Opacity Problem and Markedness Constraints

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Kim, Jong Shil. 1998. Opacity Problem and Markedness Constraints. *Linguistics,* 6-2, 223-242. This paper investigates opacity problem and presents some reanalysis on the matter based on the concepts like constraint conjunction and correspondence relation. It views opacity cases as special types in contrast to transparent cases and analyzes them as having the input-output correspondence relation in markedness constraints. It also presents the analysis in which the combination of markedness constraints and faithfulness constraints plays a role in accounting for the opacity. **(Inje University)**

1. Introduction

Derivational application of phonological rules through extrinsic rule ordering has become the main criticism against Generative Phonology. Problems of abstractness, improbability in terms of language acquisition, difficulty in applying the theory into any possible computational model have propelled new innovative phonological theories. Harmonic phonology and Optimality theory respectively have tried to capture the so-called derivational effects via non-derivational output-oriented approach. In particular Optimality theory has quite succeeded in showing that parallel application of hierarchical constraints can equally, if not better, account for the phonological alternations which often refer to prosody and morphological processes. Harmonic phonology, on the other hand, attempted to analyze phonological processes in terms of the least possible number of levels in which phonological constraints interact with rules.

Despite overwhelming improvement over the derivational theory, Optimality theory has had difficulties in providing explanatory analysis on the cases where intermediate stage(s) appear(s) to be necessary. Opacity problem has been the focal problem. As discussed in McCarthy (1998), phonological alternations have to refer to the intermediate stages as in (1).

(1) Cases involving opacity

a. Underapplication of phonological rule due to intermediate stage: Bedouin Arabic (McCarthy, 1998:3)

  a. Raising of [a] in open syllables

    /katab/ → ki.tab 'he wrote'

  b. Glide vocalization when not adjacent to a vowel

  c. Interaction: Raising → Vocalization

    /badw/ → DNA → ba.du 'Bedouin'

b. Overapplication of phonological rule due to intermediate stage: Tiberian Hebrew (McCarthy, 1998:2)

  a. Epenthesis into final clusters:

    /melk/ → melex 'king'

  b. ʔ-Deletion outside onsets

    /qaraʔ/ → qara 'he called'

  c. Interaction: Epenthesis → ʔ-deletion

    /dešʔ/ → dešeʔ → deše 'tender grass'

In McCarthy (1998), the opacity problem is analyzed from the theory of 'sympathy'. In Sympathy theory, non-optimal yet relevant candidates are chosen in terms of relevant faithfulness constraints and then they crucially determine the optimal form by being faithful to sympathetic faithfulness constraints on candidate-to-candidate relations. The theory assumes candidate-candidate correspondence relation besides input-output, base-reduplicant, and output-output correspondences which are well established throughout the Optimality literature. McCarthy starts out as limiting Sympathy theory only to the case of faithfulness constraints but then opens the door for extension referring to other works (Ito & Mester, 1997a & 1997b; Karvonen & Sherman, 1997) which required extending the scope of Sympathy theory to markedness constraints.

In this paper, I will attempt to provide an alternative analysis towards opacity problem. The analysis will be much inspired by Harmonic phonology and McCarthy's earlier analysis on Optimality and opacity problem (1994). It will also be influenced by works regarding conjoining constraints together (Ito & Mester, 1998; Lubowicz, 1998). Thus an extended type of correspondence relationship between input and output in the case of markedness constraints with conjunction to faithfulness constraints will be suggested to account for opacity problem.

2. Sympathy theory

The opacity cases in (1) cannot be analyzed correctly in terms of the standard optimality theory. As can be seen in (2) where the form with vowel raising comes up as being optimal, Bedouin Arabic underapplication cannot be accounted for with constraint hierarchy alone.

(2) /badw/ → badu with constraint ranking alone (McCarthy, 1998:24)

/badw/	*Complex	*a]σ	IDENT(high)IO	DEP-μ IO
☞ ba.du		*!		*
☜ bi.du			*	*
badw.	*!			

Thus, McCarthy (1998) proposes Sympathy theory in which a non-optimal yet relevant candidate (Ⓕ-candidate) is selected and then it holds a candidate-to-candidate relation with ultimate optimal form via sympathetic faithfulness constraints that are distinct from other constraints. He assumes the following two principles.

(3) Confinement to $C_{<+F>}$ (McCarthy, 1998:18)
Selection of the ⓕ-candidate $\aleph_F$ is confined to $C_{<+F>}$, the set of candidates that obey the IO faithfulness constraint F.

(4) Invisibility of ⓕ-Faithfulness Constraints (McCarthy, 1998:18)
Selection of ⓕ-candidates is done without reference to ⓕ-faithfulness constraints (on *any* sympathetic correspondence relation).

The ⓕ-candidate $\aleph_F$ is determined by relevant IO faithfulness constraints and it holds correspondence relation to ultimate optimal output form which is loyal to the ⓕ-Faithfulness Constraint. It is illustrated in (5). Since the status of glide [w] determines the ultimate outcome, Sympathy theory takes [badw] which satisfies the DEP-μ_{IO} as a ⓕ-candidate. A ⓕ-faithfulness constraint ⓕIdent(high)$_{dep\text{-}\mu}$ will then force the identity of vowel height to be the same as that of the ⓕ-candidate ⓕ$_{dep\text{-}\mu}$badw. The result is the selection of [ba.du] not [bi.du] here.

(5) with sympathy (McCarthy, 1998:24)

/badw/	*Complex	ⓕIdent (high)$_{dep\text{-}\mu}$	*a]$_\sigma$	Ident(high)$_{IO}$	DEP-μ $_{IO}$
☞ ba.du			*		*
bi.du		*!		*	*
ⓕ$_{dep\text{-}\mu}$badw.	*!				✓

The same goes with the overapplication case of Tiberian Hebrew as in (6).

(6) a. without sympathy (McCarthy, 1998:22)

/deš?/	*Complex	ANCHOR IO	Coda-Cond	Max-C IO	Dep-V IO
☞ deše				*	*!
☜ deš				*	
deš?e		*!			*
deše?			*!		*
deš?	*!		*!		

b. with sympathy (McCarthy, 1998:22)

/deš?/	ⓕMax-V Max-C	*Complex	ANCHOR IO	Coda-Cond	Max-C IO	Dep-V IO
☞ deše					*	*
deš	*!				*	
deš?e			*!		✓	*
ⓕMax-C deše?				*!	✓	*
deš?	*!	*!		*!	✓	

More challenging case, however, is found in Yawelmani which requires two ⓕ-candidates and ⓕ-faithfulness constraints respectively. As in the rule-based analysis of (7), the underlying vowel length and height undergo changes. Then, the analysis requires a pair of candidate-to-candidate correspondences between the two ⓕ-candidates and the optimal output as in (8).

(7) Yawelmani (derivational analysis):

	/?u:t + hin/	/c'u:m + al/
harmony:	?u:t + hun	-
lowering:	?o:t + hun	c'o:m + al
shortening:	?ot + hun	-

(8) Yawelmani with sympathy (McCarthy, 1998:28)
/?u:t+hin/ --> [?othun]

?u:t+hin	*[μμμ]σ	Long/ -High	ⓕIdent $(hi)_{Max-\mu}$	ⓕIdent $(rd)_{Ident(high)}$	RH	Max- μ_{IO}	Ident $(hi)_{IO}$	Ident $(rd)_{IO}$
☞?othun						*	*	*
ⓕIdent (hi) ☜ ?uthun			*!			*	✓	*
ⓕMax-μ ?o:thin	*!			*!		✓	*	
☜ ?othin				*!		*	*	
?u:thun	*!	*!	*!			✓	✓	*

In this analysis, the constraints Max-μ_{IO} and Ident$(hi)_{IO}$ indirectly determine the final optimal form in that they select two ⓕ-candidates. Additional ⓕ-faithfulness constraints ⓕIdent$(hi)_{Max-\mu}$ and ⓕ Ident$(rd)_{Ident(high)}$ are needed to take the candidate which retains the roundness and height of the two ⓕ-candidates as the optimal output.

From the above sympathy analysis, immediate problems arise. First, the two ⓕ-candidates are selected rather mechanically in that they are selected for their identity of vowel height and length yet influence the output selection for their roundness and height. Thus, the properties for which they are selected have nothing to do with those that determine the ultimate output. Second, although McCarthy considers this operation is occuring once and for all, it is hard to regard it to be one parallel application of constraints since for the optimal candidate to be chosen, the ⓕ-candidate should undergo constraint evaluation independent of the sympathetic constraints. Even though we accept that this is done simultaneously, obviously the input-candidate-candidate correspondence is a three-way relation unlike other correspondences. Furthermore, when there are more than two ⓕ-candidates, for instance as in the Yawelmani case, the sympathetic constraints ⓕIdent(hi)$_{Max\text{-}\mu}$ and ⓕ Ident(rd)$_{Ident(high)}$ create two three-way correspondences, which appears as problematic as traditional rule-based analysis in terms of abstractness and learnability. The variations in correspondence relation are illustrated in (9).

(9) Different Types of Correspondence Relation

Input	Base	Output		Input
|	|	|	vs	| ← *constraints*
Output	Reduplicant	Output		ⓕ-candidate
				| ← *ⓕ-constraints*
				Output

Alternatives to the above three-way correspondence can be two types. One can be the case in which an additional intermediate level is posited. The other can be the one which still maintains the parallelism of the theory with yet additional mechanism that can solve opacity problem. Derivational optimality model and Harmonic phonology are the cases which inherently posit an additional intermediate level. Another possibility can be the one in which the phonological theory posits an input-output correspondence relation even to markedness constraints. This option has been suggested (McCarthy, 1994) and subsequently abandoned. The other mechanism can involve combining constraints. In the following section, I will examine some of these theories which will make us view this opacity problem from the different perspectives. These works will partly contribute to the analysis taken in this work.

3. Harmonic Phonology, Markedness Constraints, and Combined Constraints

In Harmonic phonology (Goldsmith, 1993; Lakoff, 1993), phonological component is regarded as being organized as in (10). Harmonic phonology differs from Optimality theory in the following two aspects. First, it recognizes at least one intermediate stage; namely, the W-level. Second, phonological constraints are unviolable and interact with phonological rules. The phonological rules, on the other hand, apply to satisfy the requirements embodied by the constraints inside a level. Otherwise they are correspondence relations between levels. The formula and explanations are given below.

(10) Harmonic Phonology (Goldsmith, 1993:33)

M	(M,M) intralevel (harmonic)	
↕	<----(M,W) cross-level	(harmonic or nonharmonic)
W	(W,W) intralevel (harmonic)	
↕	<----(W,P) cross-level	(harmonic or nonharmonic)
P	(P,P) intralevel (harmonic)	

- *M-level*: a morphophonemic level, the level at which morphemes are phonologically specified
- *W-level*: the level at which expressions are structured into well-formed syllables and well-formed words, but with a minimum of redundant phonological information
- *P-level*: a level of broad phonetic description that is the interface with the peripheral articulatory and acoustic devices.
- Rule application: All intralevel rules are harmonic in function;

cross-level(interlevel) rules may or may not be harmonic in function. (Goldsmith, 1993:37)

As stated in (10), intra-level phonological rules are 'harmonic' in the sense that they apply to satisfy phonological constraints of each level. On the other hand, inter-level phonological rules do not have to be harmonic. Rather, they regulate the correspondence relations between the forms of the two levels. From this framework, there can be at maximum five sets of phonological rules ranging from M-level to P-level. However, the rule ordering is by no means the result of extrinsic ordering but the result of how the phonological component is organized. The Yawelmani case is reanalized as below.

(11) Phonological rules of Yawelmani from the Harmonic Phonology (Lakoff, 1993:139-140)

a. Shortening:

W: [+syl, +long] C C
|
P: [-long]

b. Lowering: Long vowels at W are nonhigh at P.

W: [+syl, +long]
|
P: [-high]

c. Harmony: At level W, every vowel that follows a round vowel with the same value of the feature High must be round and back.

W: If [+syl, +round, αhigh] Co X, then if X=[+syl, αhigh] then X=[+round, +back]

(12) Application of the rules:

M: ʔu:t-hin
W: ʔu:t-hun
P: ʔot-hun

In comparison with Optimality theory, the Harmonic analysis employs correspondence relations between representations, which has the effect of markedness constraints applying between the input and output. In other words, it appears that the utilization of rules as being correspondence relations brings the effects of markedness constraints to apply as input-output relations. In fact, McCarthy (1994) presented a similar view in terms of applying a markedness constraint as something that should be looked into as input-output relation. When he analyzed Tiberian Hebrew opacity problem, he detailed the markedness constraint [No-V-Stop] as having two level representations as in (14). In the Tiberian Hebrew, spirantization occurs after a vowel, after an epenthetic vowel, and even after a consonant since syncope applies after the spirantization.

(13) Opacity of Hebrew Spirantization in a Serial Derivation (McCarthy 1994: 1)

Underlying	/malake/
Spirantization: k --> x / V ___	malaxe
Syncope: V --> / VC_CV	malxe

(14) Tiberian Hebrew: markedness constraint [No-V-Stop] (McCarthy, 1994:7)

*	Condition	Level
α	V	Indifferent
β	[-son, -cont]	Surface
Linear Order	α > β	Indifferent
Adjacency	Strict	Indifferent

The above constraint says that the conditioning vowel can occur either in the input or in the output and the following consonant after a vowel should not be a fricative on the surface. On the other hand, in a hypothetical language which has [malke] not [malxe], the markedness constraint [No-V-Stop] will be as in (15) so that the underlying vowel determines the surface fricative of the following consonant.

(15) [No-V-Stop] with [malke] *[malxe] (McCarthy, 1994:10)

*	Condition	Level
α	V	Underlying
β	[-son, -cont]	Surface
Linear Order	α > β	Underlying
Adjacency	Strict	Surface

In this version, he states corresondence relations as in (16).

(16) Correspondence (McCarthy, 1994:4)

Given two strings S_1 and S_2, **correspondence** is a relation *R* from the elements of S_1 to those of S_2. Segments $\alpha \in S_1$ and $\beta \in S_2$ are referred to as **correspondents** of one another when $\alpha R \beta$.

(17) Descriptions regarding Markedness correspondence (McCarthy, 1994:10)

- A markedness constraint describes a target. It is assumed that all targets are expressed as prohibitions.
- Markedness constraints impose separate conditions on the featural composition of segments, their linear order relation, and their adjacency relation.
- In its default form, every markedness constraint imposes conditions on surface structure only. But through correspondence, specified conditions can be imposed on underlying structure or on either underlying or surface structure.

In this version of the optimality theory, McCarthy views markedness constraints as having input-output correspondence relation when they are marked and thus necessary to have complex levels. Otherwise, markedness constraints hold at the surface structure.

As another mechanism to consider for the purpose of this paper, there is a notion of combining constraints. Smolensky (1993, 1995, 1997) proposes an operation of Con that involves local conjunction which utilizes the combination of constraints as part of UG-constraints. In Ito & Mester (1998), constraint ranking is done in a way that the violation of combined constraints via conjunction is less harmonic than that of individual constraints. They limit the conjunction to markedness constraints claiming that conjunction of a markedness constraint and a faithfulness constraint will have undesirable results. Their views on the conjunction of constraints are defined as in (18).

(18) Local Conjunction of Constraints (LCC; Ito & Mester, 1998:10)

a. Definition

Local conjunction is an operation on the constraint set forming composite constraints: Let C_1 and C_2 be members of the constraint set *Con*. Then their local conjunction $C_2 \&_\delta C_2$ is also a member of *Con*.

b. Interpretation

The local conjunction $C_1 \&_\delta C_2$ is violated if and only if both $*C_1$ and $*C_2$ are violated in some domain δ.

c. Ranking (universal)

$C_1 \&_\delta C_2 \gg C_1$

$C_1 \&_\delta C_2 \gg C_2$

If the conjunction is done in the case between a markedness constraint and a faithfulness constraint, it can have a result like (19.c).

(19) a. lieb 'dear, pred.' (Ito & Mester, 1998:12)

/li:b/	NoCoda &δ VOP	Ident[F]	VOP	NoCoda
.li:b.	*!		*	*
☞ .li:p.		*		*

b. liebe 'dear, attr.'

/li:bə/	NoCoda &δ VOP	Ident[F]	VOP	NoCoda
☞.li:.bə.			*	*
.li:.pə.		*!		*

c. /bai/ 'with' (Ito & Mester, 1998:14)

/bai/	Max	NoCoda &δ Ident[F]	NoCoda	VOP	Ident[F]
☞ .bai.				*!	
☞ .pai.					*
.ai.	*!				

The interpretation of combined constraints in Ito & Mester's version is such that the whole conjunction of constraints is violated only when both of the two combined constraints are violated. It will result in [lip ə] being optimal since the form does not violate [NoCoda &δ VOP] constraints in that it never violates NoCoda constraint. Again this derives from the assumption that the combined constraints are violated only when both constraints are violated. In their theory, the conjunction is an operation of just conjoining two constraints. In fact, constraints do not have any relation with each other. They are rather mechanically combined but they do not have the same effect of a constraint being violated twice since the conjunction involves two constraints at once and the combined constraints dominate related single constraints.[1]

On the other hand, while analyzing the notion of 'derived environment', Lubowicz (1998) utilizes a different version of constraint conjunction. In her analysis of Polish, she combines a markedness constraint and a faithfulness constraint in such a way that the activation of a markedness constraint requires the violation of a

1) As can be seen in the constraint hierarchy shown in (19):

i.e. [NoCoda &δ VOP] >> ... >> VOP, NoCoda faithfulness constraint via conjunction of the two. This makes Polish spirantization apply only to derived environment as in (20).

(20) Polish (Lubowicz, 1998: 9)

a. /g/ in the input

/rog+ek/	[*ǰ & IDENT(coronal)]$_{Seg}$	IDENT(continuant)	*ǰ
roǰek	*!		*
☞ rožek		*	

b. [ǰ] in the input

/banǰ+o/	[*ǰ & IDENT(coronal)]$_{Seg}$	IDENT(continuant)	*ǰ
☞ banǰ+o	✓		*
banžo	✓	*!	

The constraint [*ǰ & IDENT(coronal)]$_{Seg}$ says that [ǰ] is prohibited only when it is combined with the violation of the identity of [coronal] feature. When we compare /rog+ek/ and /banǰ+o/, the underlying [ǰ] does not undergo spirantization while the underlying [g] undergoes both palatalization and spirantization. This difference can be captured from the fact that [g] is not ultimately realized as [ǰ] since it violates the constraint [*ǰ & IDENT(coronal)]$_{Seg}$ in that it violates the identity constraint and at the same time it is realized as [ǰ]. In the case of the underived [ǰ], the form does not violate the constraint [*ǰ & IDENT(coronal)]$_{Seg}$ since it does not violate identity constraint and thus does not violate the whole combined constraint. This way, the concept of derived environment is captured by adopting the idea of a markedness constraint together with the violation of a faithfulness constraint. This type of interpretation of constraint conjunction is crucial in the following reanalysis of opacity problem in this paper. In the following section, I will reanalyze the aforementioned opacity cases in terms of the input-output correspondence of markedness constraints and the constraint conjunction.

4. Reanalysis

As discussed earlier, Bedouin Arabic shows a case of underapplication. The example is repeated in (21).

(21) Interaction: Raising → Vocalization
/badw/ → DNA → ba.du 'Bedouin'

In this reanalysis, I consider the raising as the result of a markedness constraint holding between the input and output as in (22).

(22) $*a]_{\sigma IO}$: When [a] is in the syllable final position of the input, the output cannot have the same vowel height.

This constraint looks at the syllable-final [a] in the input and makes it impossible to be realized as [a] in the output. The tableau in (23) shows the result.

(23) input: /badw/

/badw/	*Complex	$*a]_{\sigma IO}$	IDENT(high)$_{IO}$	DEP-μ $_{IO}$
☞ ba.du				*
bi.du			*!	*
badw.	*!			

Sinc /badw/ does not have syllable final [a] in the input, the constraint $*a]_{\sigma IO}$ does not trigger vowel change and [bidu] will not be selected as optimal since it violates faithfulness constraint IDENT(high)$_{IO}$. Markedness constraint in a default case should obviously be a constraint that holds only at the output level. The Bedouin Arabic case, however, is special in that speakers are assumed to consider the syllable structure of input form for the vowel raising and this is incoporated into the markedness constraint given in (22).

Tiberian Hebrew exhibits more complexity. It is a classic case of overapplication as repeated in (24).

(24) Interaction: Epenthesis → ʔ-deletion
/dešʔ/ → dešeʔ → deše 'tender grass'

Here, the optimal form [deše] results from a couple of processes. First, [šʔ] sequence at word final position is improved with the insertion of [e]. Second, the word-final [ʔ] is deleted to optimize the syllable structure of the word. In fact, [ʔ] is involved in both processes. It is a part of undesirable syllable structure and also a part of consonant cluster which is again bad in this language. The constraint [*Complex] results in the violation of [Dep-V] and the [Coda-cond] constraint involves the violation of [Max-C]. These markedness constraints alone, however, do not show the whole picture. That is, [ʔ] has a dual function here but the violation of two faithfulness constraints function separately. The form like [deš] looks optimal on the surface since the [ʔ] is not there in that it happens to satisfy both markedness constraints. However, there appears to be an asymmetry in the application of two faithfulness constraints. The violation of Dep for the vowel insertion seems to be more potent than the violation of Max-C from the Coda-condition. What is necessary in this analysis is a constraint conjunction of Lubowicz's type with the combination of input-output corresondence of a markedness constraint. The conjoined constraints of markedness constraint and faithfulness constraint are given in (25) with hierarchy between the two.

(25) a. [$*Complex_{IO}$ $\&_{\sigma}$ $Dep\text{-}V_{IO}$][2]: When there are complex segments in the input, the $Dep\text{-}V_{IO}$ constraint should be violated.[3]

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2) The domain here is a syllable.

b. [Coda-cond$_{IO}$ &$_\sigma$ Max-C$_{IO}$]: When there is a prohibited coda in the input, the Max-C$_{IO}$ constraint should be violated.

c. [*Complex$_{IO}$ &$_\sigma$ Dep-V$_{IO}$] >> [Coda-cond$_{IO}$ &$_\sigma$ Max-C$_{IO}$]

The application is given in (26). [deše] is optimal in the sense that the most dominant constraint [*Complex$_{IO}$ & Dep-V$_{IO}$] is not violated since there are no complex segments and the constraint Dep-V is violated. On the other hand, [deš] is not optimal since Dep-V is not violated to avoid the complex segments which originate from the input and thus violate the constraint [*Complex$_{IO}$ & Dep-V$_{IO}$].

(26) input: /dešʔ/[4]

/dešʔ/	[*Complex$_{IO}$ &$_\sigma$ Dep-V$_{IO}$]	Anchor	[Coda-cond$_{IO}$ &$_\sigma$ Max-C$_{IO}$]
☞ deše	✓		✓
deš	*!		✓
dešʔe	✓	*!	*
dešeʔ	✓		*
dešʔ	*!		*

In this way, the analysis does not need to posit intermediate candidate as Sympathy theory did.

In the similar way, the Yawelmani cases which required two sets of sympathy candidates and constraints can be reanalyzed as below.

(27) a. [long/-high$_{IO}$ &$_{Seg}$ Ident(hi)]: When there is a non-high long vowel in the input, the Ident(hi) should be violated.

b. [RH$_{IO}$ &$_{Word}$ Ident(Rd)$_{IO}$]: When the roundness of vowels does not

3) Or alternatively expressed as
'to avoid the undesirable complex segments of the input, the Dep-V is required to be violated.'

4) '✓' here means 'being satisfied.'

match in the input, the Ident(Rd) should be violated.

(28) a. input: /ʔu:t+hin/

ʔu:t+hin	*[μμμ]$_σ$	[long/-high$_{IO}$ &$_{Seg}$ IDENT(hi)]	[RH$_{IO}$ &$_{Word}$ Ident(Rd)$_{IO}$]
☞ ʔothun			
ʔuthun		*!	
ʔo:thin	*!		
ʔu:thun	*!	*	
ʔothin			*!

b. input: /c'u:m+al/

c'u:m+al	*[μμμ]$_σ$	[long/-high$_{IO}$ &$_{Seg}$ IDENT(hi)]	[RH$_{IO}$ &$_{Word}$ Ident(Rd)$_{IO}$]
☞ c'o:mal			
c'o:mol			*!
c'u:mal		*!	
c'u:mol		*!	*

So far I have shown the reanalysis on the opacity cases by utilizing the input-output correspondence relation of markedness constraints and combining the markedness constraint and the faithfulness constraint violation.

5. Conclusion

In this paper, I have looked at opacity problems and the studies that deal with the matter. Sympathy theory has been reviewed and it is claimed that the candidate-to-candidate correspondence is an instance of positing an intermediate level. As bases for the reanalysis, Harmonic Phonology, earlier version of McCarthy's input-output correspondence of markedness constraints, and constraint conjunction have been briefly discussed.

In the reanalysis, markedness constraints are assumed to have input-output correspondence in such marked cases as Bedouin Arabic, Tiberian Hebrew, and Yawelmani unlike in the default cases of other languages. In addition, the mechanism of the conjunction is proposed in such a way to combine the markedness constraint and the faithfulness constraint violation similar to the one by Lubowicz. This analysis makes us to do without the unmotivated sympathy candidates and related constraints. One might suggest that the input-output correspondence in the markedness constraints will result in the uncontrollable multiplication of constraints and their relations. However, I believe that the cases with opacity problems are, in a sense, marked and thus special ones. I leave the validity of the constraint types utilized here open for further discussion and research.

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