On the Gradience of the Dative Alternation[0]

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ABSTRACT

The present study addresses the gradience of the dative alternation. It is shown that central evidential paradigms that have been used to support semantic explanations for the choice of dative constructions are not well founded empirically. Some widely repeated reports of intuitive contrasts in grammaticality appear to rest instead on judgments of pragmatic probabilities. An informational theory of the dative alternation is supported by the results of a corpus study on the distribution of person across dative NP and PP recipients in spoken English, and a formal model of the theory is given within the framework of stochastic Optimality Theory.

What drives the dative alternation? Two broad classes of approaches have been taken to answering this question: the semantic and the informational.

Semantic approaches to explaining the dative alternation have attempted to map each of a number of fine-grained semantic classes of dative verbs and idioms onto a unique syntax (Green 1974; Oehrle 1976; Gropen, Pinker, Hollander, Goldberg, and Wilson 1989; Pinker 1989; Speas 1990; Levin 1993; Marantz 1993; Goldberg 1995; Pesetsky 1995; Davis 1997; Harley 1996, in press; Arad 1998; Kay 1996; Bruening 2001; Krifka 2001, ao). We show in the first two parts of this study that central evidential paradigms that have been used to support both lexical semantic (Pinker 1989, Levin 1993, Krifka 2001) and constructional (Goldberg 1995, Kay 1996) explanations for the choice of dative constructions are not well founded empirically. Some widely repeated reports of intuitive contrasts in grammaticality appear to rest instead on judgments of pragmatic probabilities.

Informational approaches attribute the use of alternative dative syntax to contextual or processing factors such as information structure, animacy, definiteness, and end weight (Halliday 1970; Smyth, Prideaux, and Hogan 1979, Erteshik-Shir 1979, Ransom 1977, 1979, Givón 1984, Thompson 1990, 1995; Hawkins 1994, Collins

1995; Davidse 1996a,b; Arnold et al 2000; Snyder 2001, Levin and Rappaport Hovav 2002). In the third part of this study we provide an informational model of the dative alternation using the framework of stochastic OT. We present results from a corpus study showing that there is a harmonic alignment of person with the syntactic argument type of the dative recipient in the parsed SWITCHBOARD corpus of spoken English (Godfrey, Holliman, and McDaniel 1992; Marcus, Santorini, and Marcinkiewicz 1998). The person/argument alignment is independent of previously studied effects of length and syntactic complexity (Hawkins 1994, Wasow 2002), pronominality and definiteness (Givón 1984; Thompson 1990, 1995; Collins 1995). Our stochastic OT model of person/argument alignment captures the gradience of this phenomenon as well as the divergences in the probability distributions of different classes of verbs. The model leads to the expectation that near-categorical person and pronominality splits in the same direction as the quantitative alignment in English should exist in other languages. In the fourth part of this study we show that this expectation is borne out in the Nilo-Saharan language Kanuri (Hutchison 1981).

1 Is there a dative alternation?

As mentioned above, semantic approaches to explaining the dative alternation map each of a number of fine-grained semantic classes of dative verbs and idioms onto a unique syntax. Abstracting away from differences in choice of syntactic representation, one general idea that has appeared in a number of these approaches is that dative verbs or idioms which have possessive semantics as in (i) are uniquely associated with the dative NP syntax [V NP NP], while datives with allative semantics as in (ii) are uniquely associated with the dative PP syntax [V NP [to NP]$_{\mathrm{PP}}$]:[1]

(i)	'x causes y to have z'	(possessive)	⇒	NP V NP NP
(ii)	'x causes z to go to/be at y'	(allative)	⇒	NP V NP [to NP]

On these approaches, the dative NP and PP constructions are not alternative expressions of the same meaning, they are expressions of different meanings. Hence, on this view there is no true dative alternation.

Arguments in favor of this approach list a number of semantic restrictions on the dative alternation, such as those in (1)–(3):

[1] On the possessive meaning of the dative NP construction see also Herslund (1986) and Davidse (1996b).

(1) a. I threw the box to John. $\sim$ I threw John the box.

b. I lowered the box to John. $\not\sim$ *I lowered John the box.

(Pinker 1989: 110–111; Levin 1993: 46, 114)

(2) a. Ann faxed the news to Beth. $\sim$ Ann faxed Beth the news

b. Ann yelled the news to Beth . $\not\sim$ *Ann yelled Beth the news.

(Krifka 2001)

(3) The lighting here gives me a headache. $\not\sim$ *The lighting here gives a headache to me.

(Marantz 1993; Bruening 2001: 261)

For example, giving someone a headache is causing them to have a headache, not transferring the headache from one location to another. Hence, by virtue of its meaning, it is argued, this idiom occurs only in the possessive dative NP construction (i) and does not alternate. Likewise, the meaning of 'throwing' specifies the causing event in the schema (i), while the meaning of 'lowering' specifies both the causing event and the movement event in schema (ii), since there is a homomorphoric mapping between the two events in lowering actions (Krifka 2001, Pinker 1989). Therefore 'lowering' and similar verbs cannot have the syntax associated with schema (i) because it omits a essential part of their meaning. With yelling in (2b), there is "a homomorphism between speech production (e.g. the activity of yelling) and the transfer of information," according to Krifka (2001), while with faxing there is no homomorphism between the causing event and the movement event; only the initial stage of the transfer is specified as with *throw* in (1a).

When the same verb appears with both dative NP and dative PP syntax on this account, the meanings of the two constructions differ. Either the verbs *throw, fax*, and the like are lexically polysemous, or polysemy is imposed by the differing constructional contexts they appear in, depending on the specific grammatical assumptions (lexical or constructional) of the approach.

A challenge for the approach is the fact that alternating dative syntax can be found in contexts of repetition, as in the following attested examples.

(4) "You don't know how difficult it is to find something which will please everybody—especially the men."

"Why not just **give them cheques**?' I asked.

"You can't **give cheques to people**. It would be insulting."[2]

(5) "You **carrying a doughnut to your aunt** again this morning?" J.C. sneered. Shelton nodded and turned his attention to a tiny TV where "Hawaii Five-O" flickered out into the darkness of the little booth. "Looks like you **carry her some breakfast** every morning."[3]

Krifka (2001), building on Gropen et al. (1989) and Pinker (1989), proposes for *give* that "every transfer of possession entails an abstract movement event in the dimension of possession spaces."[4,5] This proposal makes some polysemies empirically indistinguishable from the monosemy hypothesis (Levin and Rappaport Hovav 2002), which asserts that when verbs in the broad semantic classes (i) and (ii) have recipient rather than purely spatial arguments, each can occur with both dative NP and PP syntax.

The question then becomes, What is the scope of these equivalenced polysemies or monosemies? We have found that it is far greater than has previously been recognized.

Case 1: 'verbs of imparting of force'

"Verbs of instantaneous imparting of force in some manner causing ballistic motion" occur with both dative NP and PP syntax:

(6) Lafleur throws/tosses/flips/slaps/kicks/pokes/flings/blasts him the puck; he shoots, he scores!

(cf. Lafleur throws/tosses/flips/slaps/kicks/pokes/flings/blasts the puck to him; he shoots, he scores!)

[4]The latinate verbs (*donate, contribute*, etc.) remain an exception to this generalization for morphophonological reasons.

[5]The *give a headache* idiom is not affected by this meaning postulate, according to Krifka (2001), because the theme does not just change possession but comes into existence.

In contrast, according to Pinker (1989: 110–111) and Krifka (2001) ao, "verbs of continuous imparting of force in some manner causing accompanied motion" occur only in the dative PP construction:

(7) *I carried/pulled/pushed/schlepped/lifted/lowered/hauled John the box.

(cf. I carried/pulled/pushed/schlepped/lifted/lowered/hauled the box to John.)

Of verbs of continuous imparting of force (*carry, pull, push, schlep*), Pinker (1989: 103) writes:

> Though they are *cognitively* construable as resulting in a change of possession (if the object is pushed over to a person with the intent of giving it to him), they are not *linguistically* construable as such because the licensing linguistic rule is not stated broadly enough to apply to them.

Yet we find from an examination of WWW documents that verbs of continuous imparting of force are linguistically construable as depicting changes of possession, and are in current use. The following examples are a selection of our findings.

(8) VERBS OF CONTINUOUS IMPARTING OF FORCE

> Karen spoke with Gretchen about the procedure for registering a complaint, and **hand-carried her a form**, but Gretchen never completed it.
> 2 June 1999, Nampa Controversy Summary — Idaho Library Association, www.idaholibraries.org/nampa.controversy.summary.htm
>
> As Player A **pushed him the chips**, all hell broke loose at the table.
> www.cardplayer.com/?sec=afeature&art_id=165
>
> Therefore, when he got to purgatory, Buddha **lowered him the silver thread of a spider** as his last chance for salvation.
> www.inch.com/ fujimura/ImofGrmain.htm
>
> Nothing like heart burn food. "I have the tums." Nick joked. He **pulled himself a steaming piece of the pie**. "Thanks for being here."
> www.realityfanfiction.addr.com/storm3.html
>
> "Well... it started like this..." Shinbo explained while Sumomo **dragged him a can of beer** and opened it for him, "We were having dinner together and..."
> www.angelfire.com/wa2/bozyby/hold1.html

Notes. The context of the second example is a tournament poker game: the card players are seated together at a card table and have bet varying amounts by putting poker chips into the pot; this is done by placing some of one's own poker chips onto a common area of the table for the chips of betting players. Whoever wins the pot receives all of the chips, which can be pushed across the table to the winner.

The last example is from a Chobits fanfiction piece: Shinbo is sitting on a tatami mat with his interlocutor (Hideki). Sumomo is a very small servant robot, small enough to dance on a table, climb up his master's leg and perch on his shoulder. Sumomo serves the beer to the visitor Shinbo by dragging a can to him.

Case 2: Verbs of communication

Another widely repeated contrast occurs among verbs that can be used for describing types of communication (Pinker 1989, Levin 1993, Krifka 2001 ao). "Verbs of instrument of communication" have uses with both dative NP and PP syntax:

(9) Susan cabled/emailed/faxed/phoned/telegraphed/... Rachel the news.

(cf. Susan cabled/emailed/faxed/phoned/telegraphed/... the news to Rachel.)

In contrast, "verbs of manner of speaking" are marked as ungrammatical with dative NP syntax:

(10) *Susan whispered/yelled/mumbled/barked/muttered... Rachel the news.

(cf. Susan whispered/yelled/mumbled/barked/muttered... the news to Rachel.)

Despite the reported ungrammaticality of verbs of manner of speaking with dative NP syntax, we again find representatives of the starred types of examples in current use:

(11) MANNER OF SPEAKING VERBS

Shooting the Urasian a surprised look, she **muttered him a hurried apology** as well before skirting down the hall.
www.geocities.com/cassiopeia_sc/fanfiction/findthemselves.html

"Hi baby." Wade says as he stretches. You just **mumble him an answer**. You were comfy on that soft leather couch. Besides ...
www.nsyncbitches.com/thunder/fic/break.htm

The shepherd-dogs, guardians of the flocks, **barked him a welcome**, and the sheep bleated and the lambs pattered round him.
www.litrix.com/raintr/raint009.htm

I think he was poking fun at the charges that Blackmore has been making that he chronically forgets words — he went over to Jon Lord during 'Smoke' and seemed to be getting Jon to **yell him the words**!!
www.thehighwaystar.com/reviews/namerica/asbuandr.htm

I still can't forget their mockery and laughter when they heard my question. Finally a kind few (three to be exact) came forward and **whispered me the answer**.
www.bangla2000.com/mboard/vbulletin.asp?ID=1462

Case 3: *give* NP NP idioms

Idioms have been long and widely cited as showing that the dative NP and dative PP constructions differ semantically. To quote just one of many authors who have repeated this claim, Davis (1997: 41) writes of idioms like *give me a headache* and *give him a punch*:

> These sentence[s] denote situations in which a participant acquires a headache or receives a punch, but the headache and the punch cannot be said to be transferred from one location to another. Accordingly, the ditransitive one is the only appropriate one in these instances.

Yet these idioms are in fact used with dative PP syntax, as are all possibly idiomatic *give* NP NP collocations we found in the SWITCHBOARD corpus. The following is a representative selection.

(12) GIVE A HEADACHE TO

sending a copy to every elector is a nice gesture, but futile, because it is unreadable, guaranteed to **give a headache to anyone who looks hard at the small print**.
(The Guardian (London), September 17, 1992, p. 23; Nexis) [from Levin and Rappaport Hovav 2002]

From the heads, offal and the accumulation of fishy, slimy matter, a stench or smell is diffused over the ship that would **give a headache to the most**

athletic constitution.
www.downhomer.com/Webmag/2000/0007/page36.html

She found it hard to look at the Sage's form for long. The spells that protected her identity also **gave a headache to anyone trying to determine even her size**, the constant bulging and rippling of her form gaze Sarah vertigo.
http://lair.echidnoyle.org/rpg/log/27.html

Design? Well, unless you take pride in **giving a headache to your visitors** with a flashing background?no.
http://members.tripod.com/∼SailorMoonWorstOfWeb/archive/RunJan01.html

(13) GIVE A PUNCH TO

When the corpse was bloodless, he got up and grinned to Ethan-vampire, oh so happy. "Oh yesssss!" He **gave a punch to his old mate**. "Let's find a bar, Ethan." . . .
vampirecows.com/odd/authors/anne/draculaannebg01.html

"Well, mate, you asked for it."- And he **gave a punch to the guy** in the middle of his face, splotching . . .
www.fortunecity.com/tattooine/tolkien/176/tekrats.htm

All three headed toward Mulan. She dropped kicked the first. Next she **gave a punch to the second man**. He blocked so she grabbed his arm and flipped him. . . .
members.tripod.com/Xi_Xiao/family002.html

She **gave a punch to the evil reporter that had asked the dumb ass question**.
http://pub56.ezboard.com/ffoxprintsfrm5.showMessage?topicID=10.topic

(14) GIVE A BREAK TO

PUC **gives a break to big users of energy**.
www.sacbee.com/content/politics/story/5114554p6120694c.html

"Why can't we **give a break to the people who organise them** [the matches]?"
www.rediff.com/cricket/2002/mar/22kapil.htm

Give a break to the overburdened who have no place to rest.
www.csmonitor.com/durable/1999/11/03/p15s1.htm

That's been the fairest way I can think of to protect the people who do register, and still **give a break to the people who have contributed to the project**. . .
www.qflux.net/wwwboard/messages/1057.html

They wonder what citizenship means if you **give a break to people who are here illegally**.
www.usbc.org/profiles/0202citizenshipmatter.htm

(15) GIVE A HARD TIME TO

The silly clowns sometimes **give a hard time to the emperor**.
www.math.ohio-state.edu/∼econrad/lang/ln.html

The Necromancer has a wide area of spells he can use to either stay out of trouble or **give a hard time to his opponents**.
www.ultimategamers.com/diablo/necromancer/necromancer.html

Those who have come before traditionally **give a hard time to those who have just come**
www.mcny.org/byron/GCAintro.htm

(16) GIVE GRIEF TO

Still, I took it back today and **gave some grief to the assistant** and came out with a better scanner than I had paid for on Tuesday
scribblepad.co.uk/archive/april2002.html

He **gave grief to those taking their time near the rear**, I remember watching him from outside the bus while we stood on the yellow footprints.
pages.sbcglobal.net/e8usmcdi/1stday.html

For further discussion of idioms in relation to usage data, see Snyder (2001), Davidse (1998), and especially Levin and Rappaport Hovav (2002).

Case 4: Verbs of prevention of possession

Even the verbs *cost* and *deny*, which are widely described as occurring only with dative NP syntax, we found to alternate. Contrast (17a,b) (Krifka 2001, among many others) with (18):

(17) a. The car cost Beth $5000. $\not\sim$ *The car cost $5000 to Beth.

b. Ann denied Beth the ice cream. $\not\sim$ *Ann dened the ice cream to Beth.

(18) COST . . . TO

The IRS is unionized, and the union apparently has the fear that outsourcing will **cost jobs to their members**.
www.collectionindustry.com/agencyNews/feedback.cfm?issue=4

Any reduced rate, however, will still **cost jobs to Californians in the teleservices profession**, drive up costs, increase inefficiency, and place an undue restraint on technology.
FIGHT AGAINST PROPOSED PREDICTIVE DIALER BAN IN CALIFORNIA CONTINUES, http://www.ataconnect.org/htdocs/govtrel/news/2000/aug/08-18/ca_ab2721update.htm

He did so thinking it would **cost nothing to the government**.
www.stuttgart.army.mil/community/Citizen/2000/0926/cheapcall.htm

(19) DENY . . . TO

Most grievances will involve only a dispute between the grievor and the employer. The employer has underpaid, or disciplined, or **denied a leave to a teacher**; resolution of the grievance does not impact directly on others.
www.bctf.ca/bargain/grievances/backgrounder.html

definition of 'abnegate'. *The American Heritage Dictionary of the English Language*, 4th Edition:

1. To give up (rights or a claim, for example); renounce. 2. **To deny (something) to oneself**: The minister abnegated the luxuries of life.

www.bartleby.com/61/83/A0018300.html

After all, who could **deny something to someone so dedicated to the causes of international friendship and collaboration**?
www.eawc.org/7forum/loula_greece.html

The answer to the question: Yes

We observe that *give a headache, give a punch, give a break, give a hard time, and give grief* have fixed meanings which are self-evidently constant across the dative NP and dative PP contexts. Likewise, the verbs of deprivation of possession *cost* and *deny* mean the same in the dative PP constructions. The verbs of continuous imparting of force *drag, carry, push, pull*, and *lower* still specify the same distinguishing manners of motion in the dative NP contexts cited as they do in the dative PP context. Likewise, the manner of speaking verbs *mutter, mumble, bark, yell, whisper* continue to specify the same characteristic emissions of sound continuously accompanying the speech acts in the dative NP contexts cited as in the dative PP contexts.

The imagined inability of these verbs, idioms, and constructions to be used in one of the two dative constructions has provided central evidential paradigms for the idea that differing semantics dictates the differing syntactic expressions of the dative.[6] On closer inspection, there seems to be no reason at all to reject the dative alternation for a much wider range of verbs and idioms than previously recognized.

We conclude that the dative alternation exists, whether it is analyzed in terms of alternative syntactic expressions of the same meaning (Levin and Rappaport Hovav's 2002 monosemy hypothesis) or of meaning postulates that create equivalences in truth conditions across semantically differing dative NP and dative PP constructions (like Krifka's 2001 equivalenced polysemies extended to a much wider range of uses of verbs).

Note that none of the starred example types are found in the parsed SWITCHBOARD corpus,[7] but all of them occur in the much larger corpus of web documents.[8] They appear not to be grammatically impossible, but just improbable.

[6]Reported entailments of completion or affectedness accompanying the dative NP construction have been shown to be defeasible implicatures (Levin and Rappaport Hovav 2002 and references).

[7]The SWITCHBOARD corpus is a database of spontaneous telephone conversations spoken by over 500 American English speakers, both male and female, from a great variety of speech communities (Godfrey et al. 1992). The conversations average 6 minutes in length, collectively amounting to 3 million words. We used the parsed portion of this corpus (released as part of the Penn Treebank, Marcus et al. 1993), which contains 1 million words.

[8]The WWW is estimated to contain 47,000,000,000 words of English as of February 2000 (Baayen 2003, citing Grefenstette 2000).

2 A systematic bias in grammaticality judgments?

The usage data for the dative alternation raise an interesting problem. Our own linguistic intuitions agree with those of the linguists cited (Pinker, Krifka, Levin, et al.), in that we perceive the contrasts in the constructed examples. At the same time we judge the web examples given above to be grammatically possible.[9] What then do our intuitions correspond to?

Although both dative NP and dative PP constructions can be used to express transfers of possession, as our examples show (see also Levin and Rappaport Hovav 2002), the fact is that there is a strong skewing of the syntax of alternating dative verbs toward the dative NP construction in conversational English usage, as measured by the parsed SWITCHBOARD corpus of English telephone conversations. See Table 1.[10] If we take *give* to be prototypical of the class of transfer of possession

Table 1: Alternating dative verbs in the parsed SWITCHBOARD corpus

	NP NP	NP PP_{to}	total:	
give	226	35	261	*give*: NP NP = 87%
other verbs	291	69	360	other v's: NP NP = 81%
total:	517	104	621	
			give = 42%	
			of all instances	
			of dative verbs	

verbs, then dative NP syntax is by far the preferred syntactic expression for this class of verbs.

Now transfers of possession may occur in many ways. In sports like hockey, possession of the puck can take place by means of a number of sudden actions in play, and there is much varied discourse about it. In the world more generally, or at least in present-day American life, if a person accompanies and holds, clings to, or otherwise stays in contact with a possession, it seems to us less likely that a transfer of possession is going on, and in many cases there is probably much less talk about it than about possession of the ball or puck or whatever in sports. Carrying people things as a transfer of possession is surely more common in situations where walking is a major mode of transportation. The previously given web examples are from

[9] Thus we do not classify our usage data given above with the sporadic adult errors of the types recorded by Gropen et al. (1989: 251).

[10] This count excludes nonalternating uses of dative verbs. See n. 11.

present-day English, but many examples of *carry* with dative NP can be found on the web in depictions of life in rural areas, often predating the rise of the automobile.

(20) Pre-automotive uses of ditransitive *carry*

> Aurie and Pearl went to Humboldt that afternoon. I went back to Mrs. Kate's to **carry her some mustard salad**.
> (www.rootsweb.com/∼tngibson/Bios/mayfield1894.htm
> [from Fidelia Mayfield Diary 1892])
>
> "This evening she was late starting dinner because her second granddaughter has a cold, and she had to **carry her some pepper sauce for her cough**."
> (www.fictionwise.com/ebooks/eBook842.htm
> [from a novel set in the Civil War period])
>
> Polly had been sick and Sara wanted to **carry her some food**.
> (www.lrwma.com/happenings/HAPPENINGS1.htm
> [from Happenings around Leatherwood Mountain in the Early 1900s])
>
> "Go, my dear, and see how thy grandmamma does, for I hear she has been very ill; **carry her a custard and this little pot of butter**."
> (www.azstarnet.com/reading/reading22.html
> [Little Red Riding Hood])

For the same reasons, pushing is probably less likely to be discussed as a mode of transferring possession than carrying, with pulling perhaps less so, and lowering and dragging the least. These observations raise the possibility that our grammaticality judgments of the contrasting pairs of examples are being systematically biased by the probability of similar descriptions of the event types depicted by the examples.

In summary, our hypothesis is this. We can use both dative NP and dative PP syntax to express transfers of possession, but the prototypical uses of giving are heavily biased toward the dative NP construction. Now transfers of possession are more likely to be described in the discourse of sports where motional verbs of instantaneous imparting of force (*throw, toss, kick, flip, slap, fling, . . .*) are heavily used than in discourse about dragging, lowering, pushing, pulling, and even carrying these days. Hence, we are more likely to judge verbs in the *throw* class as acceptable with dative NP syntax than verbs in the *drag* class.

We can pursue a similar line of thinking about the verbs of communication. Both types of communication verbs ('verbs of means of communication' and 'verbs of

manner of speaking') are grammatically possible with alternative dative syntax, yet with the first type dative NP syntax seems to be preferred in grammaticality judgments. Again we may ask, what do these intuitions correspond to?

Notice that activities of cabling, emailing, faxing, phoning, telegraphing, and the like almost always involve communication—that is transfers of the possession of information. The most frequent verb of communication that occurs in dative constructions is *tell*. Over 99% of all dative uses of *tell* in the parsed SWITCHBOARD corpus occur in the dative NP construction.[11]

In contrast to the activities described by the manner of communication verbs, whispering, yelling, mumbling, barking, muttering, and the like are more often, to varying degrees, noncommunicative. When used intransitively and with certain directional phrases, the manner-of-speaking verbs "describe the physical characteristics of a sound" rather than "an intended act of communication by speech" (Zwicky 1971: 225, 226):

(21) a. He whispered/yelled/mumbled/barked/muttered (but he wasn't saying anything).

b. He whispered/yelled/mumbled/barked/muttered at us/in our direction.

In fact, a tgrep query of the Switchboard corpus yields 17 occurrences of these five manner of speaking verbs, of which 12 are noncommunicative, 3 are semi-communicative (like "yelling for help", which may not successfully communicate because an interlocutor or even an audience is not necessarily present), and only 2 have complements which denote "the products of a speech act".

Granted that the uses of manner of speaking verbs are probably disproportionately describing noncommunicative activities, why should their communicative uses favor the dative PP over the dative NP? Zwicky (1971: 226) observes that the directional *at, toward* phrases that modify manner of speaking verbs are in complementary distribution with the *to* PPs.

(22) He whispered/yelled/mumbled/barked/muttered at us/in our direction (*to John).

This fact suggests that these verbs have a variant of the allative type lexical semantics; here the PP denotes the orientation of the actor toward the goal rather than a path

[11] This count excludes nonalternating uses such as concealed questions (*I will tell you another plant that is purply*) and 17 occurrences of the fixed expression *I('ll) tell you what*.

of movement. With these verbs the theme argument is usually a noncommunicative sound and less often the product of a speech act. The same PP syntax expresses both situations.

These observations are only suggestive, but they motivate our conjecture that *grammaticality judgments of contrasting pairs of examples may be systematically biased by the probability of similar descriptions of the event types depicted by the examples.*

Note that it is the probability of the *descriptions* of event types, not the events themselves, that we conjecture to be important in judging grammaticality. We have no idea whether yelling or muttering events are more or less probable than emailing or faxing events, but the proportions of yellings or mutterings that are described as communicative transfers of possession of information are much smaller, we suspect, than the proportions of emailings or faxings.

Thus, for communication verbs our hypothesis can be summarized in this way. We can use both dative NP and dative PP syntax to express communications, viewed as transfers of possession of information, but the prototypical dative verb of communication, *tell*, is heavily biased toward the dative NP construction. Now communication is more likely to be described in discourse about faxing, emailing, and other events involving means of communication than in discourse about whispering, yelling, mumbling, barking, and muttering. Hence, we are more likely to judge verbs in the *mutter* class as unacceptable with dative NP syntax than verbs in the *fax* class simply because there are far fewer instances of mutterings, mumblings, and yellings that are likely to be described as instances of tellings.

3 What drives the dative alternation?

For the many cases where the choice of dative syntax is not determined by meaning, what drives the dative alternation?

A simple Optimality Theoretic (OT) model of the dative alternation can be based on two conflicting constraints on syntactic structure, a faithfulness constraint requiring distinct marking of the recipient role and an economy constraint penalizing syntactic structure.[12] See Figure 1. This model assumes the same input for each candidate set; the choice of syntax is always relative to a given meaning to be expressed.

If only nonlinguistic factors were involved, the choice between these alternants would be unpredictable from properties of grammar. In this case stochastic ('noisy')

[12]We set aside additional constraints which would be needed to choose between morphological (case) and syntactic (adpositional) dative marking.

Figure 1: Structural constraints on the dative alternation:

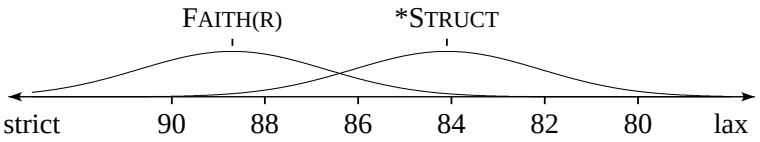
FAITH(REC): Express the recipient role of a verb with distinct marking (case or adposition)

*STRUCT: Avoid syntactic structure (here: *PP)

	*STRUCT	FAITH(REC)	OTHER CONSTRAINTS
give them cheques		*	
give cheques to them	*		
give them-DAT cheques-ACC			*

evaluation of the structural constraints, producing variable ranking, would be a sufficient model (Boersma 1998, Boersma and Hayes 2001). See Figure 2.

Figure 2: Constraint ranking on a continuous scale with stochastic evaluation:



	*STRUCT	FAITH(REC)
☞ give them cheques		*
give cheques to them	*!	

	FAITH(REC)	*STRUCT
give them cheques	*!	
☞ give cheques to them		*

In OT with stochastic evaluation the variable rankings of *STRUCT and FAITH(REC) produced by noisy evaluation will lead to constraint reversals at a frequency which is a function of the distance between the constraints on the continuous ranking scale. Given variable ranking normally distributed around a mean, the closer together the constraints are, the more the reversals, and the more variable the outputs.

An OT grammar with stochastic evaluation can generate both categorical and

variable outputs. Categorical outputs arise when crucially ranked constraints are distant. As the distance between constraints increases, interactions become vanishingly rare. (A distance of five standard deviations ensures an error rate of less than 0.02%.)[13]

The *NP PRO Constraint

But there are linguistic constraints on the dative alternation. One is the *NP PRON constraint widely cited in English linguistics. Personal pronouns, but not demonstrative or indefinite pronouns, are avoided when following lexical NPs if both are objects:

(23)

Erteschik-Shir (1979: 452):	Collins (1995: 39):	Kay (1996):
John gave it to Mary.	*Tom gave an aunt them.	*She gave John it
*John gave Mary it.	Tom gave them to an aunt.	I gave John that.
		She gave John one.

A similar constraint appears in other languages, including the Bantu language Lunda (Kawasha 2002).[14] In Lunda ditransitives with *give*, the recipient NP object precedes the theme NP object:

(24) a. *N-é-enk-a* *kánsi* ***mu-kánda***
i SG-PAST-give-FV 1.child 3.book
'I gave the child a book.'

b. **N-é-enk-a* ***mu-kánda*** *kánsi*
i SG-PAST-give-FV 3.book 1.child
'I gave the book a child.'

A pronominal secondary object can cliticize to the verb, but only if the primary object is not a lexical NP:

(25) a. **N-e-enk-á=**__wu__ *kánsi*
i SG-PAST-give-FV=PRO 3 1.child
'I gave it to the child.'

[13] See Boersma and Hayes (2001: 50). Units of measurement are arbitrary. With standard deviation = 2.0, a ranking distance of 10 units between constraints is taken to be effectively categorical.

[14] Also Lillooet (van Eijk 1997).

b. *N-e-mw-ink-á=**wu***
i SG-PAST-1 OBJ-give-FV=PRO 3
'I gave it to him.'

Contrast a pronominal locative clitic in Lunda:

(26) a. *W-a–tentek-á mali **mu-chisweki**.*
1 SUBJ-PAST-put-FV 6.money 8-7.cupboard
'He put money in the cupboard.'

b. * *W-a–tentek-á **mu-chisweki** mali.*
1 SUBJ-PAST-put-FV 8-7.cupboard 6.money
'He put in the cupboard money.'

c. *W-a–tentek-á=**mu** mali*
1 SUBJ-PAST-put-FV=PRO 18 6.money
'He put money in there.'

d. *W-a-yí-tentek-á=**mu***
1 SUBJ-PAST-6 OBJ-put-FV-PRO 18
'He put it in there.'

Ranking the *NP PRON constraint above all constraints which favor the ditransitive NP NP dative will eliminate [V NP Pronoun] structures from the output of the grammar:

(27)

	*NP PRON	*STRUCT	FAITH(REC)
give Mary them	*!		*
☞ give them to Mary		*	

For example, if *STRUCT and FAITH(REC) are ranked closely enough together to create a threshhold of linguistically unpredictable alternation through noisy evaluation, *NP PRON can be ranked so much higher above both that the result is effectively a categorical absence of variation for [VERB NP PRONOUN] inputs.

In fact, however, the avoidance of NP pronoun sequences appears to be gradient and not categorical in English. It is true that the parsed Switchboard corpus has no examples of ditransitives with the NP Pronoun sequence. But the following examples are representative of those found in active use on the much larger corpus of web documents.

(28) V NP PRONOUN

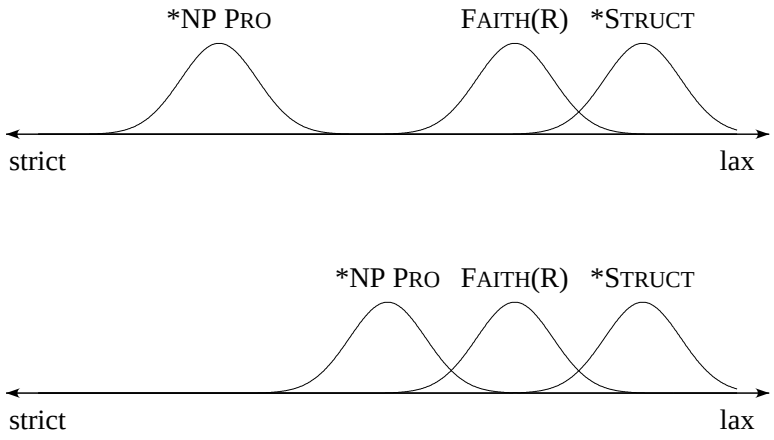
> Note: I don't give children peanut butter until they are 3 years old since it is recommended not to **give children it** to avoid possible allergies.
> Pratt's Children's Recipes & Links www.fastq.com/∼jbpratt/recipes/children-recipes.html
>
> You should never give out your address or phone number online and you should never **send someone them** in the mail either.
> www.girlpower.gov/girlarea/sciencetech/web/step1.htm
>
> Per[c]eptions about God's absence are due to our lack of **showing people him** through our life.
> christian-bookstore.net/xml031021436X/
>
> Mega Blast beam: This is kakuri's strongest ki attack only he has what it takes to know how to use it he can **teach people it** but it takes at least 2 years
> www.angelfire.com/ak4/DBZRPGgame/Kakuri_s_sheet.html
>
> Please follow these simple rules and **teach your children them**, however most dogs are friendly.
> Life4Paws-Knowledge Sharing, www.life4paws.org/sevenrules.htm
>
> Second graders finished their underwater scenes and are very proud of these. They could not wait to **show their parents them** and can't wait to bring them home.
> cowlishaw.ipsd.org/specials.htm

Our model can very easily capture both the categoricity and the gradience of the constraint across different languages, different varieties of English, or different speakers. As illustrated in Figure 3, the strictness of the *NP PRON constraint is a function of the distance between it and the conflicting constraints.

A more stringent version of this constraint is active for some speakers, who avoid pronouns in second object position even when the primary object is also pronominal:

(29) *. . . gave her it (Erteschik-Shir 1979: 452)
. . . gave him it (Hawkins 1994: 312)

Figure 3: Categorical and gradient effects of *NP PRON:



Hawkins' (1994) grammaticality judgments reflect the less stringent constraint, which only prohibits a secondary object pronoun in the presence of a primary object lexical NP. Only the less stringent constraint is active in the Lunda data as well:

(30) Lunda:
*N-e-**mw**-ink-á=**wu***
i SG-PAST-1 OBJ-give-FV=PRO 3
'I gave it to him.'

These differences are easily captured by means of constraint ranking:

(31) English (Erteschik-Shir): *NP PRON ≫ *XP PRON ≫ *STRUCT

English (Hawkins): *NP PRON ≫ *STRUCT ≫ *XP PRON

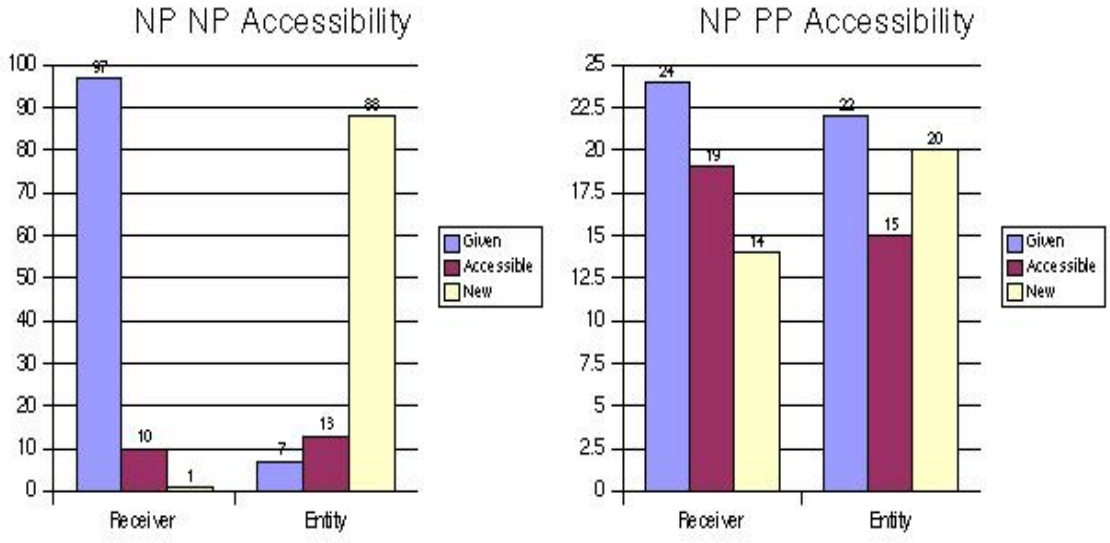
Lunda: *NP PRON ≫ *STRUCT ≫ *XP PRON

Generalizing the *NP PRO Constraint

These constraints undoubtedly reflect a broader generalization about ditransitive objects, which has been characterized as "Receiver/Entity Differentiation" by Collins

(1995: 47). When there are two NP objects, their properties are sharply differentiated and polarized on scales of discourse accessibility, definiteness, pronounhood, and word length. The increased differentiation of ditransitives is graphically depicted in Figure 4, based on Collins' (1995: 43) tabular data for givenness ('accessibility').[15]

Figure 4: Receiver/Entity Differentiation (Collins 1995)



Receiver/Entity Differentiation is succinctly described by Collins (1995: 47) in this way:

> In the indirect object construction the communicative differentiation between receivers and entities is acute (receivers are almost 14 times more likely than entities to be given, and entities are over 90 times more likely than receivers to be new; entity NPs are over three times longer than receiver NPs; receivers are over 11 times more likely than entities to be expressed as pronouns; and receiver NPs are about 4.5 times more likely than entity NPs to be definite). In the prepositional construction, by contrast, the differences in communicative

[15] For Collins (1995) 'new' means either "nonrecoverable because introduced for the first time into the discourse" or "already present in the discourse, but newly identified." 'Accessible' means "recoverable, but less directly so than for a given entity, because the entity has to be inferred, is generally known, or was first mentioned some time ago (or some combination of these) and is therefore not as salient in the discourse as a given entity." 'Given' is defined as "directly recoverable because either previously mentioned or referred to directly in the speech situation (or, in some cases, both)."

status between receivers and entities are milder: along no dimension is the order of the difference greater than 1.5.

An OT model for this kind of pattern exists in Harmonic Alignment (Prince and Smolensky 1993, Aissen 1999, 2002), and it has been extended with stochastic evaluation (Boersma 1998, Boersma and Hayes 2001) to model gradient harmonic alignment patterns in English syntax by Bresnan, Dingare, and Manning (2001) and Dingare (2001). Here we will simply encapsulate the multidimensional family of constraint subhierarchies produced by this model in the Double-Object Primacy Constraint:

(32) DOUBLE-OBJECT PRIMACY (OO-PRIMACY):

When both are objects, the receiver/possessor (strictly) dominates the entity on hierarchies of informational prominence, and the entity (strictly) dominates the receiver/possessor on the reversed hierarchies:

$$\text{Given} \succ \text{Accessible} \succ \text{New}$$
$$\text{Definite} \succ \text{Indefinite}$$
$$\text{Shorter} \succ \text{Longer}$$
$$\text{Pronoun} \succ \text{Noun}$$
$$\ldots$$

A side note. The phenomenon of scope-freezing in ditransitives (Aoun and Li 1989, Bruening 2001) is probably an instance of the same generalization. There is indeed a strong preference for the first NP in the double NP construction to scope over the second, compared with the *to*-dative and the passive, and it may derive from this increased sharpness of informational primacy of the primary object over the secondary object:

(33) a. Ozzy gave a (different) telescope to each girl. each > a

b. Ozzy gave a (different) girl each telescope. *each > a

c. A (different) girl was given each telescope. each > a

Notice that this effect is also somewhat gradient, in that if the second NP can be made accessible enough in context, scope reversal seems grammatically possible:[16]

[16]Thanks to Ivan Sag for constructing these examples, and to Beth Levin and Peter Sells for helpful suggestions.

(34) a. My book collection had odd gaps in it. For example, I found that over the course of 20 years of teaching I had given one student or another each of my personal copies of *Sense and Sensibility*. each > a

b. It seemed likely that Bush had promised each campaign contributor a certain tax exemption(, which is ordinarily available only to foreign nationals). a > each

Bruening's (2001) syntactic analysis of the scope-freezing phenomenon is independently motivated by by claimed grammatical impossibility of *give* NP NP idioms to alternate, which we have seen is not not empirically supported. Thus, it seems desirable to explore a more general informational approach to these semantic interactions with the dative constructions.[17]

Core/Noncore Harmony

While improperly differentiated ditransitives are penalized by OO-Primacy, there are also constraints penalizing disharmonic *to*-dative constructions.

Previous corpus studies of the dative alternation have found evidence of a skewing of animate, definite, short, pronominal, and given arguments toward the dative NP position and away from the dative PP position (Givón 1984; Thompson 1990, 1995; Collins 1995). Givón (1984) characterizes the dative NP as a grammaticalized "secondary topic" and Thompson (1990: 241, 1995: 158) interprets the findings as evidence that the dative NP argument has more subject-like informational properties ('topicworthiness') than the dative PP argument.[18]

In corpus studies of the choice between active and passive, the distribution of local persons has been found to be skewed toward the subject argument and away from nonsubject arguments in English (Estival and Myhill 1988, Bresnan, Dingare, and Manning 2001, Dingare 2001, ao). If the dative NP shares informational properties with subjects, as has previously been hypothesized, then we would expect to find local persons harmonically aligned with the core dative NP argument and nonlocal persons with the noncore dative PP argument. This is the hypothesis we chose to investigate in the current study.

[17]Bruening (2001) also analyzes superiority effects and antecedent-contained deletion which he correlates with the scope-freezing phenemenon in ditransitives. Though these topics lie outside the scope of the present study, we can point to previous work suggesting an optimization approach to operator binding, which straightforwardly extends to superiority effects (Bresnan 1998).

[18]Subject-like syntax for the NP-dative is embodied in some syntactic derivations of datives as well (Larson 1988; cf. Jackendoff 1990, Larson 1990).

In the Switchboard corpus, dative NPs of all types (pronominal and nominal) are more frequent than dative PPs of all types, as we already observed in Table 1: 83% ($n = 517$) of all the dative arguments collected are expressed as dative NPs, and only 17% ($n = 104$) as dative PPs. If we split up these dative arguments by person, we find that the distribution of local (first and second) persons is skewed toward dative NPs while the distribution of nonlocal (third) persons is skewed toward dative PPs. See Table 2.

Table 2: Person by Dative Argument Type in SWITCHBOARD

	dative NP	dative PP
1^{st}, 2^{nd} person	296	20
3^{rd} person	220	83

All alternating dative verbs, pronominal and nominal 3^{rd} persons
Fisher's exact test, p(O≥E) $<$ 0.000

However, the property we are interested in, person, is highly correlated with many other properties: for example, pronouns are short, definite, and tend to be given, and local person pronouns are in addition animate and seem nearly always given in conversations. We know that there is an effect of weight (correlated with word-length) on the dative alternation (Thompson 1990, 1995; Hawkins 1994: 212–213, 311–313; Collins 1995; Wasow 1997, 2002). Since local person pronouns are all short while nonlocal person NPs are longer on average, the weight or length effect would be in the same direction as the person effect: the shorter would tend to precede the longer. That would bias local-person Recipients toward dative NP position adjacent to the verb and away from dative PP position following the often heavier or longer Themes. Hawkins (1994) argues that apparent effects of topicality or givenness can be better explained in terms of syntactic weight and processing.[19] Would weight be sufficient to explain the apparent harmonic alignment effects we observe in Table 2?

To address this issue, we controlled for length by excluding examples which could be independently explained by the principle of end weight: in ditransitives, the theme was restricted to one lexical word (allowing for nonlexical elements such as determiners). We also restricted our search to personal and demonstrative pronouns

[19] Arnold et al. (2000) and Wasow (2002) have already shown that weight and informational status have distinct effects on ordering.

in order to control for pronominality. To discount an effect of OO-Primacy in this count, examples with personal pronoun themes were also excluded. As before, all non-alternating verbs and expressions were eliminated; this includes all concealed question uses of *tell* and 17 occurrences of *tell you what* (see n. 11), as well as ditransitives that do not alternate with *to* datives, such as benefactives. But in addition, 12 occurrences of the sentential adverbial *to tell you the truth* were eliminated.[20]

Under these stringent conditions the verb *give* shows a total absence of pronominal PP recipients for cases with non-pronominal themes, and therefore any effect of person cannot be seen. We therefore eliminated *give* from the count. For the remaining verbs, first and second persons are still skewed toward the dative NP position compared to the third person, as shown in Table 3.

Table 3: Person by Dative Argument Type in SWITCHBOARD

	dative NP	dative PP
local pronoun	41	5
nonlocal pronoun	19	8

Alternating dative verbs other than *give* with personal and demonstrative pronoun Recipients, less personal pronoun Themes and controlling for end weight.
Fisher's exact test, $p(O \geq E) < 0.05$

[20] Interestingly, this use of *to tell you the truth* is not a fixed expression, but itself shows alternative dative syntax. It is not unnatural to say "To tell the truth to you", if there is some reason to stress "you"; at any rate, adverbial uses of this expression with dative PP syntax are found on the internet; several are poetic, perhaps exploiting the metrical possibilities of this paraphrase:

> Let's see... Bethany, **to tell the truth to you**, I can't really remember.
> callistawolf.com/KymKyhgQ4/ep1pt2/page2.html

> You read your poetry I never understood. **To tell the truth to you**, it was never any good.
> www.eightyproofsoul.com/LyricsPinkiePromises.html

> **To tell the truth to you**, my love. when your comments are caging. the space that awaits me, ...
> www.racoon.com/herpes/biopage/MegAnn%20poem.html

If the twelve excluded examples of *to tell you the truth* were added to our data in Table 3, they would add support to the harmonic alignment effect (Fisher's exact test, $p(O \geq E) < 0.02$).

Our conclusion is that there is an effect of harmonic alignment of person with the syntactic argument type (Core = NP or Noncore = PP) of the recipient. We now introduce the constraint HARMONY(1,2) in our model:

(35) Core/Noncore Harmony for Person:

HARMONY(1,2): *NP$_{Noun}$ & *PP$_{1,2\,Person}$

This harmony constraint can be formally derived by standard methods in OT by harmonically aligning the pronominality and person hierarchies with the structural hierarchy of Core and Noncore arguments (36) and making use of constraint conjunction. These formal techniques are now familiar in syntax from the work of Aissen (1999, 2002) and others, and we will not repeat the construction here. We note that animacy and other harmonies may also play a role in the dative alternation in spoken English, but the parsed SWITCHBOARD corpus is not annotated for this category. With limited resources, we restricted our attention to the category of person for the present study.[21]

(36) Prominence scales for Harmonic Alignment:

Core $\succ$ Noncore

Pronouns $\succ$ Nouns

Animate $\succ$ Inanimate

Local (1^{st}, 2^{nd}) persons $\succ$ Nonlocal (3^{rd}) persons

In summary, our (partial) model of the constraints driving the dative alternation now looks like this (again assuming ranking on a continuous scale with stochastic evaluation):[22]

(37) OO-PRIMACY $\gg$ HARMONY(1,2) $\gg$ FAITH(REC) $\gg$ *STRUCT

OO-PRIMACY, being near-categorical, is ranked above all the other constraints. HARMONY(1,2) favors the dative NP construction, while FAITH(REC) favors the

[21] The Edinburgh-Stanford Link project Paraphrase Analysis for Improved Generation aims to provide animacy, givenness, and definiteness annotations to the parsed SWITCHBOARD corpus as one of its goals (on-line, Edinburgh University: http://www.hcrc.ed.ac.uk/stanford/).

[22] The rankings shown are not meant to represent the mean rankings which derive the input-output distributions under stochastic evaluation, but simply to illustrate the dominance relations among constraints which will hold under a portion of the effective rankings during the evaluation.

dative PP construction, which is again opposed by *STRUCT. The picture then is that what drives the dative alternation are linguistic pressures to sharply differentiate double objects on informational hierarchies, to prefer informationally prominent elements in core argument positions, to faithfully mark the semantic role of recipient, and to economize on syntactic structure.

We now turn to the question of how lexical variation is accounted for in this model.

Lexical Variation

The verb *give* is often taken to be the prototypical dative verb; it is the highest-frequency dative verb in the parsed SWITCHBOARD corpus, constituting 42% of all alternating dative verbs. Yet it does not have the same distribution of syntactic argument types as the pool of other dative verbs: *give* is used with dative NP syntax in 87% of its occurrences in the parsed SWITCHBOARD corpus, compared to 81% for the pool of other dative verbs, as we saw in Table 1.

The verb *give* also differs in having a higher percentage of third persons among its pronominal dative arguments:

(38) All pronominal recipients
(animate and inanimate, reflexive and nonreflexive)

	give		other verbs	
local person	153		148	
nonlocal person	102	(40%)	63	(30%)
totals:	255		211	

This difference is particularly striking with the pronoun *it*: where 95% (n=21) of dative NP occurrences of *it* occur with *give*:

(39) Distribution of recipient *it* for *give* and other verbs

Other verbs	*give*	Total
1 (5%)	21 (95%)	22 (100%)

For inanimate recipients in general, *give* diverges significantly from other dative verbs:

(40) Distribution of inanimate dative arguments (pronominal and nominal) for *give* and other verbs

	Other verbs	*give*	Total
Dative NP:	2	25	27
Dative PP:	9	1	10

Fisher's exact test, $p(O \geq E \mid O \leq E) < 0.001$

These differences undoubtedly reflect the greater abstractness of the meaning of *give*, illustrated in examples like these:

(41) Um, but still, it gives **it** some variety.

but I'm going to give **it** thumbs down.

you know, give **it** a great deal of thought,

and you can add hamburger if you want to give **it** a little more body

All of these examples are paraphrasable with dative PPs (*give some variety to it, give thumbs down to that, give a great deal of thought to it, give a little more body to it*), suggesting that *give* here is not strictly polysemous, but generic or abstract in meaning.[23] This reflects a parallel to the well-known generalization that high frequency verbs tend to be more polysemous (Koehler 1986, cited in Baayen and Tweedie 1998); here, the highest frequency verb has greater semantic range.

Interestingly, the extended senses derive from *give* together with its Theme argument: to *give thumbs down* is to reject or disapprove; to *give thought*; is to think about, to *give variety* is to variegate, and so forth. At the same time the recipient is preferred in the dative NP position, separating the Theme from the verb. These facts with *give* run counter to the principles of semantic connectedness (Hawkins 2000) and semantic distance (Bybee 1985) which would favor closer syntactic groupings of semantically dependent constituents and thus predict that the recipients would tend to appear in dative PP position. Evidently, other factors are overriding the role of verbal or constructional semantics in harmonic person/type alignment.

We can easily incorporate this lexical variation into our model by distinguishing FAITH(REC) for smaller lexical and constructional semantic classes.[24] Then the

[23] We assume that polysemy arises when related meanings have distinct grammatical properties; such grammatical differences are not present in these examples.

[24] This idea was suggested to us by Stemberger's (2001) work.

greater resistence to alternation of some dative verbs will correspond to their more faithful observance of the constraint to mark a Recipient role. Consider the following constraint ranking on the continuous scale:

(42) Incorporating lexical variation:

$$\text{OO-PRIMACY} \gg$$
$$\text{HARMONY}(1,2) \gg \text{FAITH}_{other}(\text{REC}) \gg \text{FAITH}_{give}(\text{REC}) \gg *\text{STRUCT}$$

In this ranking, OO-PRIMACY outranks the other constraints, reflecting the near-categorical avoidance of double object NP Pronoun sequences. The effect of HARMONY(1,2) on FAITH_{give}(REC) is greater than the effect of HARMONY(1,2) on FAITH_{other}(REC) (because of their relative distance relations under stochastic evaluation). This means that *give* should obey HARMONY(1,2) to a greater extent than other alternating verbs do. That is, disharmonic cases of NP PP should be rarer with *give* (for other verbs, disharmonic NP PPs are more likely to result from reranking of FAITH_{other}(REC) with HARMONY(1,2)). This implies that (i) the bias to express local recipients as objects should be stronger for *give* than for other alternating verbs.

At the same time, FAITH_{other}(REC) is affected less by *STRUCT compared to FAITH_{give}(REC), so other verbs should be more rarely found in NP NP with non-local recipients, again because of the relative distance relations of the faithfulness constraints to *STRUCT. That is, the percentage of NP NPs not motivated by HARMONY should be lower for other alternating verbs than for *give* (with *give*, more NP NPs will result from reranking of FAITH_{give}(REC) and *STRUCT, since the distance is closer). This implies that (ii) nonlocal recipients should be more often expressed as dative NPs with *give* than with other verbs.

Both of these consequences of this model are true. (i) the bias to express local recipients as objects is stronger for *give* than for other alternating verbs:

(43) local person pronoun recipients:

	give	other verbs
NP	40	41
PP	0	5

Fisher's exact test, $p(O \geq E) < 0.04$

(ii) nonlocal recipients should is more often expressed as dative NPs with *give* than with other verbs:

(44) nonlocal person pronoun recipients:

	give	other verbs
NP	25	19
PP	0	8

Fisher's exact test, p(O≥E) < 0.03

Frequency differences among fine-grained semantic classes of verbs can be incorporated into this model in the same way. The ranking in (45) models the greater resistence of verbs of manner of speaking (*yell, mutter,* ...) and motional verbs of continuous imparting of force (*carry, drag,* ...) to the dative NP constructions. These verbs are expected to alternate less and therefore have more disharmonic dative PP constructions than verbs of means of communication (*email, fax,* ...) and motional verbs of instantaneous imparting of force (*throw, slap,* ...). In the following model, we use curley braces around an exemplar verb as an abbreviation for a fine-grained class of dative verbs which has a distinct FAITH(REC) constraint; *give* is treated as a singleton class for FAITH(REC), because of its prototypicality, generic semantics, and overwhelming frequency.[25]

(45) Incorporating more fine-grained classes:

$$\text{OO-PRIMACY} \gg$$
$$\text{FAITH}_{\{yell\}}, \text{FAITH}_{\{drag\}} \gg \text{HARMONY(1,2)} \gg \text{FAITH}_{\{fax\}}, \text{FAITH}_{\{throw\}}$$
$$\gg \ldots \gg \text{FAITH}_{\{give\}}\text{(REC)} \gg \text{*STRUCT}$$

For verbs that fail to alternate, such as the latinate class *donate, contribute,*..., FAITH(REC) can be ranked very high, near-categorically far removed from the constraints which result in dative NP syntax:

(46) Incorporating nonalternating classes:

$$\text{OO-PRIMACY}, \text{FAITH}_{latinate}\text{(REC)} \gg$$
$$\text{FAITH}_{\{yell\}}, \text{FAITH}_{\{drag\}} \gg \text{HARMONY(1,2)} \gg \text{FAITH}_{\{fax\}}, \text{FAITH}_{\{throw\}}$$
$$\gg \ldots \gg \text{FAITH}_{\{give\}}\text{(REC)} \gg \text{*STRUCT}$$

[25] Alternatively, these classes may be thought of as representing clusters of individuals in the constraint space.

In sum, there is a gradation in frequency of alternation of verb classes, from those that are categorically used with dative PPs (most of the latinate class), to those that are rare with dative NPs (motional verbs of continuous imparting of force, manner of speaking verbs), through the more frequently ditransitive classes (other motional and communication verbs), to the most frequently ditransitive (*give*). *According to the model, the more frequently ditransitive alternating verbs are more driven by the harmonic effects of informational hierarchies (such as discourse accessibility, animacy, pronominality and person), as well as economy.*

4 Are gradient patterns linguistically significant?

Within our stochastic model of grammar, the structure of language has remarkable plasticity. The boundaries between categoricity and gradience are fluid. We therefore expect to find languages in which the gradient but broadly motivated patterns we have discovered in English are hardened into categorical rule systems.

Several languages show categorical pronominal and person splits in the dative alternation (Nikitina 2003), but we consider just one here. Kanuri, a Nilo-Saharan language spoken in Nigeria, Niger, and Cameroon, shows a person split across alternative dative structures (Hutchison 1981). In Kanuri with the verb *give* a non-local person recipient can be expressed only in a postpositional phrase:

(47) *shí-rò yíkə́nà*
him-to give.PRF
'I gave (it) to him'

Note that it appears to be highly dispreferred to drop the third person recipient:[26]

(48) ?*yíkə́nà*
Ø-give.PRF
'I give (it) to him'

However, if the recipient is second or first person, it is normally expressed as a direct object prefix on the verb:

(49) *nj-íkìn*
2SG.OBJ-give.IMP
'I give (it) to you'

[26]All third person recipients found with the verb 'give' in Hutchison (1991), Ellison (1937) and Lukas (1937) are marked by the postposition. (All of these examples are also specific.)

This split is straightforwardly captured by the constraint ranking shown in (50).

(50) HARMONY(1,2) $\gg$ FAITH$_{give}$(REC)$\gg$ *STRUCT

/give it to him/	HARMONY(1,2)	FAITH(REC)	*STRUCT
him-to (it) give			*
☞ (it) him-give		*!	

/give it to you/	HARMONY(1,2)	FAITH(REC)	*STRUCT
you-to (it) give	*!		*
☞ (it) you-give		*	

In Kanuri HARMONY(1,2) is ranked above FAITH$_{give}$(REC) and so if the input is 'I give it to you', the candidate with the recipient expressed in a postpositional phrase is excluded by highly ranked HARMONY(1,2). If the input is 'I give it to him', HARMONY(1,2) remains inactive (the recipient is non-local person), and it is the variant with postpositional expression of the Recipient (satisfying FAITH$_{give}$(REC) that wins in that competition.

Finally, note that in Kanuri only the single verb meaning *give*, according to Hutchinson, shows a dative alternation. All other verbs express all recipients, whether local or nonlocal persons by means of postpostional phrases. Thus a fuller model of the Kanuri constraint system is shown in (51):

(51) FAITH$_{other}$(REC) $\gg$ HARMONY(1,2) $\gg$ FAITH$_{give}$(REC)$\gg$ *STRUCT

The Kanuri constraint system for the dative alternation resembles that of English (45), but the Kanuri constraints will be spread sufficiently far apart on the continuous scale to produce a (near-)categorical person split.[27]

In English, the generalization that the most frequently alternating dative verb is most driven by harmony is gradient; it Kanuri, it is near-categorical.[28]

[27]Compare Bresnan, Dingare, and Manning 2001 for a similar demonstration of gradient and categorical person splits affecting active-passive choice.

[28]Claims of categoricality must be carefully evaluated for every language, taking into account both textual and elicitation data, as is currently the best practice in field linguistics. If the Kanuri generalization is itself quantitative, the frequency differentials still support our model. See Bresnan, Dingare, and Manning (2001).

Conclusion

In conclusion, we have shown that central evidential paradigms that have been used to support both lexical semantic (Pinker 1989, Krifka 2001) and constructional (Goldberg 1995, Kay 1996) explanations for syntactic contrasts are not well founded empirically. Some widely repeated reports of intuitive contrasts in grammaticality appear to rest instead on judgments of pragmatic probabilities. We have also shown that at least one type of informational structure (specifically the hierarchy of person or speech act participants) exerts an effect on the dative alternation independently of effects of length or weight, semantic role, and pronominality. The findings show that syntactic processing theories based on factors correlated with length (e.g. Hawkins 1994) are not sufficient explanations, though they may well be necessary to a full understanding of the dative alternation. Further, we have proposed a unifying model of the person alignment phenomenon within the framework of stochastic Optimality Theory, and have shown how lexical variation can be incorporated into the model. Within the framework of this model, the constraint ranking for English implies that the most frequently ditransitive alternating verbs should be the most driven by informational harmony. Finally, we have shown that the same pattern of person/argument alignment that appears gradiently in the English dative alternation appears near-categorically in Kanuri, as our model leads us to expect.

We note in conclusion that the stochastic OT model used in the present study belongs to a family of new probabilistic approaches that permit unifying explanations of categorial and gradient effects in syntax.[29]

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[29]Other promising models include partially ordered constraint ranking (Anttila and Fong 2003 and references) and the wide range of probabilistic models discussed in Bod, Hay, and Jannedy (eds) (2003) and Manning (2003).

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