

## Verbs describing routines facilitate object omission

**Intro** It is a longstanding puzzle (Fillmore 1986, Cote 1996, a.o.) which verbs can omit their objects & why – which transitive verbs can describe an event with an unexpressed, non-anaphoric patient (*I ate \_\_\_* vs. *?I devoured \_\_\_*). Sometimes taken as arbitrary, object omission is argued to be facilitated for verbs providing more statistical information about the taxonomy of their object ('selection'; Resnik 1993); for more-frequent verbs (Goldberg 2005); or for verbs that describe a routine (Levin & Rappaport Hovav 2014; Martí 2015) – a conventional series of actions in a community (c.f. Fillmore's 'frames'; Schank & Abelson's 1977 'cultural scripts'; Hopper & Thompson's 1980 claim that repeated actions are less prototypically 'transitive'). Disentangling these predictors, this paper offers evidence that a verb is more likely to omit its object if it describes a **routine**.

**Corpus study** While there can be no absolute metric for routine, I assume that routines are gradient and vary across communities: even if we cannot say absolutely whether an action such as *bottle* is routine or not, we can agree that it is *relatively more routine* among e.g. homebrewers than elsewhere. I use a corpus of 72 million words of Reddit comments – a social media platform organized into more-or-less specialized communities – to compare object omission across such communities. Using over 800 normally-transitive verbs (Levin 1993), the SpaCy parser (Honnibal & Johnson 2015), and some labor-intensive human judgment to remove false positives for object omission among uses of verbs without a direct object (inchoatives: *the fire burned*; middle voice: *it washes well*; mis-parses: *Best Buy*, etc.), I identified uses of transitive verbs with and without direct objects in the writings of both generalist subreddits (r/AskReddit, r/news) and specialist subreddits such as r/Homebrewing. This large dataset accurately records the number of uses of over 800 verbs with and without a direct object in different communities, as well as (in each community) its per-million-word frequency and its selectional strength according to Resnik's (1993) metric.

First, in generalist subreddits (r/AskReddit, r/news), I find no association whatsoever (in linear regressions) between the percentage of object-omitting uses of a verb and that verb's selection or frequency – not consistent with prior claims that these facilitate omission. Next, I compared specialist subreddits to generalist ones, identifying 134 verbs which omit their objects significantly more often (according to a Fisher Exact Test, similar to a  $\chi^2$  test) in subreddits dedicated to particular specialty (r/Homebrewing, r/beer, etc. are grouped into a 'beverage' speciality) vs. in generalist ones. The Table excerpts these data: *bottle* omits its object significantly more in specialist 'beverage' subreddits (*I sold my kegging setup and went back to bottling*) vs. generalist subreddits.

specialty(words)	subreddits	verbs omitting obj significantly more
generalist (22.8 million)	AskReddit, worldnews, news, explainlikeimfive, LifeProTips, Showerthoughts	n/a; 'generalist' is the reference to which all the 'specialist' corpora are compared
beverages (2.6 million)	Homebrewing, beer, tea, wine, Craft-Beer	<i>boil, bottle, chill, distribute, fill, filter, mash, open, serve, shake, stir, taste ...</i>
martial arts (1.3 million)	bjj, martialarts, MuayThai, karate, kungfu, taekwondo, kravmaga	<i>hit, kick, pass, punch, stretch, strike, tap</i> (Excerpt; more verbs & specialties ...)

These 134 verbs have significantly higher selection and frequency in the specialist subreddits in which they omit their objects significantly more often: the median selectional strength for such a verb is 0.62 in generalist subreddits and 0.76 in specialist subreddits; the median per-million-word frequency is 84 in generalist and 203 in specialist subreddits – both highly significant in Wilcoxon tests for paired samples. **While neither frequency nor selection predicts the percentage of object-omitting uses of a verb overall, verbs are found to have relatively higher selection and frequency in the subreddits where they more often omit their objects.** A verb should be more frequent and selective in a community where it's more routine: if *bottling beer* is routine for homebrewers, then homebrewers should use *bottle* more often (more frequent), mostly with *beer* as the object (more selective) – while outsiders should use *bottle* less, with more diverse objects (*water, milk ...*). So these results are consistent with the claim that verbs **omit their objects more**

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often in the communities where they are more strongly associated with routines.

**Experiments** Two experiments disentangle routine from selection or frequency to provide more targeted evidence that **routine** itself **facilitates object omission**. In **Experiment 1**, 100 native-English MTurkers encountered 8 items, with 10 fillers. Each item appears randomly in 1 of 4 conditions: the narrator undertakes the action described by the verb regularly (high routine) or haphazardly (low routine); & the verb appears with 2 identical objects (high selection), or 2 distinct objects (low selection).

(1) **Item from Exp. 1 (Routine vs. Selection):** Your friend Caroline tells you about her weekend:

	<b>Routine low</b>	<b>Routine high</b>
<b>Selxn low</b>	<i>I went for a bike ride. Then, just because my friend wanted me to try it, I bottled beer &amp; I bottled lotion. Then I went fishing.</i>	<i>I worked on my home-brewing project. Like every weekend, I bottled beer &amp; I bottled lotion. Then I grew some hops.</i>
<b>Selxn high</b>	<i>I went for a bike ride. Then, just because my friend wanted me to try it, I bottled beer &amp; I bottled more beer. Then I went fishing.</i>	<i>I worked on my home-brewing project. Like every weekend, I bottled beer &amp; I bottled more beer. Then I grew some hops.</i>

In **Experiment 2** (98 participants), routine is crossed with frequency (verb appears once vs. twice):

(2) **Item from Exp. 2 (Routine vs. Frequency):** Your friend Caroline tells you about her weekend:

	<b>Routine low</b>	<b>Routine high</b>
<b>Freq low</b>	<i>I went for a bike ride. Then, just because my friend wanted me to try it, I bottled beer. Then I went fishing.</i>	<i>I worked on my home-brewing project. Like every weekend, I bottled beer. Then I grew some hops.</i>
<b>Freq high</b>	<i>I went for a bike ride. Then, just because my friend wanted me to try it, I bottled beer &amp; I bottled more beer. Then I went fishing.</i>	<i>I worked on my home-brewing project. Like every weekend, I bottled beer &amp; I bottled more beer. Then I grew some hops.</i>

In both experiments, participants provided five-star-Likert ratings (☆☆☆☆☆) to items like (3):

(3) The next time Caroline tells you about bottling beer the day before, how likely do you think she is to say the following?: ‘**I bottled yesterday.**’ (☆☆☆☆☆)

Data were analyzed using mixed-effects linear regression models predicting ‘rating’ as a function of routine, {selection (Exp. 1) or frequency (Exp. 2)}, & their interaction, with random intercepts for participants & items. In these models (see Table), **hi-routine items have systematically higher ratings**. (Results remain significant in ordered categorical models.)

	<b>Exp. 1</b>	<b>lo routine</b>	<b>hi routine</b>
<b>lo selxn</b>		2.37 (intercept)	2.78 ( $\beta = 0.41, t = 4.10, p < 0.001$ ) [***]
<b>hi selxn</b>		2.38 ( $\beta = 0.01, t = -0.09, p = 0.92$ ) [n.s.]	2.74 ( $\beta = -0.05, t = -0.31, p = 0.76$ ) [n.s.]
	<b>Exp. 2</b>	<b>lo routine</b>	<b>hi routine</b>
<b>lo freq</b>		2.0 (intercept)	2.42 ( $\beta = 0.42, t = 4.38, p < 0.001$ ) [***]
<b>hi freq</b>		2.13 ( $\beta = 0.13, t = 1.36, p = 0.17$ ) [n.s.]	2.47 ( $\beta = -0.08, t = 0.61, p = 0.55$ ) [n.s.]

**Discussion** I’ve shown evidence that verbs facilitate object omission if associated with a routine.

On this analysis, routine itself drives omission, and selection and frequency are only associated with omission insofar as they approximate routine. Semantically, object-omitting verbs are analyzed (following Levin & RH 2014) as intransitive activity verbs (systematically polysemous with their transitive forms), describing the routine actions of an agent (which may involve a conceptual theme argument). To the extent that the hearer can recognize the routine described by the verb, communication proceeds felicitously. This analysis explains why omitted objects tend to be understood as ‘typical’ (routine): *I ate* suggests a meal, not a raisin (Fillmore 1986); why object omission may differ across corpora or across speakers; and where it may emerge next. Zooming out, this paper illuminates verbs as social artifacts, shaped by the practices of the people who use them.

**Refs** Douglas Bates et al. 2015 • Sharon Cote 1996 • Charles Fillmore 1986 • Adele Goldberg 2005 • Matthew Honnibal & Mark Johnson 2015 • Paul Hopper & Sandra Thompson 1980 • Beth Levin 1993 • Beth Levin & Malka Rappaport Hovav 2014 • Luisa Martí 2015 • Phil Resnik 1993, 1996 • Robert Schank & Robert Abelson 1977