Contents

- Kotek & Erlewine (2013)
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- Conclusions
English verbs that participate in the causative alternation have two causative forms: a zero-derived lexical form (1a) and a periphrastic form with make (1b).

1.   a. The coach *bounced* the ball on the floor.
    b. The coach *made* the ball *bounce* on the floor.
English verbs that participate in the causative alternation have two causative forms: a zero-derived lexical form (1a) and a periphrastic form with *make* (1b).

1. a. The coach *bounced* the ball on the floor.
   b. The coach *made* the ball *bounce* on the floor.

With animate causees, only the periphrastic form is felicitous.

2. a. # The coach *bounced* the gymnast on the floor.
   b. The coach *made* the gymnast *bounce* on the floor.
Extraction of causee degrades acceptability of periphrastic causative when causee is inanimate (3), but not when causee is animate (4).

3.  a. That’s the ball that the coach *bounced* on the floor.
   b. * That’s the ball that the coach *made bounce* on the floor.

4.  a. # That’s the gymnast that the coach *bounced* on the floor.
   b. That’s the gymnast that the coach *made bounce* on the floor.
### Lexical & Periphrastic Causatives

<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td><strong>Inanimate Causee</strong></td>
<td>In situ: ✓</td>
<td>In situ: ✓</td>
</tr>
<tr>
<td></td>
<td>Extracted: ✓</td>
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</tr>
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Key ideas:

Causatives involving animate and inanimate causees have different syntactic structures. Structure for animates is more complex and must be spelled out as periphrastic causative. Structure of inanimates is simpler and can be spelled out in two ways:

- Periphrastic causative grammatical if something intervenes between *make* and verb.
- Lexical causative blocks periphrastic if nothing would intervene.

Morphological form of causative (lexical vs. periphrastic) is resolved post-syntactically. (Distributed Morphology)
Kotek & Erlewine’s Analysis

Key ideas:

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- Morphological form of causative (lexical vs. periphrastic) is resolved post-syntactically.
  (Distributed Morphology)
K&E explain English causative facts in terms of the Distributed Morphology operation fusion (based on Halle & Marantz 1993).
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**Fusion**: Post-syntactic operation that fuses two linearly adjacent terminal nodes into a single node. Fusion cannot skip intervening nodes, including phonologically null nodes. However, traces do not count as interveners.
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**Fusion**: Post-syntactic operation that fuses two linearly adjacent terminal nodes into a single node. Fusion cannot skip intervening nodes, including phonologically null nodes. However, traces do not count as interveners.

Given the DM principle Rules Apply, if fusion can occur, it must occur.
Kotek & Erlewine’s Analysis

Following Harley’s 2008 proposal for Japanese causatives, K&E posit two different causative structures:
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\[
\sqrt{P} \text{ embedding}
\]

\[
\sqrt{P}
\]

\[
vP
\]

\[
\text{subject}
\]

\[
v_{\text{caus}}
\]

\[
\sqrt{P}
\]

\[
\text{causee}
\]

Causation meaning (inanimate causees); can be spelled out as lexical or periphrastic causative.
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\[ \sqrt{P} \text{ embedding} \]

\[ \begin{array}{c}
\text{vP} \\
\text{subject} \\
\text{v}_{\text{caus}} \\
\text{causee} \\
\sqrt{P}
\end{array} \]

Causation meaning (inanimate causees); can be spelled out as lexical or periphrastic causative.

\[ \text{vP embedding} \]

\[ \begin{array}{c}
\text{vP} \\
\text{subject} \\
\text{v}_{\text{caus}} \\
\text{causee} \\
\sqrt{P}
\end{array} \]

Compulsion meaning (animate causees); must be spelled out as periphrastic causative.
Consider what occurs when a causee is extracted.
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\[ \sqrt{P} \text{ embedding} \]

\[ vP \]

\[ \begin{array}{c} \text{subject} \\ v_caus \\ \sqrt{P} \\ t \end{array} \]

\[ v_{caus} + \sqrt{} \Rightarrow \text{lexical causative} \]
Consider what occurs when a causee is extracted.

$\sqrt{P}$ embedding

$\sqrt{P}$

$\sqrt{P}$

$v_P$ embedding

$v_P$

$v_P$

$v_caus$

$v_caus$

$t$

$t$

$v$

$v$

$v_caus + \sqrt{v} \Rightarrow$ lexical causative

No fusion due to intervening $v$ head $\Rightarrow$ periphrastic causative
**Prediction 1**: For inanimate causees, acceptability of periphrastic causative depends upon causee position (in situ vs. extracted).
Predictions

- **Prediction 1**: For inanimate causees, acceptability of periphrastic causative depends upon causee position (in situ vs. extracted).

- **Prediction 2**: These acceptability facts are independent of notions of direct and indirect causation. In particular, indirect causation cannot “rescue” otherwise unacceptable sentences with periphrastic causatives.
Experiments
Question: Does acceptability of periphrastic causatives with inanimate causees depend upon extraction? (Prediction 1)
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Experiment 1

- 160 US participants on Mechanical Turk.
Experiment 1

- 160 US participants on Mechanical Turk.
- 24 target items, 24 filler items
Experiment 1

- 160 US participants on Mechanical Turk.
- 24 target items, 24 filler items
  - Sentence templates adapted from K&E study, each template consisting of 8 sentences using $2 \times 2 \times 2$ factorial design, crossing causative type, causee animacy, and causee position.
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  - Half of participants saw causees in situ, half saw causees extracted.
- Participants rated sentences for acceptability on 1–7 scale.
- Non-native English speakers, participants with less than 75% accuracy on fillers were excluded from analysis.
Example sentence template:

- The worker laid the plank on the floor.
- The therapist laid the judge on the couch.
- The worker made the plank lie on the floor.
- The therapist made the judge lie on the couch.
- That's the plank that the worker laid on the floor.
- That's the judge that the therapist laid on the couch.
- That's the plank that the worker made lie on the floor.
Experiment 1

Example sentence template:

5.  a. The worker laid the plank on the floor.
b. The therapist laid the judge on the couch.
c. The worker made the plank lie on the floor.
d. The therapist made the judge lie on the couch.
e. That’s the plank that the worker laid on the floor.
f. That’s the judge that the therapist laid on the couch.
g. That’s the plank that the worker made lie on the floor.
h. That’s the judge that the therapist made lie on the couch.
K&E found the expected pattern for sentences with causees extracted.

- That’s the judge that the therapist laid on the couch.
- That’s the plank that the worker laid on the floor.
- That’s the judge that the therapist made lie on the couch.
- That’s the plank that the worker made lie on the floor.
Experiment 1

Extracted causees:

- That’s the judge that the therapist laid on the couch.
- That’s the plank that the worker laid on the floor.
- That’s the judge that the therapist made lie on the couch.
- That’s the plank that the worker made lie on the floor.
Experiment 1

Unextracted causees:

- The therapist laid the judge on the couch.
- The worker laid the plank on the floor.
- The therapist made the judge lie on the couch.
- The worker made the plank lie on the floor.
Experiment 1

Experiments

Causation Type

<table>
<thead>
<tr>
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<th>Extracted</th>
<th>Unextracted</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lexical</strong></td>
<td><img src="Lexical_Bars" alt="Bar Graph" /></td>
<td><img src="Lexical_Bars" alt="Bar Graph" /></td>
</tr>
<tr>
<td><strong>Periphrastic</strong></td>
<td><img src="Periphrastic_Bars" alt="Bar Graph" /></td>
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</tr>
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Mean Rating

- **Causee**
- **Animate**
- **Inanimate**
Experiment 1

- Linear mixed-effects model treating experiment participant and verb as random effects.
Experiment 1

- Linear mixed-effects model treating experiment participant and verb as random effects.
- Causee type, causative type, causee position and all interactions as fixed effects.
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</thead>
<tbody>
<tr>
<td>Causee position (extracted)</td>
<td>$-0.353$</td>
<td>$0.161$</td>
<td>$-2.188$</td>
<td>$0.030$</td>
</tr>
<tr>
<td>Causee type (inanimate)</td>
<td>$2.089$</td>
<td>$0.188$</td>
<td>$11.101$</td>
<td>$&lt; 0.01$</td>
</tr>
<tr>
<td>Causative type (periphrastic)</td>
<td>$2.080$</td>
<td>$0.184$</td>
<td>$11.279$</td>
<td>$&lt; 0.01$</td>
</tr>
<tr>
<td>Causee type - Causative type</td>
<td>$-3.788$</td>
<td>$0.134$</td>
<td>$-28.318$</td>
<td>$&lt; 0.01$</td>
</tr>
<tr>
<td>Causee position - Causative type -</td>
<td>$-0.435$</td>
<td>$0.201$</td>
<td>$-2.163$</td>
<td>$0.031$</td>
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## Experiment 1

- Linear mixed-effects model treating experiment participant and verb as random effects.
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Conclusion: Same acceptability patterns whether causees are extracted or left in situ, driven by main effects and interaction between causee type and causative type.
Question: Acceptability patterns independent of notions of direct and indirect causation? (Prediction 2)
For verbs that allow both lexical and periphrastic causatives, previous work has established a relationship between lexical causatives and direct causation and periphrastic causatives and indirect causation (McCawley 1978, Levin & Rappaport Hovav 1999, Wolff 2003, Kiparsky 2005).
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Thus, if a sentence describes an event of indirect causation, we may expect the sentence to use a periphrastic causative, even in cases when a periphrastic causative would otherwise be unacceptable.
Experiment 2

- 160 US participants on Mechanical Turk.
Experiment 2

- 160 US participants on Mechanical Turk.
- Same design as Experiment 1, but new stimuli were constructed including a prepositional phrase headed by *by* to indicate indirect causation.
160 US participants on Mechanical Turk.

Same design as Experiment 1, but new stimuli were constructed including a prepositional phrase headed by *by* to indicate indirect causation.

Non-native English speakers and participants with less than 75% accuracy on fillers were excluded from analysis.
Example sentence template:

6. a. The scientist levitated the coin by placing it over a super magnet.
b. The woman levitated the superhero by asking him to prove his powers.
c. The scientist made the coin levitate by placing it over a super magnet.
d. The woman made the superhero levitate by asking him to prove his powers.
e. That’s the coin that the scientist levitated by placing it over a super magnet.
f. That’s the superhero that the woman levitated by asking him to prove his powers.
g. That’s the coin that the scientist made levitate by placing it over a super magnet.
h. That’s the superhero that the woman made levitate by asking him to prove his powers.
Experiment 2

Example sentence template:

6. a. The scientist levitated the coin by placing it over a super magnet.
b. The woman levitated the superhero by asking him to prove his powers.
c. The scientist made the coin levitate by placing it over a super magnet.
d. The woman made the superhero levitate by asking him to prove his powers.
e. That’s the coin that the scientist levitated by placing it over a super magnet.
f. That’s the superhero that the woman levitated by asking him to prove his powers.
g. That’s the coin that the scientist made levitate by placing it over a super magnet.
h. That’s the superhero that the woman made levitate by asking him to prove his powers.
Experiment 2

Extracted causees:

- That’s the superhero that the woman levitated …. 
- That’s the coin that the scientist levitated …. 
- That’s the superhero that the woman made levitate …. 
- That’s the coin that the scientist made levitate …. 

Causation Type

- Lexical
- Periphrastic

Mean Rating

- Causee
- Animate
- Inanimate
Experiment 2

Unextracted causees:

- The woman levitated the superhero ....
- The scientist levitated the coin ....
- The woman made the superhero levitate ....
- The scientist made the coin levitate ....

![Bar chart showing mean ratings for lexical and periphrastic causation types, with causee types differentiated by color: purple for animate and green for inanimate.](image)
Experiment 2

![Chart showing the mean ratings for Experiments 2 with bars for Extracted and Unextracted conditions. The chart compares Causation Type (Lexical, Periphrastic) for Causee type (Animate, Inanimate).]
Experiment 2

- Linear mixed-effects model treating experiment participant and verb as random effects.
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<tbody>
<tr>
<td>Causee type (inanimate)</td>
<td>1.459</td>
<td>0.231</td>
<td>6.324</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Causative type (periphrastic)</td>
<td>1.657</td>
<td>0.169</td>
<td>9.802</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Causee type - Causative type</td>
<td>−1.095</td>
<td>0.131</td>
<td>−8.389</td>
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<tr>
<td>Causee position - Causee type - Causative type</td>
<td>−0.445</td>
<td>0.195</td>
<td>−2.282</td>
<td>0.023</td>
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Experiment 2

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Experiment 2

- No significant difference between lexical and periphrastic causatives with extracted, inanimate causees ($t = 0.431$, $p > 0.1$).
Experiment 2

- No significant difference between lexical and periphrastic causatives with extracted, inanimate causees ($t = 0.431$, $p > 0.1$).
**Conclusion:** Periphrastic causatives with extracted, inanimate causees are dramatically more acceptable in cases of indirect causation, despite linear adjacency of *make* and the verb.
Conclusions
Unacceptability of sentences like (7) is not due to linear adjacency of *make* and verb.

7. * That’s the ball that the coach made bounce on the floor.
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7. * That’s the ball that the coach made bounce on the floor.

English causatives do not provide evidence for post-syntactic resolution of derivational morphology.
Unacceptability of sentences like (7) is not due to linear adjacency of *make* and verb.

7. * That’s the ball that the coach made bounce on the floor.

English causatives do not provide evidence for post-syntactic resolution of derivational morphology.

So why does (7) seem less acceptable?

Causation events with inanimate causees typically involve direct causation.

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Compulsion meanings for animate causees are a form indirect causation.

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Compulsion meanings for animate causees are a form indirect causation.

Thus, lexical causatives are preferred with inanimate causees if there is no reason to think that the even involves indirect causation. In contrast, periphrastic causatives are preferred with animate causees.
Sentences involving long-distance dependencies are found to be less acceptable than those that don’t (Warner & Maratsos, King & Just 1991, Hawkins 1999, Warren & Gibson 2002, Hofmeister & Sag 2010, etc.).
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Extracting causees from already degraded sentences further degrades acceptability.
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This still leaves open the question of how to account for the three-way interaction observed in the data.
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Parts of this analysis of the data was initially suggested by Paul Kiparsky (p.c.).
Thank you!

Contact: pcrone@stanford.edu

My thanks to Vera Gribanova, Masoud Jasbi, Paul Kiparsky, Dan Lassiter, Beth Levin, and the rest of the Stanford Linguistics Department for their feedback and assistance.
Appendix
Theoretical Concerns

K&E’s definition of fusion departs from standard definitions, which require two input nodes to fusion to be sisters.
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- K&E’s definition of fusion departs from standard definitions, which require two input nodes to fusion to be sisters.
- Traces do not count as interveners, but phonologically null nodes do.
Theoretical Concerns

- K&E’s definition of fusion departs from standard definitions, which require two input nodes to fusion to be sisters.
- Traces do not count as interveners, but phonologically null nodes do.
- Cases such as wanna-contraction suggest that traces do count as interveners for some morphological processes (Layoff 1970).
  8. a. Who do you want t to visit Fred?
     b. * Who do you wanna visit Fred?

However, there are accounts of wanna-contraction consistent with K&E’s analysis (Bresnan 1978, Snyder and Rothstein 1992, Bošković 1997, Arregi and Nevins 2012).
Consider what occurs when a causee is left in situ. In $\sqrt{P}$ embedding structures, there is optional head movement of $\sqrt{\cdot}$ to $v_{caus}$. 
Consider what occurs when a causee is left in situ. In $\sqrt{P}$ embedding structures, there is optional head movement of $\sqrt{\_}$ to $v_{\text{caus}}$.

**With head movement**

$\sqrt{P}$

subject

$v$

$v_{\text{caus}}$

causee

t

$v_{\text{caus}} + \sqrt{\_} \Rightarrow \text{lexical causative}$
Consider what occurs when a causee is left in situ. In \( \sqrt{P} \) embedding structures, there is optional head movement of \( \sqrt{ } \) to \( v_{caus} \).

**With head movement**

\[
\begin{align*}
\sqrt{P} & \\
 & \downarrow v \\
 & \downarrow v_{caus} \\
& \downarrow \sqrt{ } \\
& \text{subject} \\
\end{align*}
\]

\[v_{caus} + \sqrt{ } \Rightarrow \text{lexical causative}\]

**Without head movement**

\[
\begin{align*}
\sqrt{P} & \\
 & \downarrow v_{caus} \\
 & \downarrow \sqrt{ } \\
& \downarrow \text{causee} \\
& \text{subject} \\
\end{align*}
\]

No fusion due to intervening causee \( \Rightarrow \text{periphrastic causative} \)
In vP embedding structures, head movement is not possible due to intervening v head.
In $vP$ embedding structures, head movement is not possible due to intervening $v$ head.

No head movement, no fusion $\Rightarrow$ periphrastic causative