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Optimality Theory: An overview

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franca of the area, but there are some negative attitudes toward it. Bilingual proficiency in Amharic and Arabic is low. Related to Ganza.

Kachama-Ganjule: also called Gats'ame, Get'eme. 4,072 speakers. Ethnic population: 3,886 as of 1998, including 2,740 Kachama, 1,146 Ganjule. Dialects are Ganjule (Ganjawle), Ganta, Kachama. Some people are bilingual in Wolaytta.

Kaficho: also called Kafa, Kefa, Keffa, Kaffa, Caffino, Manjo. 569,626 speakers. Ethnic population: 599,188 as of 1998. Spoken in the Kafa region, in and around the town of Bonga. There may be some speakers in Sudan. Dialects are Kafa, Bosha (Garo). Related to Shakacho. Bosha may be a separate language. Manjo is an argot based on Kafa.

Karo: also called Kerre, Cherre, Kere. 200 speakers in southern Omo region, upstream from the Daasanach, riverside settlements near the Hamer-Banna. Dialect or closely related language to Hamer-Banna. Many use Nyangatom as second language.

Koorete: also called Amarro, Amaarro, Badittu, Nuna, Koyra. 103,879 speakers. Ethnic population: 107,595 as of 1998. Spoken in the Amaro Mountains east of Lake Abaya, Sidama region.

Male: 53,779 speakers. Ethnic population: 46,458 as of 1998. Spoken in the Omo region, southeast of Jinka. Male is spoken in the home.

Melo: also called Malo. 20,151 speakers. Ethnic population: 20,189 as of 1998. Spoken in the northern Omo region, in and around Malo-Koza, northeast of the Basketto. Related to Gamo-Gofa-Dawro, but may not be inherently intelligible. The Language Academy said it should be considered a separate speech variety.

Nayi: also called Na'o, Nao. 3,656 speakers. Ethnic population: 4,005 as of 1998. Related to Dizi, Sheko. Kaficho is the trade language. Spoken by adults. Young people speak only Kaficho.

Oyda: 16,597 speakers. Ethnic population: 14,075 as of 1998. Spoken in the northwestern Omo region, southwest of Sawla. Some people are reported to be bilingual in Wolaytta.

Seze: also called Sezo. 3,000 speakers in the western Oromo region, near Begi, north of the Hozo. Related to Bambassi, but a separate language. Oromo-Wellega is the lingua franca of the area, but there are some negative attitudes toward it. Bilingual proficiency in Amharic and Arabic is low.

Shakacho: also called Moc'ha, Mocha, Shekka. 54,894 speakers. Ethnic population: 53,897 as of 1998. Spoken in the northern Kafa region, in and around Maasha. Closely related to Kaficho.

Sheko: also called Shekko, Shekka, Tschako, Shako, Shak. 23,785 speakers in Ethiopia. Ethnic population: 23,785 (1998 census). Kafa Region, Shako District. Gaizek'a is a monolingual community. Bajek'a, Selale, and Shimi are multilingual. Dialects are Dorsha, Bulla (Daan, Dan, Daanyir). Some bilingualism in Amharic and Gimira. Sheko is the primary language of the home, religion, and public use. Related to Dizi and Nayi.

Wolaytta: also called Wellamo, Welamo, Wollamo, Wallamo, Walamo, Ualamo, Uollamo, Wolaitta, Wolaita, Wolayta, Wolataita, Borodda, Uba, Ometo. 1,231,673 speakers. Ethnic population: 1,269,216 as of 1998. Spoken in the Wolaytta region, Lake Abaya area. Dorze, Melo, Oyda may be dialects of Wolaytta or of Gamo-Gofa-Dawro.

Yemsa: also called Yem, Yemma. "Janjero," "Janjerinya," "Janjor," "Yangaro," "Zinjero" are derogatory names sometimes used. 81,613 speakers. Ethnic population: 165,184 as of 1998. Dialects are Fuga of Jimma, Toba. Fuga of Jimma may be a separate language. Young people are bilingual in Amharic, older people in Oromo. The primary language of the ethnic group. Some negative attitudes toward Oromo. Speakers want literature in their language.

Zayse-Zergulla: also called Zaysse. 18,000 speakers. Ethnic population: 11,232 as of 1998, including 10,842 Zayse, 390 Zergulla. Spoken in the Omo region, west of Lake Chamo. Dialects are Zergulla (Zergullinya), Zayse. Close to the Gidicho dialect of Koorete. Vigorous language use. Approximately 7,000 ethnic Gamo speak Zayse-Zergulla as mother tongue, which is reflected in the figures above.

B. Grimes

ONOMATOPOEIA. *See* Sound Symbolism.

OPTIMALITY THEORY. [*This entry includes the following subentries:*
Overview
Phonology
Syntax]

Overview

Optimality Theory (OT) is a general framework for modeling human linguistic competence. It has been applied primarily to phonology and syntax, but it also has implications for many other aspects of language, including semantics, acquisition, learnability, variation, and change. OT was developed by Alan Prince and Paul Smolensky and first became widely known through their 1993 manuscript "Optimality Theory: Constraint interaction in generative grammar."

OT has several core properties that tend to set it apart from other linguistic theories: it is comparative; it has

FIGURE 1. *A Constraint-Ranking Tableau*

	F	G
a. ☞Cand1		*
b. Cand2	*	

ranked, violable constraints; and it is inherently typological, asserting that all differences between languages may be reducible to differences in constraint ranking. Each of these characteristics is explained below.

In OT, the well-formedness of a linguistic expression is determined comparatively. An expression is well-formed because it is the best among a set of competing expressions, called *candidates*. For example, *Will John go?* and *Did John will go?* compete as ways of forming a yes/no question from *John will go*. The first candidate is better because it lacks the dummy verb *did* found in the second candidate, and also because no high-ranking constraint requires *did* to be present when there is another auxiliary verb available (cf. *Did John go?*). When two candidates are compared in this way, the better one is said to be more *harmonic*. The *optimal* candidate is the one that is more harmonic in all such pairwise competitions over the full range of candidates.

Candidates are compared by a hierarchy of ranked, violable constraints. When two constraints disagree in their assessment of competing candidates, the constraint that is ranked higher is the one that takes precedence. In consequence, the optimal candidate can and often does violate one or more lower-ranked constraints.

For example, suppose Cand1 and Cand2 are two competing candidates, with F and G being two constraints, each of which favors a different candidate in this pair. Whichever of the pair F and G is ranked higher will determine which candidate is more harmonic. The diagram in Figure 1, called a *tableau*, shows this situation under the assumption that F dominates G and Cand1 is favored by F. The constraints are written across the top in domination order. The various candidates label the rows, and each cell indicates how many violation-marks a constraint assigns to a given candidate. This tableau shows that Cand1 is more harmonic, as the pointing hand (a conventional symbol) indicates. Constraint F is ranked higher, and it favors Cand1 over Cand2. Constraint G says the opposite, but the higher-ranked constraint takes precedence. Hence, Cand1 is more harmonic than Cand2. This tableau supplies the necessary conditions for a valid *ranking argument* for F and G. These constraints conflict in their evaluation of these two candidates. Under the assumption that Cand1 is optimal (and no other constraints interfere), it can be concluded that F *dominates* G.

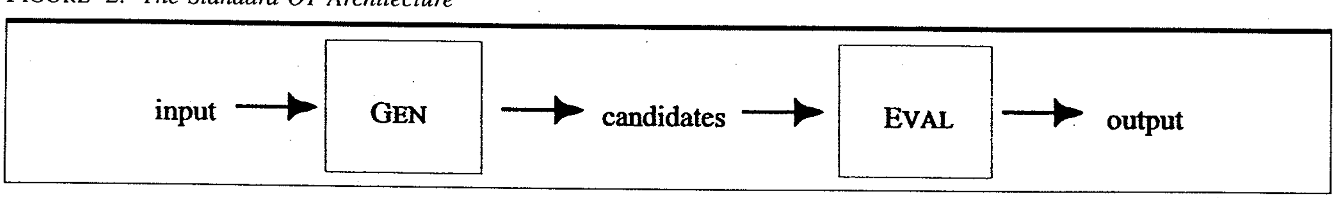
Figure 2 shows the basic organization of OT. The input may consist of a phonological underlying representation or something similar from another grammatical component. GEN (the generator) accepts this input and constructs a set of candidates based on it, and those candidates are supplied to EVAL (the evaluator). EVAL selects the optimal candidate, which is the output, by applying a language-particular constraint hierarchy.

Both GEN and EVAL are universal. It is usually assumed that the constraints are also universal, and hence that there is a universal constraint component CON. It is also usually assumed that the inputs are universal. The universality of inputs, a thesis known as *richness of the base*, means that there are no language-particular restrictions on inputs, such as morpheme-structure constraints.

Because GEN, EVAL, CON, and the input are all universal, it follows that only the ranking imposed on CON is specific to any given language. For this reason, OT can be described as an inherently typological theory. A constraint hierarchy valid for one language implies, through ranking permutation, the constraint hierarchies of all other languages. Ranking permutation yields a *factorial typology* of predicted cross-linguistic differences and similarities.

Because these core elements of OT are not tied to any specific empirical domain, they have been applied successfully to phonology, syntax, and other areas. In these various applications, hypotheses about CON assume par-

FIGURE 2. *The Standard OT Architecture*



ticular importance because, through permuted ranking, CON makes predictions about what is a possible language and what is not. A fairly standard assumption is that CON contains constraints of two types and no others. *Markedness* constraints assign zero or more violation-marks to a candidate based on aspects of its output structure, without reference to the input from which it is derived. Two typical markedness constraints are *Onset*, which prohibits vowel-initial syllables, and *Subj*, which prohibits sentences without overt subjects. *Faithfulness* constraints assign zero violation-marks to the candidate that is identical to the input, but they penalize candidates that differ from the input in various respects. Under this view of CON, the interaction of universal markedness and faithfulness constraints through ranking is the source of all the language-particular phenomena that are studied in fields like phonology or syntax.

In recognizing conflict among defeasible (violable) constraints, OT has historical associations with connectionism, especially Harmony Theory (Smolensky 1986), which links connectionism with the kinds of symbolic computations that are typical of linguistic theory. There is an important difference, however: OT constraints are ordered in strict-domination hierarchies that give higher-ranking constraints absolute priority over lower-ranking ones. Strict domination leads to a more restrictive view of language typology and language learning.

[*See also* Formal Grammar; Markedness; Phonology; Acquisition of Language; Minimalist Program; Mathematical Linguistics; Computational Linguistics; Cognitive Science; *and* Learnability.]

BIBLIOGRAPHY

Archangeli, Diana, and D. Terence Langendoen, eds. 1997. *Optimality Theory: An overview*. Oxford: Blackwell.

Beckman, Jill, Laura Walsh Dickey, and Suzanne Urbanczyk, eds. 1995. *Papers in Optimality Theory*. Amherst, Mass.: GLSA Publications.

Dekkers, Joost, Frank van der Leeuw, and Jeroen van de Weijer, eds. 2000. *Optimality Theory: Phonology, syntax, and acquisition*. Oxford: Oxford University Press.

Kager, René. 1999. *Optimality Theory*. Cambridge: Cambridge University Press.

Legendre, Géraldine, Jane Grimshaw, and Sten Vikner, eds. 2001. *Optimality-theoretic syntax*. Cambridge, Mass.: MIT Press.

McCarthy, John J. 2002. *A thematic guide to Optimality Theory*. Cambridge: Cambridge University Press.

Prince, Alan, and Paul Smolensky. 1993. Optimality Theory: Constraint interaction in generative grammar. Report no. RuCCS-TR-2. New Brunswick, N.J.: Rutgers University Center for Cognitive Science. Available at the Rutgers Optimality Archive, http://roa.rutgers.edu.

Prince, Alan, and Paul Smolensky. 1997. Optimality: From neural networks to universal grammar. *Science* 275.1604–1610.

Smolensky, Paul. 1986. Information processing in dynamical systems: Foundations of harmony theory. In *Parallel distributed processing: Explorations in the microstructure of cognition*, edited by D. Rumelhart et al., pp. 194–281. Cambridge, Mass.: Bradford Books/MIT Press.

Tesar, Bruce, Jane Grimshaw, and Alan Prince. 1999. Linguistic and cognitive explanation in Optimality Theory. In *What is cognitive science?*, edited by Ernest Lepore and Zenon Pylyshyn, pp. 295–326. Oxford: Blackwell.

Tesar, Bruce, and Paul Smolensky. 2000. *Learnability in Optimality Theory*. Cambridge, Mass.: MIT Press.

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Phonology

1. Architecture. Generative Phonology aims to construct a predictive theory of natural language sound systems, rooted in a finely detailed account of the principles defining linguistic representations and the possible relations between them. Within these broad goals, Optimality Theory (OT) develops in the context of specific empirical theses about the way phonological systems are organized. We identify three of them here.

1.1. ***Role of output targets.*** Phonological representations may change from their lexical form to their surface or output forms: German /rad/, 'wheel–lexical form' is pronounced [rat], Maori /inum/ 'drink–lexical form' is pronounced [i.nu], English/lik+d/ 'leak + past' is pronounced [likt], and so on a period is used to demarcate syllables). An important finding, announced in Kisseberth 1970 and since replicated in many areas of phonology and morphology, is that such changes are often conditioned by properties that hold for the surface or output forms in the language. In Maori, for example, no syllable is ever closed by a consonant: many lexical forms can be successfully parsed into open syllables without modification (e.g. /patu/ 'kill'), but others, like /inum/, must accommodate to the surface regularity by doing violence to lexical specification.

1.2. ***Intrinsic relation between change and conditions of change.*** Regular changes in representations take place under specifiable conditions; more subtly, the nature of the change is closely related to the nature of the conditions that provoke it. In Maori, for example, we see a change involving deletion under conditions that refer to