Optimal Religion

An Optimality Theoretical model for (Jewish) rituals

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International Workshop on Religion and Cognition
April 6-7, 2006

Overview

- Introduction to Optimality Theory
- Problems with current models to rituals (Whitehouse; McCauley and Lawson)
- Propose a model for the dynamics of the rituals
- Summary

Typologies in different disciplines

Research steps in most disciplines (in yours, too?):

- Collect your data:

- Systematize your data and create typologies:
- Create a model describing your typology:
  a deeper "understanding" of the phenomenon

Optimality Theory for buying chocolate (1)

You may prefer one or the other → customer typology

- Quality?
- Quantity?
- Price?

Optimality Theory for buying chocolate (2)

	Quality	*Quantity*	*Price*
Mars	excellent	55 g	0.50 EUR
Túró Rudi	excellent	30 g	0.30 EUR
Côte d'Or	good	200 g	1.40 EUR
Milka	medium	200 g	1.20 EUR

- Quality $\gg$ Quantity $\gg$ Price $\longrightarrow$ Mars
- Quality $\gg$ Price $\gg$ Quantity $\longrightarrow$ Túró Rudi
- Price $\gg$ Quantity $\gg$ Quality $\longrightarrow$ Túró Rudi
- Quantity $\gg$ Quality $\gg$ Price $\longrightarrow$ Côte d'Or
- Quantity $\gg$ Price $\gg$ Quality $\longrightarrow$ Milka

- Thus, *Optimality Theory* accounts for customer typology

Optimality Theory in linguistics (1)

Language typology:

Example: where is the stressed syllable in the word?

- Stress on the first syllable (e.g. Hungarian, Danish, Afrikaans, Latvian, Arawak, Sami, etc.)
- Stress on the last syllable (e.g. Aramaic, Guarani, Mazatec, etc.)
- Stress on the penultimate syllable (e.g. Mohawk, Albanian, Chumash, Chamorro, etc.)
- (Etc. - ignore)
- No language with stress always on the second syllable.

Optimality Theory in linguistics (2)

Let's use the following constraints:

- *Early*: the stress must occur as early as possible in the word
- *Late*: the stress must occur as late as possible in the word
- *No-Final*: the last syllable must not be stressed

Optimality Theory in linguistics (3)

(s = stressed syllable, u = unstressed syllable)

4-syllable word	*Early*	*Late*	*No-Final*
s.u.u.u	good	worst	good
u.s.u.u	medium	bad	good
u.u.s.u	bad	medium	good
u.u.u.s	worst	good	bad

- *Early* $\gg$ *Late* $\gg$ *No-Final* $\longrightarrow$ s.u.u.u (word initial stress)

Optimality Theory in linguistics (3)

(s = stressed syllable, u = unstressed syllable)

4-syllable word	*Late*	*Early*	*No-Final*
s.u.u.u	worst	good	good
u.s.u.u	bad	medium	good
u.u.s.u	medium	bad	good
u.u.u.s	good	worst	bad

- *Early* $\gg$ *Late* $\gg$ *No-Final* $\longrightarrow$ s.u.u.u (word initial stress)
- *Late* $\gg$ *Early* $\gg$ *No-Final* $\longrightarrow$ u.u.u.s (word final stress)

Optimality Theory in linguistics (3)

(s = stressed syllable, u = unstressed syllable)

4-syllable word	*No-Final*	*Late*	*Early*
s.u.u.u	good	worst	good
u.s.u.u	good	bad	medium
u.u.s.u	good	medium	bad
u.u.u.s	bad	good	worst

- *Early* $\gg$ *Late* $\gg$ *No-Final* $\longrightarrow$ s.u.u.u (word initial stress)
- *Late* $\gg$ *Early* $\gg$ *No-Final* $\longrightarrow$ u.u.u.s (word final stress)
- *No-Final* $\gg$ *Late* $\gg$ *Early* $\longrightarrow$ u.u.s.u (penultimate stress)
- No ranking yields u.s.u.u: systematic lack in the predicted typology
  Indeed, now language with stress always on the second syllable

Optimality Theory (OT): an overview

Alan Prince and Paul Smolensky, 1993

- Candidates: initially, all possibilities compete
- Constraints:
  - Best candidates survive the constraint
  - Worse-than-best candidates are filtered out
- Different rankings (hierarchies) yield different winners
- Therefore: OT is a model for typology
  (customer typology / language typology)

Cognitive models for rituals (1)

Two modes of religiosity (since Max Weber...)

Whitehouse (1995, based on Pomio Kivung in Dadul):

Doctrinal mode	Imagistic more
repetitive, routinized	*periodic*
semantic memory	*episodic memory*

etc. p. 197.

Cognitive models for rituals (2)

McCauley and Lawson (2002):

- Ritual = action
- Action representation system
  - Act, Agent, Patient, Instrument, Recipient, Circumstances (time, place, direction,...), etc.

Cf. thematic (theta) roles in linguistics

Cognitive models for rituals (3)

Which factor predicts better emotional arousal / sensory pageantry of rituals?

- *Ritual Frequency Hypothesis*: frequency
  - Frequent = low arousal (else, too expensive)
  - Rare = high arousal (in order to remember, flashbulb)
- *Ritual Frequency Hypothesis*:
  - special agent = high arousal
  - special patient / instrument = low arousal

Judaism

- Main stream Judaism: unbalanced system to the extreme. Tedium effect, splinter group with special agent rituals: Hasidism?
- Problem: the McCauley-Lawson model is inappropriate to rabbinic Judaism (lack of *enabling rituals*!)
- Longer discussion of certain rituals, if time permits and if there is interest (Whitehouse, 2004:410)
- Modern and folkloristic forms of Judaism might differ

Remarks

- Use McCauley-Lawson model without referring to *special patient, special instrument rituals*.
- Rather: presence or absence of *special agent rituals*.
- This way, it works for Judaism.
- *Special patient, special instrument rituals* is too long + lacks recipients, special locations, etc.
- Problem: no exact model of dynamics.

Optimality Theory for rituals (1)

Person X is "supposed to" / "able to" perform action y.
Given: a set of possible forms of action y: $\{y_1, y_2, ...\}$.
Question: which one to choose?

Constraints determine the choice, including X's own interests, as well as factors related to other agents.
Religious rituals: some agents are superhuman ones.

CSR research project: derive constraints driving religious actions from constraints determining secular actions.

Goal of a research project in the cognitive science of Judaism: describe the relevant constraints in Judaism.

Optimality Theory for rituals (2)

Goal: model dynamics

(NB: new model w.r.t. written version.)

Universal constraints driving the events in Dadul:

Set of candidates:

$$\left\{(h,g) \;\middle|\; h \in \{0,1,2,...,N\}, g \in \{0,1\}\right\}$$

Namely: human can offer a sacrifice whose price is between 0 and N (time, energy, health, resources,...). Gods can answer the sacrifice or not.

Optimality Theory for rituals (3)

Constraints used by the fellow agent (SH in our case):

- For all $z > 0$: DG_z: don't give for less than z

$$\mathrm{DG}_z(h, g) = \begin{cases} 1 & \text{if } h < z \text{ and } g = 1 \\ 0 & \text{else} \end{cases}$$

- MB: make business

$$\mathrm{MB}(h, g) = \begin{cases} 1 & \text{if } g = 0 \\ 0 & \text{if } g = 1 \end{cases}$$

NB: can MB be derived from other principles?

Optimality Theory for rituals (4)

Humans are learning the supposed grammar driving the gods' behaviour. The goal of the humans is to pay the minimum price p for which gods still answer the sacrifice.

$$\mathrm{DG}_1 \gg \mathrm{DG}_2 \gg \ldots \gg \mathrm{DG}_z \gg \ldots$$

Humans offer price p. Will gods accept the offer?
If $\mathrm{MB} \gg \mathrm{DG}_{p+1}$

	DG_1	DG_2	...	MB	...	DG_{p+1}
$(p, g = 0)$	0	0 ...		1!	...	0
☞ $(p, g = 1)$	0	0 ...		0	...	1

Optimality Theory for rituals (5)

Humans are learning the supposed grammar driving the gods' behaviour. The goal of the humans is to pay the minimum price p for which gods still answer the sacrifice.

$$\mathrm{DG}_1 \gg \mathrm{DG}_2 \gg \ldots \gg \mathrm{DG}_z \gg \ldots$$

Humans offer price p. Will gods accept the offer?
If $\mathrm{DG}_{p+1} \gg \mathrm{MB}$

	DG_1	DG_2	…	DG_{p+1}	…	MB
☞ $(h = p, g = 0)$	0	0 …		0	…	1
$(h = p, g = 1)$	0	0 …		1!	…	0

Optimality Theory for rituals (6)

If $\text{MB} \gg \text{DG}_{p+1}$

	DG_1	DG_2	...	MB	...	DG_{p+1}
$(p, g = 0)$	0	0 ...		1!	...	0
☞ $(p, g = 1)$	0	0 ...		0	...	1

Bruce Tesar's *Error Driven Constraint Demotion Algorithm*: humans offer sacrifice with price p, and expect gods answer the sacrifice ($g = 1$). But they don't. Hence, *learn* that MB must be demoted below DG_{p+1}.

Optimality Theory for rituals (7)

By repeating the algorithm, finally we learn that $\mathrm{DG}_{N+1} \gg \mathrm{MB}$. Then, humans predict only candidate $(p = N + 1, g = 1)$ win, but N is upper limit of payable price. Then, break down.

Conclusion: we have described the dynamics of run away and break down of the splinter group.

Optimality Theory for rituals (9)

"Anti-splinter group development" ("secularization"), if argument is found to promote MB:

$(p, g = 1)$ is optimal even for lower p's.

Alternatively: we don't know if $g = 0$ or $g = 1$, but exactly the same happens for all p's. Then: employ p as low as possible (economy on the human side, cf. article).

Future work: combine constraints on the human side with constraints on the gods' side.

Optimality Theory for rituals (10)

What is the dynamics that creates attractor positions?

If no argument found either to promote or to demote MB.

Possible arguments from

- Direct personal experience
- Randomized personal experience
- Theology

Future work: include these into the model.

Summary

- Introduction to Optimality Theory (both connectionist and symbol manipulating approaches exist)
- *McCauley and Lawson's model:* Thematic roles of actions – hard to interpret for Judaism
- *McCauley and Lawson's model:* no exact dynamics given – proposed dynamics using *Error Driven Constraint Demotion Algorithm*

Thank you for your attention!

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