shown by .brü.[ç]-ig., normal application can occur following Level II affixation. This is expected under the Turbid account: “overapplication” of assimilation is triggered by output relationships, so changes in the output of the derived form (as compared to the base form) can effect opaque processes.

The tableau for the umlaut case is shown in (15). Since UMLAUT is ranked above FAITHFULNESS, the vowel must undergo umlaut (candidate A). Once the vowel has undergone umlaut; there is no motivation to change the backness of the dorsal fricative (B). This interaction between umlaut and fricative assimilation is easily incorporated into the Turbid explanation.

2.3 Comparison with the Output-Output Faithfulness Account of Opacity

Output-Output Faithfulness (OO-F: Benua, 1997; Burzio, 1994; et seq.) provides an alternative account of opacity effects within OT. In this approach, opacity is conditioned by a faithfulness relation between the output and the output of another related form(s). Overapplication under Level-II affixation is caused by faithfulness to the backness of the dorsal fricative in the underived/base form, depicted schematically below.

(16) Underived Form → Derived Form(Level II)
.rau[x]. .rau.[x]-ig.

The overapplication is determined by the ranking of OO-FAITH-LEVEL II(back) >> INPUT-OUTPUT FAITH (back). That is, derived forms with Level II affixes must be faithful to the backness of their base forms at the expense of faithfulness to their inputs. Note that this overapplication effect is completely determined by the morphological relationship between the base and the derived form. Due to this property of the OO-F constraints, this ranking will also predict overapplication under umlaut[10]:

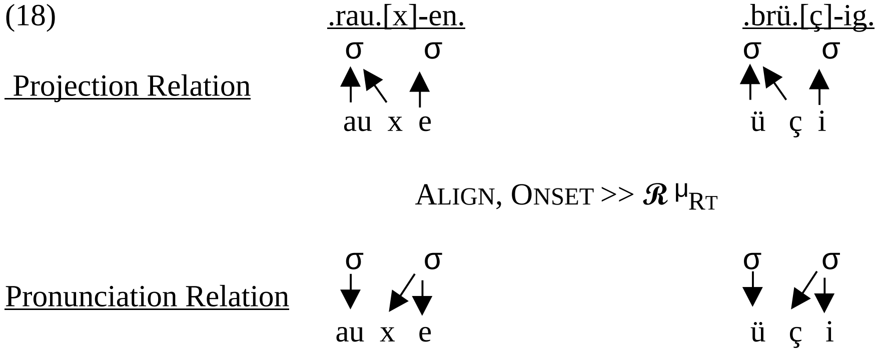
(17) Underived Form → Derived Form(Level II)
.bru[x]. *.brü.[x]-ig.

Since the crucial morphological relationship has remained unchanged, overapplication should still occur regardless of changes to the phonological environment in the derived form.

This set of facts provides for a contrast between the mechanisms that produce opacity in Turbidity and OO-F. In Turbidity, the pressure for the fricative to assimilate is determined by its phonological environment in the derived form.

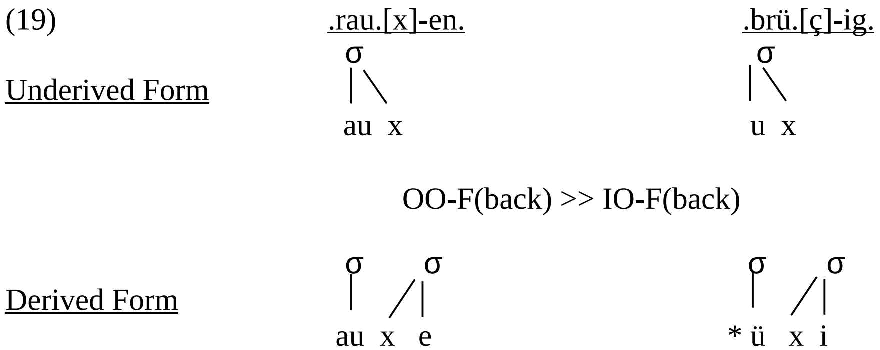
[10] In order to get surface application of umlaut, we must assume that UMLAUT >> OO-FAITH.

(18)



Note that the fricative is different in the Projection structure of each case: the covert relationships can be sensitive to the phonological environment of the derived form. In the OO-F case, the pressure for the fricative to assimilate exists regardless of the phonological environment of the derived form.

(19)



Here, the fricative is the same in both underived forms: the opacity-inducing structure cannot be sensitive to changes in the derived form. German provides an example where opacity must be sensitive to changes in the environment of the derived form; Turbidity can express this fact, while OO-F cannot.

3. Conclusion: Output-Based Explanation

Opacity effects require surface-unmotivated unfaithful mappings, impossible under the basic principles of Prince & Smolensky (1993). How do we best accommodate such effects inside of OT? OO-F proposes that we allow the transfer of unfaithful mappings from other related outputs. This contrast with Turbidity in that the process of transferring unfaithful mappings is blind to changes in the derived form. Sympathy proposes that we allow the transfer of unfaithful mappings from other related candidates. This contrasts with Turbidity in that the transfer is not based on the outcome of the unfaithful mapping, but what faithfulness violations gave rise to that mapping.

Turbidity utilizes a single complex representation which incorporates covert, structural relationships (Projection) and audible, surface relationships (Pronunciation). This strategy sets Turbidity apart from these other proposals in two ways. First, unfaithful mappings need not be transferred from other outputs; they can be motivated directly within a single output. This allows the opacity-inducing covert structure to be more sensitive to its phonological environment. Second, unfaithful mappings are "transferred" from the Projection to the Pronunciation relation by an outcome-based mechanism. This makes the grammar less sensitive to the origins of covert material, and more sensitive to the outcome of covert processes.

Previous OT proposals have also argued for an extension of phonological representations[11]. What sets Turbidity apart from these approaches is its generality. By distinguishing between Projection and Pronunciation relations for all phonological associations, Turbidity aims for a general approach to opacity effects. Here, we have analyzed moraic/segmental and syllablic/segmental opacity. Goldrick (1998) and Goldrick & Smolensky (1999) analyze additional Turbid relations between features and segments (with respect to transparency in vowel harmony) and tones and segments (examining OCP effects in Mituku).

Turbidity holds the promise of bringing a wide range of opacity effects into the family of phonological phenomena to which the output-based descriptive and explanatory apparatus of OT can be fruitfully applied.

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[11] e.g. Ambisyllabicity (Ito & Mester, 1994; Merchant, 1995, 1996); Null Vowels (Kager, 1997); Weak Layering (Hagstrom, 1997).

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